

US EPA ARCHIVE DOCUMENT

ENVIRONMENTAL PROTECTION AGENCY**40 CFR Parts 260, 261, 264, 265, 266, 270, and 271****[EPA/OSW-FR-91-012; SWH-FRL-3865-6]****RIN 2050-AA72****Burning of Hazardous Waste in Boilers and Industrial Furnaces****AGENCY:** Environmental Protection Agency (EPA).**ACTION:** Final rule.

SUMMARY: Under this final rule, the Environmental Protection Agency (EPA) is expanding controls on hazardous waste combustion to regulate air emissions from the burning of hazardous waste in boilers and industrial furnaces. Currently, such burning is exempt from regulation. EPA is promulgating this final rule after considering public comment on rules proposed on May 6, 1987, plus the comments on EPA's supplemental notices of October 26, 1989 and April 27, 1990.

These rules control emissions of toxic organic compounds, toxic metals, hydrogen chloride, chlorine gas, and particulate matter from boilers and industrial furnaces burning hazardous waste. In addition the rules subject owners and operators of these devices to the general facility standards applicable to hazardous waste treatment, storage, and disposal facilities. Further, today's final rule subjects hazardous waste storage units at regulated burner facilities to part 264 permit standards. Burner storage operations at existing facilities are generally now subject only to interim status standards under part 265.

Finally, today's rule takes final action on two pending petitions for rulemaking: (1) based on a petition by Dow Chemical Company, EPA is designating halogen acid furnaces as industrial furnaces under § 260.10; and (2) based on a petition by the American Iron and Steel Institute, EPA is classifying coke and coal tar fuels produced by recycling coal tar decanter sludge, EPA Hazardous Waste No. KO87, as products rather than solid waste. The rule also makes several technical corrections to regulations dealing with loss of interim status for facilities that achieved interim status as of November 7, 1984.

EFFECTIVE DATE: This final rule is effective on August 21, 1991. Technical corrections to § 270.73 are effective on publication.

The incorporation by reference of certain publications listed in the regulations is approved by the Director

of the Federal Register as of August 21, 1991.

ADDRESSES: The official record for this rulemaking is identified as Docket Numbers F-87-BBFP-FFFFF and F-89-BBSP-FFFFF, and is located in the EPA RCRA Docket, room 2427, 401 M Street SW., Washington, DC 20460. The docket is available for inspection from 9 a.m. to 4 p.m., Monday through Friday, except on Federal holidays. The public must make an appointment to review docket materials by calling (202) 475-9327. The public may copy up to 100 pages from the docket at no charge. Additional copies cost \$.15 per page.

FOR FURTHER INFORMATION CONTACT: For general information contact the RCRA Hotline at: (800) 424-9346 (toll-free) or (703) 920-9810 locally. For information on specific aspects of this final rule, contact Shiva Garg, Office of Solid Waste (OS-322W), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (703) 308-8460.

EPA is planning to conduct six two-day implementation workshops beginning in mid February in the following cities: San Francisco, CA; Dallas, TX; Kansas City, KS; Atlanta, GA; Chicago, IL; and Philadelphia, PA. The purpose of the sessions is to explain responsibilities of owner/operators burning hazardous waste under this rule. The first day will be open only to government representatives involved in implementation, compliance, and enforcement of these regulations. The second day is open to the public. Preregistration is required to assure a reservation. Same day registration will be allowed as space is available. Interested parties should call 919-549-0722 to obtain further information and get on the mailing list for notices.

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- I. Legal Authority**
- These regulations are promulgated under authority of sections 1006, 2002, 3001 through 3007, 3010, and 7004 of the Solid Waste Disposal Act of 1970, as amended by the Resource Conservation and Recovery Act of 1976, the Quiet Communities Act of 1978, the Solid Waste Disposal Act Amendments of 1980, and the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. 6905, 6912, 6921 through 6927, 6930, and 6974.
- II. Overview of the Final Rule**
- A. Controls for Emissions of Organic Compounds*
- Today's rule requires boilers and industrial furnaces to comply with the same destruction and removal efficiency (DRE) standard currently applicable to hazardous waste incinerators: 99.9999% DRE of dioxin-listed waste, and 99.99% DRE for all other hazardous wastes. In addition, the rule controls emissions of products of incomplete combustion (PICs) by limiting flue gas concentrations of carbon monoxide (CO), and where applicable, hydrocarbons (HC) to ensure that the device is operated under good combustion conditions. Finally, emissions testing and health-risk assessment is required for chlorinated dioxins and furans for facilities meeting specified criteria where the potential for significant concentrations may exist.
- B. Controls for Emissions of Toxic Metals*
- The rules establish emission limits for 10 toxic metals listed in appendix VIII of 40 CFR part 261 based on projected inhalation health risks to a hypothetical maximum exposed individual (MEI). The standards for the carcinogenic metals (arsenic, beryllium, cadmium, and chromium) limit the increased lifetime cancer risk to the MEI to a maximum of 1 in 100,000. The risk from the four carcinogens must be summed to ensure that the combined risk is no greater than 1 in 100,000. The standards for the noncarcinogenic metals (antimony, barium, lead, mercury, silver, and thallium) are based on Reference Doses (RfDs) below which adverse health effects have not been observed.

The standards are implemented through a three-tiered approach. Compliance with any tier is acceptable. The tiers are structured to allow higher emission rates (and feed rates) as the owner or operator elects to conduct more site-specific testing and analyses (e.g., emissions testing, dispersion modeling). Thus, the feed rate limits under each of the tiers are derived based on different levels of site-specific information related to facility design and surrounding terrain. Under Tier I, the Agency has provided very conservative waste feed rate limits in "reference" tables as a function of effective stack height and terrain and land use in the vicinity of the stack and assumed reasonable, worst-case dispersion. The owner or operator demonstrates compliance by waste analysis, not emissions testing or dispersion modeling. Consequently, the Tier I feed rate limits are based on an assumed reasonable, worst-case dispersion scenario, and an assumption that all metals fed to the device are emitted (i.e., no partitioning to bottom ash or product, and no removal by an air pollution control system (APCS)).

Under Tier II, the owner or operator conducts emissions testing (but not dispersion modeling) to get credit for partitioning to bottom ash or product, and APCS removal efficiency. Thus, the Agency has developed conservative emission rate limits in reference tables, again as a function of effective stack height and terrain and land use in the vicinity of the stack. The Agency also assumed reasonable, worst-case dispersion under Tier II.

Under Tier III, the owner or operator would conduct emissions testing and site-specific dispersion modeling to demonstrate that the actual (measured) emissions do not exceed acceptable levels considering actual (predicted) dispersion.

The standards are implemented through limits on specified operating parameters, including hazardous waste feed rate and metals composition, feed rate of metals from all feed streams, combustion chamber temperature, and APCS-specific parameters.

C. Controls for Emissions of Hydrogen Chloride and Chlorine Gas

The rules control emissions of hydrogen chloride (HCl) and free chlorine (Cl₂) under the same general approach as that used for metals. The owner and operator must comply with and implement the HCl and Cl₂ controls in the same manner as for metals.

D. Emission Standards for Particulate Matter

The rules limit particulate matter (PM) emissions of 0.08 gr/dscf, corrected to 7 percent oxygen (O₂). This is the same standard that currently applies to hazardous waste incinerators and is intended to supplement the risk-based metals controls. (Metals emissions are generally controlled by limiting feed rates of metals and controlling PM.) Compliance with the standard is demonstrated by emissions testing, and the standard is implemented by operating limits in the permit on parameters including: ash content of feed streams, feed rate of specific feed streams, and air pollution control system operating parameters. All boilers and industrial furnaces must comply with the standard; however, cement and aggregate kilns need not monitor the ash feed rate of all feed streams to demonstrate compliance with the standard given that particulate matter from these devices is generated primarily from raw materials. Instead, the rule provides that these devices must comply with the operating limits on the particulate matter control system to ensure continued operation at levels achieved during the compliance test (under interim status) or trial burn (under the part B permit application).

E. Permitting Procedures

The final rule requires similar permitting procedures for regulated BIFs that apply to hazardous waste incinerators. For example, owners and operators are required to submit a part B permit application for evaluation in order to be eligible for an operating permit. Permit applications will be called on a schedule considering the relative hazard to human health and environment the facility poses compared to other storage, treatment, and disposal facilities within the Director's purview.

F. Control During Interim Status

Today's final rule requires boilers and industrial furnaces that have interim status to comply with substantive emissions controls for metals, HCl, Cl₂, particulates, and CO (and, where applicable, HC and dioxins and furans). Owners and operators must certify compliance with the emissions controls under a prescribed schedule, establish limits on prescribed operating parameters, and operate within those limits throughout interim status.

G. Units Exempt from Air Emissions Standards

The rule conditionally exempts from regulation the following devices: (1)

Boilers and industrial furnaces that burn small quantities of hazardous waste fuel (i.e., the small quantity burner exemption), and that operate the device under prescribed conditions; (2) smelting, melting, and refining furnaces that process hazardous waste solely for the purpose of metal reclamation and not partially for destruction or energy recovery; and (3) coke ovens if the only hazardous waste they process is K087.

The small quantity burner exemption—as provided in section 3004(q)(2)(B)—is a risk-based exemption specifically alluded to in the statute. The exemption is provided only to hazardous waste fuels generated on-site, and is conditioned on a number of requirements, including a one-time notification and recordkeeping.

The Agency is also providing a temporary exemption for metal reclamation furnaces from today's burner standards until we determine how best to apply rules designed for combustion process to noncombustion metal reclamation operations. (It should be noted that section 3004(q) requires EPA to issue rules controlling air emissions from devices burning hazardous waste for energy recovery by a specified date. Section 3004(q) does not apply to devices burning hazardous waste for the sole purpose of material recovery. Although EPA has authority to issue such regulations, the section 3004(q) deadline does not apply). To distinguish between waste that are processed solely for metal reclamation rather than (partial) destruction, the final rule considers a hazardous waste processed by a smelting, melting, or refining furnace with a total concentration of appendix VIII, part 261 toxic organic constituents exceeding 500 ppm to be burned at least partially for treatment or destruction. To distinguish between processing for material recovery and burning for energy recovery, the final rule considers a hazardous waste processed by a metal reclamation furnace with a heating value exceeding 5,000 Btu/lb to be burned at least partially for energy recovery. Metals reclamation furnaces claiming the exemption must notify the Agency, sample and analyze their hazardous wastes to document compliance with the conditions of the exemption, and keep records of such documentation.

Coke ovens are exempt from today's rule if the only hazardous waste they process is K087 as an ingredient to produce coke. Given that K087 is for practical purposes just like other materials used to produce coke and comes from the same process as these

other materials, it would be anomalous to assert RCRA control over the coking process.

H. Pollution Prevention Impacts

This rule provides an incentive to reduce the generation of metal and chlorine-bearing hazardous waste at the source given that the metals and HCl emissions controls will be implemented by additional requirements attendant to the disposal of those wastes, i.e., feed rate limits for individual metals and total chlorine. These requirements are, in essence, tied to the economics of disposing of given volumes of waste since feed rates depend, in part, on the volume of waste the facility operator needs to burn. Thus, the metals and HCl controls do not simply require a percent reduction in emissions, irrespective of the volume and rate of incoming waste streams. Rather, the controls are health-based and, thus, provide limits on emissions rates of metals and HCl that would be implemented by feed rate limits.

Waste generators who send their waste to industrial furnaces such as cement kilns and light-weight aggregate kilns that act as commercial waste management facilities will have the incentive to reduce the generation of metal and chlorine-bearing wastes because waste management fees are likely to increase for such waste given that the burner has a fixed metal and chlorine feed rate allotment (due to prescribed feed rates and facility operating conditions). Wastes with extremely high metals content may no longer be acceptable for burning in many cases unless the waste generator reduces the metals content of the waste. Any alternative for the disposal of such wastes may be unavailable or the costs of such treatment may be high enough to create the incentive to reduce waste generation rates at the source. This is a typical scenario for pollution prevention measures to be undertaken by waste generators.

Similarly, generators who burn their wastes on site also have the incentive to reduce the generation of metal and chlorine-bearing wastes given that the rule will provide a fixed feed rate allotment for their boiler or industrial furnace.

III. Relationship to Other Rules

A. Regulations to be Promulgated Under the New Clean Air Act

Title III of the recent Clean Air Act Amendments of 1990, amending section 112 of the Act dealing with hazardous air pollutants, potentially addresses many of the same sources that would be

regulated under today's rule. That section requires the Agency to develop a list of major and area sources of hazardous air pollutants (a major source is a stationary source that has the potential to emit up to 10 tons per year of a hazardous air pollutant, or 25 tons per year of a combination of such pollutants, and area sources are other stationary sources emitting hazardous air pollutants), and to develop technology-based controls for such sources over specified time periods. See Clean Air Act, amended sections 112(c), and (d). Additional controls shall be imposed within eight years after promulgation of each of these technology-based standards, if such controls are needed to protect public health with an ample margin of safety, or to prevent adverse environmental effect. (Cost, energy, and other relevant factors must be considered in determining whether regulation is appropriate in the case of environmental effects.) In addition, if the technology-based standards for carcinogens do not reduce the lifetime excess cancer risk for the most exposed individual to less than one a million (10⁻⁶), then EPA must promulgate health-based standards. See amended section 112(f)(2)(A).

It is premature for the Agency to attempt to provide a definitive opinion on the relationship of these provisions to today's rule. Sources covered by the present rule may not ultimately be required to be further regulated under amended section 112. In this regard, amended section 112(n)(7) provides that if sources' air emissions are regulated under subtitle C, "the Administrator shall take into account any regulations of such emissions * * * and shall, to the maximum extent practicable and consistent with the provisions of this section, ensure that the requirements of such subtitle and this section are consistent." Thus, at a minimum, Congress was concerned about the potential for duplicative regulation and urged the Agency to guard against it. Since the Agency regards today's rules as protective (based on present knowledge), it may be possible to avoid further air emissions regulation. (EPA notes, however, that these sources will likely be listed as major sources, and the Agency will study whether further emissions controls are required in the course of implementing amended section 112.)

B. April 27, 1990 Proposed Incinerator Amendments

On April 27, 1990 (55 FR 17862), EPA proposed amendments to the existing hazardous waste incinerator standards of subpart O, part 264 to make the

incinerator standards conform to the emissions standards being promulgated today for boilers and industrial furnaces burning hazardous waste. The proposed rule would add emission standards for products of incomplete combustion (i.e., carbon monoxide and hydrocarbon limits), metals, and hydrogen chloride and chlorine gas.

In the proposed rule for incinerators, EPA also proposed to revise or to add definitions for a number of thermal treatment devices: Industrial furnace, incinerator, plasma arc and infrared incinerators. Those definitions are being promulgated in today's rule. In addition, EPA proposed in the incinerator rulemaking to clarify the regulatory status of carbon regeneration units. Those clarifications are also promulgated in today's final rule.

Finally, EPA proposed to revise the definition of principal organic hazardous constituents (POHCs) used to demonstrate destruction and removal efficiency (DRE). The revised definition would allow the Director on a case-by-case basis to approve as POHCs compounds that are neither constituents in the hazardous waste nor organic. That revised definition of POHC is finalized in today's rule as a part of the DRE standard to control organic emissions from boilers and industrial furnaces.

C. July 18, 1990 Proposed Amendment to Definition of Wastewater Treatment Unit to Exempt Sludge Dryers

On July 18, 1990 (see 55 FR 29280), EPA proposed to clarify the regulatory status of sludge dryers to make it clear that sludge dryers that meet the definition of a tank and that were a part of a wastewater treatment unit were exempt from RCRA regulation even if they heretofore met the definition of an incinerator. Today's final rule promulgates a definition of sludge dryer and revises the definition of incinerator to explicitly exclude sludge dryers. See Part Four, section II of today's preamble.

D. Land Disposal Restriction Standards

In the May 6, 1987 proposal, the Agency indicated that once the present rules became final, the Agency would amend certain of the land disposal restriction standards that specified incineration as a treatment standard (at that time, the standard for HOCs under the California list rule), to also include burning in boilers and industrial furnaces. See 52 FR at 17021. Since that time, the issue has become more involved. In particular, significant issues regarding the relationship of the Bevill amendment and land disposal

restrictions exist (which the Agency in fact referenced in the rulemaking record to the California list rule when considering this issue). The Agency believes it inappropriate to try and resolve these issues in this proceeding, given the time constraints created by the District Court's order and the fact that this rulemaking does not deal principally with issues relating to the land disposal restrictions program. The Agency consequently plans to address these questions in a later proceeding and not to finalize the May 1987 proposal at this time.

Part Two: Devices Subject to Regulation

I. Boilers

EPA defines a boiler in § 260.10 as an enclosed device using controlled flame combustion and having the following characteristics: (1) The combustion chamber and primary energy recovery section must be of integral design; (2) thermal recovery efficiency must be at least 60 percent; and (3) at least 75 percent of the recovered energy must be "exported" (i.e., not used for internal uses such as preheating of combustion air or fuel, or driving combustion air fans or feed water pumps).

Today's final rule applies to all boilers burning hazardous waste for any purpose—energy recovery or destruction. (We note, however, that an existing boiler may not burn hazardous waste for destruction (i.e., waste that is not a fuel) before certifying compliance with the interim status emissions standards.)

Nonindustrial boilers are currently prohibited from burning hazardous waste unless they are operated in conformance with the incinerator standards of subpart O of part 264 or 265. On the effective date of today's rule, however, nonindustrial boilers burning hazardous waste will be subject to these boiler and industrial furnace rules. We note that nonindustrial boilers generally cannot burn hazardous waste until they receive an operating permit under today's rule (unless they are already operating under the incinerator standards). This is because the prohibition is not rescinded until the effective date of the rule, and a facility would have to be "in existence" with respect to hazardous waste burning on that date to be eligible for interim status.

EPA believes that approximately 925 boilers burn hazardous waste fuels. Approximately 600 of these boilers burn very small quantities of hazardous waste and will be conditionally exempt under the small quantity burner provision of today's rule. See § 266.108. (We note that these boilers burn less

than one percent of the total hazardous waste currently being burned in boilers and industrial furnaces.) EPA also believes that approximately 200 boilers will stop burning hazardous waste because they burn quantities exceeding the small quantity burner exemption but do not burn enough waste to justify the cost of complying with today's rule. Thus, approximately 125 boilers will continue to burn hazardous waste and will be subject to the interim status and permit standards provided by §§ 266.102 and 266.103 of today's rule.

II. Industrial Furnaces

Under today's revised definition, EPA defines an industrial furnace in § 260.10 as those designated devices that are an integral component of a manufacturing process and that use thermal treatment to recover materials or energy. With the addition of halogen acid furnaces by today's rule, the Agency has designated 12 devices as industrial furnaces: Cement kilns; lime kilns; aggregate kilns (including light-weight aggregate kilns and aggregate drying kilns used in the asphaltic concrete industry); phosphate kilns; coke ovens; blast furnaces; smelting, melting, and refining furnaces; titanium dioxide chloride process oxidation reactors; methane reforming furnaces; pulping liquor recovery furnaces; and combustion devices used in the recovery of sulfur values from spent sulfuric acid. The definition also includes criteria and procedures for designating additional devices as industrial furnaces.

Any industrial furnace burning or processing any hazardous waste for any purpose—energy recovery, material recovery, or destruction—is subject to today's rule, with certain exceptions. Furnaces (like boilers) burning small quantities of hazardous waste fuel are exempt from regulation under § 266.108, coke ovens are exempt from regulation if the only hazardous waste they burn is Hazardous Waste No. K087, and regulation of smelters processing hazardous waste solely for material recovery is deferred (see discussion in section II.D).

The Agency believes that approximately 75 industrial furnaces burn over one million tons of hazardous waste annually. The regulated universe appears to comprise approximately 40 cement kilns, 16 light-weight aggregate kilns, and 15 halogen acid furnaces. Each of these types of furnaces is described below.

A. Cement Kilns

Cement kilns are horizontal inclined rotating cylinders, refractory lined and internally fired, to calcine a blend of

80% limestone and 20% shale to produce Portland cement. There is a wet process and a dry process for producing cement. In the wet process, the limestone and shale are ground wet and fed into the kiln in a slurry. In the dry process, raw materials are ground dry. Wet process kilns are longer than dry process kilns in order to facilitate water evaporation from the wet raw material. Wet kilns can be more than 450 feet in length. Dry kilns are more thermally efficient and frequently use preheaters or precalciners to begin the calcining process before the raw material is fed into the kiln.

Combustion gases and raw materials move counterflow in kilns. The kiln is inclined, and raw materials are fed into the upper end while fuels are normally fed into the lower end. Combustion gases thus move up the kiln counter to the flow of raw materials. The raw materials get progressively hotter as they travel the length of the kiln. The raw materials eventually begin to soften and fuse at temperatures between 2,250 and 2,700 °F to form the clinker product. Clinker is then cooled, ground, and mixed with other materials such as gypsum to form Portland cement.

Combustion gases leaving the kiln typically contain from 6 to 30% of the feed solids as dust. Particulate emissions are typically controlled with electrostatic precipitators or fabric filters (baghouses), and are often recycled to the kiln feed system.

Dry kilns with a preheater or precalciner often use a by-pass duct to remove from 5 to 30% of the kiln off-gases from the main duct. The by-pass gas is passed through a separate air pollution control system to remove particulate matter. By-pass dust is not reintroduced into the kiln system to avoid a build-up of metal salts that can affect product quality.

Some cement kilns burn hazardous waste fuels to replace from 25 to 75% of normal fossil fuels. Most kilns burn liquid waste fuels but several burn small (e.g., six gallon) containers of viscous or solid hazardous waste fuels. Containers have been fired into the upper, raw material end of the kiln and at the midpoint of the kiln.

Several cement companies have also expressed an interest in using solid hazardous waste such as contaminated soils as an ingredient to produce cement. Cement kilns that burn hazardous waste as an ingredient are regulated by today's rule.¹ Under

¹ See discussion in section VII.H of Part Three of the text.

today's rule, a facility may burn (or process) hazardous waste solely as a bona fide ingredient during interim status beginning with the effective date of the rule. If a waste is burned partially for destruction or energy recovery, however, it is not burned solely as an ingredient and special restrictions apply during interim status (see discussion below). EPA considers a waste to be burned at least partially for destruction if it contains a total of 500 ppm or more by weight of nonmetal hazardous constituents listed in appendix VIII, part 261. Further, EPA considers a waste to be burned at least partially for energy recovery if it has a heating value of 5,000 Btu/lb or more.

Today's rule does not allow burning of a waste for the purpose of destruction during interim status prior to certification of compliance (see § 266.103(c)) with all applicable emission standards. Further, the rule applies special requirements during interim status on owners/operators who feed hazardous waste into a kiln system at any location other than the "hot" end where product is discharged. Hazardous waste burned (processed) solely as an ingredient, however, is not subject to the special requirements because emissions from such burning would not pose an adverse effect on human health and the environment.²

B. Light-Weight Aggregate Kilns

Light-weight aggregate (LWA) describes a special use aggregate with a specific gravity much less than sand and gravel which is used to produce insulation and nonstructural and light-weight concrete. LWA is produced much like cement, but the feedstocks are special clays, pumice, scoria, shale, or slate.

The LWA kiln is configured much like a cement kiln. The raw material is crushed and introduced at the upper end of a rotary kiln. In passing through the kiln, the materials reach temperatures of 1,900 to 2,100°F. Heat is provided by a burner at the lower end of the kiln where clinker is discharged.

LWA kilns are also major sources of particulate emissions and are equipped with wet scrubbers, fabric filters, or electrostatic precipitators. Wet scrubbers dominated the industry until recently. Many facilities are now converting to dry systems to reduce the cost of residue

² This is because nonmetal toxic constituents will not be present in the waste at significant levels (i.e., less than 500 ppm) and metal emissions will be adequately controlled under today's rule by the air pollution control system irrespective of where the waste is fed into the kiln system.

management by recycling the collected dust into the kiln.

LWA kilns that burn hazardous waste fuel typically burn 100% liquid hazardous waste fuels.

C. Halogen Acid Furnaces

The Dow Chemical Company (DOW) filed a rulemaking petition with EPA on March 31, 1986, in accordance with the provisions of 40 CFR 260.20, requesting that EPA designate their halogen acid furnaces (HAFs) as industrial furnaces. HAFs are typically modified firetube boilers that process secondary waste streams containing 20 to 70 percent chlorine or bromine to produce a halogen acid product by scrubbing acid from the combustion gases. Currently HAFs that produce steam meet the definition of a boiler while HAFs that do not generate steam meet the definition of an incinerator even though they use hazardous waste as a fuel and as an ingredient to produce halogen acid product. Today's rule designates HAFs that do not generate steam as an industrial furnace for the reasons given below.

DOW petitioned the Agency to designate their HAFs as industrial furnaces after the Agency changed the definition of incinerator in 1985 from a "purpose of burning test" to a "design test" and developed new classifications for boilers and industrial furnaces. The Agency inadvertently did not designate HAFs as industrial furnaces at the time which potentially left certain HAFs operating not in compliance with the incinerator standards promulgated in 1981. Although HAFs (prior to today's rule) technically meet the definition of incinerator, the Agency has indicated its intention since receiving the DOW petition to correct the problem and to properly designate HAFs as industrial furnaces.

On May 6, 1987 (52 FR 17033), EPA proposed to grant this petition and to add halogen acid furnaces (HAFs) to the list of devices that are designated as industrial furnaces under 40 CFR 260.10. On April 27, 1990 (55 FR 17917), the Agency proposed changes to the proposed designation of HAFs as industrial furnaces. With modifications based on additional information and comments, today's rule adds HAFs to the list of devices that are included in the definition of an industrial furnace under 260.10.

In today's rule, EPA is defining an "industrial furnace" in 260.10 as an enclosed device that uses thermal treatment to recover (or produce) materials or energy as an integral

component of a manufacturing process.³ EPA has previously designated 11 devices as industrial furnaces: (1) Cement kilns; (2) lime kilns; (3) aggregate kilns (including light-weight aggregate kilns and aggregate drying kilns used in the asphaltic concrete industry); (4) phosphate kilns; (5) coke ovens; (6) blast furnaces; (7) smelting, melting, and refining furnaces; (8) titanium dioxide chloride process oxidation reactors; (9) methane reforming furnaces; (10) pulping liquor recovery furnaces; and (11) combustion devices used to recover sulfur values from spent sulfuric acid.

The industrial furnace definition in 260.10 also provides criteria and procedures for adding devices to the list. A device may be defined as an industrial furnace if it meets one or more of the following criteria: (1) The device is designed and used primarily to recover material products; (2) the device is used to burn or reduce raw materials to make material products; (3) the device is used to burn or reduce secondary materials as effective substitutes for raw materials in processes that use raw materials as principal feedstocks; or (4) the device is used to burn or reduce secondary materials as ingredients in industrial processes to manufacture material products.

As explained below, the basis for designating HAFs as industrial furnaces under § 260.10 is that HAFs are integral components of a manufacturing process, they recover materials and energy, and they meet two of the criteria (1 and 4) described above for classifying a device as an industrial furnace.

1. Current Practices

Information available to EPA indicates that at least 3 companies in the United States operate at least 30 devices that may be halogen acid furnaces. These devices typically process chlorinated or brominated secondary materials with 20 to 70 percent halogen content (by weight) to produce an acid product, either hydrogen chloride (HCl) or hydrogen bromide (HBr), both of which have a halogen content that ranges from 3 to

³ This definition of industrial furnace is the revised definition as noticed on April 27, 1990 (55 FR 17869). The previous definition read "an enclosed device using controlled flame combustion to recover materials or energy as an integral component of a manufacturing process." Public comments on the proposal are discussed in the Comment Response Document for the BIF Regulations. EPA revised the definition to include nonflame devices (i.e., by referring to thermal treatment) because controlled-flame devices and nonflame devices can have the same emissions and pose the same hazard to human health and the environment.

greater than 25 percent (by weight). These secondary materials typically have as-fired heating values of approximately 9,000 Btu/lb and are typically produced on site.

Some of the HAFs currently in use are modified firetube boilers that generate and export steam. These HAFs meet the definition of a boiler under § 260.10, and, thus, will be regulated as boilers. The remaining HAFs, although modified firetube boilers, do not generate steam and thus do not meet EPA's definition of a boiler. Today's rule classifies these nonboiler HAFs as industrial furnaces. For the remainder of this discussion, the term "HAF" refers to these nonboiler HAFs.

2. Designation of HAFs as Industrial Furnaces

a. Dow's Petition. On March 31, 1986, the Dow Chemical Company (DOW) filed a rulemaking petition with EPA in accordance with the provisions of 40 CFR 260.20, requesting that HAFs at Dow Chemical be designated as industrial furnaces. EPA proposed to grant this petition in the May 6, 1987 proposal. Today's rule includes HAFs in the definition of an industrial furnace under § 260.10. Further background discussion on DOW's petition is contained in the May 6, 1987 proposed rule.

b. May 1987 and April 1990 Proposed Rules. EPA proposed to designate HAFs as industrial furnaces for the reasons discussed in the May 6, 1987 proposed rule. To ensure that a particular device was an industrial furnace involved in *bona fide* production of acid* as an integral component of a manufacturing process, and was not an incinerator equipped with halogen emissions removal devices, the 1987 proposed HAF definition required that: (1) The furnace be located on site at a chemical production facility; (2) the waste fed to the device be halogenated; and (3) the acid product from the device contain at least 6 percent halogen acid.

Based on comments received on the 1987 proposal and on further consideration by the Agency, EPA proposed revisions to the HAF definition in the April 1990 notice. These revisions were proposed for two reasons: (1) To

* The Agency's concern is that devices capturing some HCl in scrubber effluent not automatically be classified as HAFs if they find a way to utilize the scrubber effluent. The HCl content of the effluent from wet scrubbers used to control HCl emissions from the incineration of chlorine-bearing waste is normally on the order of 1 percent or less. EPA does not consider such low HCl content scrubber water a *bona fide* product for purposes of designation as an industrial furnace even if the scrubber water is beneficially used in a manner that specifically relates to its HCl content.

better clarify the differences between HAFs and incinerators equipped with wet scrubbers to control halogen acid emissions, and (2) to better reflect industry practice.

To ensure that a particular device is an integral component of a chemical manufacturing process, the April 1990 proposal included requirements that at least 50 percent of the acid product be used on site and that any off-site waste fed to the HAF be generated by a SIC 281 (inorganic chemicals) or SIC 286 (organic chemicals) process. To ensure that the waste is burned as a *bona fide* ingredient to produce the halogen acid product, the April 1990 proposal also required that each waste fed to the HAF have an "as-generated" halogen content of at least 20 percent. In addition, to better reflect industry practice, the 1990 proposal required that the acid product have a halogen acid content of 3 percent rather than 6 percent, an amount that still clearly distinguished the HAF acid product from incinerator scrubber water, which has an acid content of well below 1 percent. Finally, EPA proposed in April 1990 to list hazardous waste fed to a HAF as inherently waste-like to ensure that halogenated waste fed to a HAF (and the HAF itself) would be subject to regulation. This would preclude a claim that the secondary materials were used as ingredients to make a product, and, thus, not a solid waste under § 261.2(e)(1)(i).

c. Summary of Public Comments. Commenters on the 1987 and 1990 proposed rules objected to the requirements that 50 percent of the acid product be used on site and that any off-site waste feed be limited to SIC 281 or 286 processes. The commenters argued that minimum specifications on the halogen content of the feed and/or the acid content of the HAF product are sufficient to distinguish *bona fide* HAF operations from incinerator operations, and that the requirement that a substantial portion of the product be used on site serves only to limit the legitimate treatment of halogenated wastes and the sale of *bona fide* HAF products without being necessary to protect human health and the environment.

After consideration of these commenters' concerns, the Agency believes that both the proposed off-site restriction for waste fed to HAFs and the proposed on-site acid product use restriction are indeed unnecessary to ensure that HAFs are integral components of manufacturing processes. The Agency agrees with the commenters that the requirements specifying the minimum halogen content of the waste

feed and the minimum halogen acid concentration of the HAF product are sufficient to ensure that HAFs are integral components of a manufacturing process (i.e., the process of halogen acid production). EPA is not adopting these proposed conditions given that air emissions from HAFs will be regulated under today's rule, that these proposed conditions were directed at how to classify these devices rather than how to ensure their safe operation, and that HAF operations (as properly controlled) are environmentally advantageous in that they utilize acid values rather than dispose them and therefore should not needlessly be discouraged. Today's rule, therefore, does not restrict the use of HAF waste feeds generated off site or require that any percentage of the acid product be used on site.

In today's rule, the Agency considers a *bona fide* HAF operation as one in which a secondary material with a minimum as-generated halogen content of 20 percent by weight is processed into an acid product with a minimum halogen content of 3 percent by weight. The acid product must be used in a manufacturing process either on site or off site. The Agency maintains that this approach will allow the legitimate processing of highly halogenated secondary materials into usable products but will still clearly distinguish HAF product acid from incinerator halogen acid scrubber water.

Upon review of other comments submitted on the 1987 and 1990 proposed rules, the Agency has identified several issues pertaining to HAFs that require clarification in the regulations. Specifically, these issues concern: (1) The regulation of chlorine emissions from HAFs, (2) the operation of HAFs under the special operating requirements (SOR) exemption for boilers, and (3) the designation of hazardous waste fed to HAFs as inherently waste-like material.

One commenter to the 1987 proposed rule requested that the Agency clarify its position on limiting inorganic halide salts in feedstocks to boilers and industrial furnaces. The Agency has established limits on emissions of HCl and Cl₂ from industrial furnaces, and a HAF operator, like any other industrial furnace operator, must comply with these HCl and Cl₂ emission standards. To demonstrate compliance under the Tier I feed rate screening limits, a HAF operator must include inorganic chlorine as part of the total chlorine fed to the device. The Agency believes that this requirement is justified because recent testing indicates that even thermally stable compounds such as NaCl are

converted with high efficiency to HCl under laboratory conditions that simulate incineration.⁵

Another commenter to the 1987 proposal stated that HAFs are unjustly excluded from the automatic waiver of a trial burn to demonstrate 99.99% destruction and removal efficiency (DRE) when operated under the special operating requirements (SORs). The Agency acknowledges the commenter's concern, but notes that all industrial furnaces, including HAFs, are ineligible for the automatic DRE trial burn waiver. The Agency stated in the preamble to the 1987 proposal that modified boilers that produce and export steam (and thus meet EPA's definition of boiler in § 260.10) would be regulated as boilers. In such a case, the unit may be eligible for the automatic waiver of the DRE trial burn, which applies only to boilers. Any halogen acid furnace that is a modified fire-tube boiler not meeting the definition of a boiler in § 260.10, however, would not be eligible for the automatic waiver. The Agency's reasons for applying the automatic DRE trial burn waiver only to boilers are discussed further in Section II.C.2.d of this preamble.

Several commenters expressed concern that the April 27, 1990 proposal required a minimum heating value of 5,000 Btu/lb for secondary materials fed to HAFs. Today's final rule does not require a minimum heating value on secondary materials fed to HAFs. Although the Agency understands that most wastes burned in HAFs have a heating value greater than 5,000 Btu/lb and, so, that HAFs are engaged in energy recovery as well as materials recovery, not all wastes meeting the minimum halogen limit also have a heating value normally associated with energy recovery. The Agency believes that HAFs need not be required to recover both material and energy values from every hazardous waste fed to the device to meet the definition of an industrial furnace, and that the regulations adopted today for HAFs ensure that they will be operated in a protective manner even if energy values are not recovered.

Commenter's misconceptions regarding a minimum heating value for secondary materials may have arisen from the Agency's proposal pursuant to § 261.2(d)(2) to list hazardous waste fed to HAFs as inherently waste-like material. In today's rule, the Agency is listing as inherently waste-like any secondary material fed to HAFs that is

identified or listed as a hazardous waste under 40 CFR part 261, subparts C and D. Without such materials being designated as inherently waste-like, HAFs burning hazardous wastes solely as ingredients (i.e., wastes that have low heating value and therefore, are not burned partially for energy recovery) to produce an acid product might not be regulated because the material they are burning might not be a solid waste pursuant to § 261.2(e)(1)(i). However, HAFs that burn hazardous wastes with high heating values (i.e., greater than 5,000 Btu/lb), would be subject to today's rule even without listing them as inherently waste-like because these wastes are considered under § 261.2(e)(2)(ii) to be burned at least partially for energy recovery. For reasons discussed in the April 27, 1990 proposed rule (55 FR 17892), the Agency believes that such an inconsistent result would not provide adequate protection of human health and the environment (the wastes burned by HAFs are some of the most toxic generated and regulation of emissions from burning these wastes certainly is needed to protect human health and the environment). Moreover, there are significant elements of treatment associated with burning in HAFs: toxic organic compounds are destroyed rather than recovered, and the burning if conducted improperly could become part of the waste disposal problem. Because the materials burned in HAFs meet the criteria of § 261.2(d) for inherently waste-likely materials, EPA today is adding to the list of inherently waste-like materials under § 261.2(d)(2) secondary materials fed to HAFs that are listed or identified as hazardous waste under subparts C or D of part 261. While HAFs will not be precluded from burning secondary materials with low heating values, today's listing will prevent the HAFs that burn this material and the material itself from being unregulated. As a result, in all cases, hazardous waste fed to HAFs, and the HAFs themselves, will be subject to hazardous waste regulations under today's final rule.

d. Basis for Designating HAFs as Industrial Furnaces. EPA has defined an industrial furnace in § 260.10 as any of the specifically-designated enclosed devices that are integral components of a manufacturing process and that use thermal treatment to accomplish recovery of materials or energy. To date, 11 types of devices have been designated as industrial furnaces. The industrial furnace definition also provides criteria for adding devices to the list. As discussed above, these

criteria include: (1) The design and use of the device primarily to accomplish recovery of material products; (2) the use of the device to burn or reduce raw materials to make a material product; (3) 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; and (4) the use of the device to burn or reduce secondary materials as ingredients in an industrial process to make a material product. As explained below, HAFs, meet the definition of an industrial furnace as well as two of the above criteria, (1) and (4), for designating additional devices as industrial furnaces.

HAFs are Integral Components of a Manufacturing Process. HAFs are commonly located on-site at large scale chemical manufacturing processes that reclaim primarily secondary materials generated on-site and that typically use the halogen acid product on-site. In these cases, the Agency believes the device should clearly be considered an integral component of the manufacturing process and, thus, eligible for designation as an industrial furnace. The situation is less clear when the device receives halogen-bearing secondary materials from off-site or if the halogen acid product is sent off-site. In these situations, the Agency believes, nonetheless, that the device should be considered an integral component of a manufacturing process and, thus, eligible for consideration as an industrial furnace provided that the device is located on the site of a manufacturing process and that the halogen acid product is used by a manufacturing process.

HAFs Recover Materials and Energy. EPA believes that HAFs recover materials and energy to produce a *bona fide* product. Production of halogen acid (a 3 to 20 percent halogen acid solution) from the combustion of chlorine-bearing secondary materials constitutes materials recovery in the context of the designation of HAFs as industrial furnaces. HAFs can also be considered to burn secondary material as ingredients in an industrial process to make a material product (i.e., the product halogen acid). As discussed above, chlorine-bearing secondary materials are burned to produce the halogen acid product for use in a manufacturing operation.

HAFs also recover energy. Most halogen-bearing secondary materials reclaimed in HAFs are burned partially for energy recovery because substantial, usable heat energy is released by the materials during combustion. The

⁵ U.S. EPA, Laboratory Method to Estimate Hydrogen Chloride Emission Potential Before Incineration of a Waste, February 1990.

materials typically have an as-fired heating value of approximately 9,000 Btu/lb, and the heat released results in the thermal degradation of chlorinated organic compounds to form HCl. Although under definitions in 260.10, energy recovery in a boiler is characterized by the recovery and export of energy, energy recovery in an industrial furnace need not involve any export of energy. Rather, energy recovery in an industrial furnace is based on the burning of materials with substantial heating values (greater than 5,000 Btu/lb) in a manner that results in the release of substantial usable heat energy. See 50 FR 49171-49174 (November 29, 1985).⁶

HAFs Meet Industrial Furnace Criteria. The Agency believes that HAFs meet two of the above criteria (i.e., criteria (1) and (4)) for designating devices as industrial furnaces. EPA believes that restrictions on the halogen content of waste streams fed to HAFs and on the halogen content of the acid product ensure that the HAF is: (a) Designed primarily to recover halogen acid (and so is not engaged in incineration); and (b) used to burn secondary materials as ingredients in the process of halogen acid production to produce a material product (i.e., the product halogen acid).

Addition of HAFs to List of Industrial Furnaces. EPA believes that HAFs are integral components of a manufacturing process and that they are designed and operated to recover materials and energy. For these reasons EPA is today adding to the list of devices designated as industrial furnaces under § 260.10 HAFs defined as furnaces that: (1) Are located at the site of a manufacturing process; and (2) process hazardous wastes with a minimum as-generated halogen content of 20 percent by weight to produce an acid product with a minimum halogen content of 3 percent by weight and where the acid product is used in a manufacturing process.

e. Interim Status for HAFs. HAFs that are in existence on the effective date of today's rule are eligible for interim status like other boilers and industrial furnaces burning for energy or material recovery. Although certain HAFs may technically have met the amended definition of incinerator, EPA believes that there was legitimate confusion as to such unit's operating status. These devices would not have been incinerators under the original 1980

definition of incinerator because their primary purpose was not destruction of waste. When EPA amended that definition in 1985 to adopt a definition based on the unit's design rather than its operating purpose, the Agency did not intend to regulate HAFs as incinerators and noted that the regulatory change was not intended to (or expected to) affect the number and identity of regulated incinerator units. See 50 FR 625 (Jan. 4, 1985). Moreover, given that many HAFs met the definition of boiler, it would have been anomalous and unintended for some HAFs to be subject to full regulation and others to be unregulated (until the present rules were adopted). Given these circumstances, the Agency is finding pursuant to § 270.10(e)(2) that there was substantial confusion as to which HAF owners and operators were required to submit a part A application and that this confusion is attributable to ambiguities in the subtitle C rules. Accordingly, such owners and operators may submit part A applications by the effective date of today's regulation.

We note that this policy on interim status eligibility date does not apply to other devices that are currently subject to regulation as an incinerator but claim to be an industrial furnace subject to the BIF rule and its interim status eligibility date. An example is an aggregate kiln that currently burns hazardous waste for the purpose of treatment (destruction) and, so, is subject to the incinerator standards of subpart O, parts 264 and 265. There is no ambiguity about the regulatory status of such a device given that the Agency clearly intended for such burning to be subject to the incinerator standards, and the Agency's rules have always so stated. Thus, the date for interim status eligibility for such facilities is the 1981 date for incinerator interim status.

D. Smelting, Melting, and Refining Furnaces Burning Hazardous Waste to Recover Metals

In the October 1989 supplement to the proposed rule, EPA solicited further comment on an appropriate regulatory regime for smelting furnaces burning hazardous waste for the exclusive purpose of material recovery. See 54 FR 43733. This issue was closely connected with the question of jurisdictional limitations on the Agency's authority to regulate industrial furnaces burning secondary materials for material recovery, discussed under the rubric of indigenous wastes. *Id.* at 43731-32. The Agency noted generally that where it did not perceive jurisdictional limitations on its authority, it regarded regulation of organic emissions from

smelting furnaces as unnecessary given the normal absence of organics in the material fed to the unit. We also indicated concern at the prospect of regulating emissions of metals that were not attributable to the processing of hazardous waste, and accordingly solicited comment as to a means of determining when burning of hazardous waste resulted in emissions in excess of those from processing other materials in the device. *Id.* at 43733. With respect to a test for determining when wastes are indigenous, the Agency repropose a fairly broad test that would have had the effect of excluding many wastes and devices from the Agency's jurisdiction, but would have distinguished between wastes being burned for the purpose of conventional treatment, and for the purpose of material recovery treatment.

These proposals proved extremely controversial. Perhaps more importantly, after the proposal was issued, the question of indigenous waste was the partial subject of the District of Columbia Circuit Court of Appeals' decision *API v. EPA*, 906 F. 2d 726 (D.C. Cir. 1990). In that decision, the court stated that the Agency had been overly restrictive in interpreting the jurisdictional limitations imposed by the statutory definition of solid waste based upon the court's earlier opinion in *American Mining Congress v. EPA*, 824 F. 2d 1177 (D.C. Cir. 1987). That earlier opinion, the court held, is limited to situations involving continuous recycling processes that are not part of the waste disposal problem, and certainly does not mandate the type of indigenous principle that the Agency discussed in the 1989 notice. 906 F. 2d at 740-41. The court accordingly remanded and directed the Agency to rethink whether any type of indigenous principle is warranted given the court's clarification of its earlier opinion.⁷ *Id.* at 741.

The court's opinion, as well as the many comments on this issue, raise complex issues that EPA has not yet resolved. (In this regard, the Agency notes that the mandate in section 3004(q) to regulate facilities burning hazardous waste for energy recovery as may be necessary to protect human health and the environment does not

⁷ Technically, the court remanded the Agency's decision not to formally adopt a treatment standard under the land disposal restrictions program for the residue from processing a waste the Agency had indicated would be indigenous to a particular type of metal recovery furnace. *Id.* at 740. EPA has since indicated, in motions filed with the court, that it views the interim treatment standard based on stabilization as applying in all cases where the residue remains a hazardous waste.

⁶ We note as discussed previously in the text that, although all hazardous wastes fed to a HAF must have an as-generated halogen content of at least 20%, all such wastes need not have a heating value of 5,000 Btu/lb.

apply to devices burning for the purpose of material recovery, H. Rep. No. 198, 98th Cong., 1st Sess. 40, and so the court-ordered December 31, 1990 issuance date does not apply.) In particular, the Agency is presently studying the question of jurisdiction as part of a comprehensive effort to determine if the Agency's rules on recycling should be amended (either as a regulatory matter or as part of RCRA reauthorization). In the interim, however, the Agency does not believe it prudent to apply regulations to a whole potential class of devices and wastes that the Agency has not fully evaluated (since these situations would have been excluded from regulation under the proposal). See provision for conditional deferral of smelting, melting, and refining furnaces under § 266.100(c). In addition, because EPA has placed most of its efforts into issuing the mandated portion of these regulations as soon as possible, the Agency has not resolved the questions of how to regulate raised in the 1989 notice even for the class of smelting furnaces where authority would have existed under the proposed view of indigenous waste. The issue of whether material recovery is a form of "treatment" is also presently submitted for decision to a panel of the DC Circuit in *Shell Oil v. EPA* (No. 80-1532), and the Agency believes it prudent to await the court's ruling.

Another reason for deferring regulation of these devices is that the Agency wishes to study further whether regulation under the Clean Air Act may be more appropriate than RCRA regulation. Smelting, melting, and refining furnaces have been traditional subjects of Clean Air Act regulation, and with the advent of amended section 112 of the Clean Air Act Amendments of 1990, technology-based controls on toxic air emissions are likely to apply to these devices. Given that in many instances the principal risks potentially posed by air emissions from these devices would come from the nonhazardous waste portion of feed (see 54 FR at 43733), and that Clean Air Act regulation may result in control of individual toxics, the Agency believes that further study of the most appropriate means of regulation is warranted. (The Agency specifically requests information on other devices that may burn hazardous waste solely for metal recovery. EPA will use such information to consider whether the deferral for smelting, melting, and refining furnaces should be broadened provided that the principles stated here apply to the other devices as well.)

At the same time, EPA is concerned that this deferral not become a license

for sham recycling activities, or for operations motivated by conventional treatment objectives rather than recovery purposes. Accordingly, the Agency has crafted this deferral narrowly. First, only smelting, melting, and refining furnaces (as used in the § 260.10 definition of "industrial furnace") burning hazardous waste solely to recover metals would be eligible for this deferral. In the unlikely event that one of these devices would be used to recover organics or nonmetal inorganics, EPA believes that substantial amounts of organics would be destroyed showing that the purpose of the activity was either conventional treatment or energy recovery. (The Agency notes specifically that it intends to include as a smelting, melting, or recovery furnace the types of high temperature metal recovery devices used as the basis for the land disposal prohibition treatment standard for waste KO61, and other similar devices.)

Second, sham recovery operations would be viewed as conventional treatment operations and would require a permit to control emissions. Although it is difficult to quantify when operations are sham, two fundamental notions are that any waste involved must contain economically viable amounts of metals to recover (the best objective measure would be the same or greater levels of metal as in normal nonhazardous feed stocks), and that the person recovering the metal be in the business of producing metals for public sale (whether to an ultimate user or for further processing or manufacture). See also 53 FR at 522 (Jan. 8, 1988). The limitations on Btu level and levels on toxic organics discussed below are further efforts to ensure that only *bona fide* metal recovery activities be deferred from emissions regulation at this time.

Third, today's regulations are deferred only when these devices burn (process) hazardous waste exclusively for metal recovery and not partially for destruction or energy recovery as well. To implement this policy, today's rule provides that a waste with a heating value of 5,000 Btu/lb or more (either as-generated or as-fired) is burned (at least partially) as a fuel. The heating value limit is based on the Agency's long standing sham recycling policy (48 FR 11157 (March 16, 1983)) that wastes with a heating value of 5,000 Btu/lb or more are considered to be fuels. See also 50 FR at 49171-173 (Nov. 29, 1985) (partial burning for energy recovery is covered by section 3004(q) and Btu-rich wastes are burned at least partially for that purpose).

Finally, only wastes that contain less than 500 ppm total toxic organic constituents listed in appendix VIII, part 261, will be considered to recover metals. EPA believes that it is important to have an objective measure to determine when burning is for metal recovery, and that a 500 ppm level is within the zone of reasonable values that the Agency could select for this purpose. As noted in the supplemental proposal in a closely related context, a 500 ppm level for total toxic organic constituents reasonably distinguishes wastes destined for material recovery from wastes burned for nonrecovery purposes because: (1) It represents a concentration of material far exceeding trace levels (generally measured in single digit parts per million (ppm) or tens of ppm); (2) this level of hazardous constituents could create an incremental health risk if burned inefficiently, or with inadequate emission controls; and (3) this level is high enough to indicate that an objective of burning is waste treatment—destroying nontrace level organics—as opposed to material recovery. (The Agency's earlier proposal dealt with the question of when a waste might be considered to be indigenous to an industrial furnace burning for material recovery, and considered the issue of whether these devices were burning for a material recovery purpose, and proposed the 500 ppm level adopted in this rule as a means of objectively ascertaining that purpose. 54 FR 43731.)

In order to be informed of persons claiming this deferral, and in order to decrease potential abuse of the deferral, the Agency is requiring that all persons notify the Agency if they assert that their smelting, melting, or refining furnaces are deferred from regulation when burning hazardous wastes because the purpose of the activity is metal recovery. In addition, all such persons have to keep records documenting the basis for the claim (i.e., that the wastes meet the Btu and total toxic organic constituent thresholds, the wastes contain recoverable levels of metals, and the device is indeed engaged in producing a metal product for public use). Sampling and analysis procedures specified in SW-846 must be used to make these determinations. These conditions are consistent with existing § 261.2(f) which requires that all persons claiming to be exempt or excluded from regulation because of a recycling activity to have the burden of proof demonstrating that they are entitled to the exemption or exclusion. In addition, the Agency notes that a consistent recommendation of state and regional officials at the Agency's recent

public meetings on the regulatory definition of solid waste was to provide notification and recordkeeping so that regulatory officials know that a person is operating in an exempt status in order to verify their claim. The Agency is acting on these recommendations in this rule.

The Agency also notes that the derived from rule could apply to the residues from metal recovery if metals are being recovered from listed hazardous wastes. EPA believes this to be explicit from the remand in *API v. EPA* discussed earlier. The Court indicated that the Agency's explanation for not establishing a treatment standard for the slag residue from processing waste K061 was erroneous, and remanded the case to the Agency to reconsider its explanation. 906 F. 2d at 740-42. Implicit (or perhaps explicit) in this holding is the fact that the Court viewed the residue as a hazardous waste still coming under the terms of the K061 land disposal prohibition (the Court referred repeatedly to "k061 slag" and mentioned the derived from rule as the basis for the slag being a hazardous waste, *id.* at 742), at least until the Agency provides a different explanation as to why the slag might not be a hazardous waste. Thus, because EPA has not yet provided a new explanation regarding the indigenous principle (as explained above), at the present time, EPA views residues from metal recovery of listed hazardous wastes are considered to be derived from treatment of hazardous waste and thus hazardous themselves unless some other principle (such as the Beville amendment, or in some cases, status under an authorized state program) operates to achieve a different result.

Finally, the Agency notes that the deferral applies only to the furnace itself. The hazardous waste is subject to transportation and storage controls prior to introduction into the furnace. See § 266.100(c).

The deferral of regulation of emission standards does not apply to cement kilns, aggregate kilns, and HAFs that burn hazardous waste for purposes other than energy recovery. The Agency has studied these devices carefully and determined that the regulatory standards in today's rule are appropriate for these devices when they burn hazardous wastes for a purpose other than energy recovery. Consequently, the Agency sees no reason to defer emission standards for these types of units.

Part Three: Standards for Boilers and Industrial Furnaces Burning Hazardous Waste

Today's rule establishes controls for emissions of particulate matter, toxic organic compounds, toxic metals, and hydrogen chloride and free chlorine. Those controls are discussed below.

EPA notes that in some cases, today's rule potentially requires limitations on the content of nonwaste input to a boiler or industrial furnace that is burning hazardous waste. For example, compliance with the limits for metals, PM, and HCl/Cl₂ requires controls not only on the hazardous waste input but also potentially controls on other fuels and industrial furnace feedstocks. EPA has adopted this approach not to regulate the nonwaste input to these devices, but rather to ensure that burning hazardous waste in the device does not pose unacceptable risks to human health and the environment. These limitations function as operating conditions on the unit to ensure compliance with the hazardous waste emission standards. For example, unless limitations are established on nonwaste parameters, owners and operators could initially demonstrate compliance by burning clean raw materials along with hazardous waste, and then change their raw material input in a manner that causes emissions to increase significantly. In addition, the approach adopted today allows owners and operators maximum flexibility in demonstrating compliance with the emission standards by allowing adjustments to nonwaste input as a means of achieving compliance. The alternative of demonstrating compliance only through alteration of hazardous waste feed is not only less flexible, but would create enormous administrative difficulties (and add significant expense) for both regulated entities and Agency permit writers. (For example, stack monitoring might no longer be a feasible means of demonstrating compliance because one could not ascertain what portions of the emissions are attributable to burning hazardous waste.) For these reasons, we think the approach adopted today is the most sensible means of demonstrating compliance.

I. Emission Standard for Particulate Matter

Boilers and industrial furnaces that burn hazardous waste may emit substantial quantities of particulate matter (PM). (Emissions of particulate matter can have adverse effects on human health and the environment even if toxics are not adsorbed on the particulate matter. However, the

Agency's chief concern in this rule is control of adsorbed toxics.) Because toxic metals and organic compounds may adsorb onto smaller size PM that can be entrained in the lungs, unregulated particulate emissions could pose a significant threat to human health. Although there may be limitations to the health-based standards, the metals and organic emissions standards promulgated in today's rule provide protection of public health based on current knowledge about toxic pollutants and available risk assessment methodologies. The PM control standard promulgated today will provide additional protection by ensuring that adsorbed metal and organics are removed from stack gas with the PM.

In today's rule, EPA is establishing a standard for boilers and industrial furnaces which limits particulate emissions to 0.08 gr/dscf (grains/dry standard cubic foot) corrected to 7% oxygen. This limit was chosen because it provides a common measure of protection from particulate emissions from boilers, industrial furnaces, and incinerators burning hazardous waste. This standard may be redundant for: (1) a new, large capacity facility assigned to a specific source category which is governed by a New Source Performance Standard (NSPS); (2) a waste burning facility located in a non-attainment area subject to State Implementation Plan (SIP) standards; (3) a facility with standards for metals and HCl emissions that result in particulate emissions below 0.08 gr/dscf; and (4) a facility subject to a stricter standard based on Best Available Control Technology (BACT) imposed pursuant to the Clean Air Act's Prevention of Significant Deterioration (PSD) program. In such cases, the device would be subject to the more stringent particulate matter standard, not the RCRA 0.08 gr/dscf standard, and the additional burden of demonstrating compliance with the applicable particulate matter standard concurrently with the applicable emissions standards in today's rule for organic compounds, metals, and acid gases will not be substantial. We believe, however, that there are many situations where a BIF is either not currently subject to a particulate matter standard, or the standards is higher than the RCRA 0.08 gr/dscf standard.

The Agency has considered lowering the particulate standard to take advantage of technology advances made in air pollution control and to be consistent with the proposed standard of 0.015 gr/dscf for municipal waste incinerators. (We note that the proposed

standard for MWIs also served as a surrogate to control emissions of toxic metals. 54 FR 52219. In contrast, today's rule has separate emission standards for each toxic metal.) We are not prepared to do that at this time, however, because we have not conducted the studies to establish an appropriate PM standard that represents best demonstrated technology (BDT). Although many boilers and industrial furnaces may be able to achieve a PM standard lower than 0.08 gr/dscf (in fact, the PM NSPS for specific types of BIFs is lower than 0.08 gr/dscf), we are not certain that all BIFs can meet a standard of 0.015 gr/dscf. This is because some industrial furnaces have a very high (uncontrolled) particulate loading due to entrained particles of raw materials. Examples are cement kilns and light-weight aggregate kilns. Hence, a single PM standard of 0.015 gr/dscf cannot now be promulgated.

The Agency firmly believes that the 0.08 gr/dscf PM standard, when used as a supplement to the risk-based metal controls provided by today's rule, provides protection of human health and the environment. Given that hazardous waste burned in BIFs could contain virtually unlimited concentrations of toxic metals, the Agency believes that risk-based standards are needed to supplement the PM standard for hazardous waste burning irrespective of whether the PM standard represents best-demonstrated technology. Even under a PM standard as low as 0.015 gr/dscf, a large fraction of the PM emitted from a hazardous waste combustion device could be comprised of toxic metals that could result in substantial health risk.

Nonetheless, the Agency will consider if additional PM controls are warranted to control emissions of toxic metals. In that evaluation, the Agency will consider whether the additional controls, if any, should be promulgated in the future under the new Clean Air Act. See discussion in section III.A of part One of this preamble. Finally, we note that permit writers also could impose a lower PM standard where facts warrant, pursuant to the omnibus permit authority in section 3005(c)(3).⁸

⁸ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

A. Basis for Final Rule

Particulate matter (PM) is controlled from combustion sources to limit emissions of toxic metals and PM per se (i.e., because of human health and ecological impacts associated with PM that does not contain toxic metals). In the May 6, 1987 proposed rule, EPA suggested that a PM emission standard was not needed for boilers and industrial furnaces because the risk-based metals controls provide adequate control of metals emissions. The Agency reasoned that a standard intended to control PM per se would be more appropriately applied to these sources under authority of the Clean Air Act rather than RCRA.

EPA received numerous comments on the May 6, 1987 proposed rule suggesting the need for a particulate standard for boilers and furnaces burning hazardous waste. Many commenters believed that, notwithstanding the risk-based metals controls, unregulated PM emissions with adsorbed toxic metals and organic compounds could pose a significant health risk. In addition, three commenters suggested that EPA address the issue of particulate control during soot-blowing cycles when levels of particulate emissions are 4 to 7.2 times the level of emissions under normal operation. The Agency carefully considered these comments and subsequently determined that the risk-based metals standards should be supplemented with a PM standard to provide a common measure of control for metals. This decision was based in part on a consideration of commenters' concerns about the limitations of risk-based metals standards. See 54 FR 43720-21. Hence, the Agency subsequently proposed a particulate emissions standard of 0.08 gr/dscf (grains/dry standard cubic foot) corrected to 7% oxygen in the October 26, 1989 supplement to the proposed rule. The standard would be applicable to all boilers and industrial furnaces not governed by a more stringent (NSPS or SIP) standard.

1. *Alternatives Considered.* In selecting the standard for boilers and industrial furnaces, the Agency considered the following alternatives: (1) Apply the current NSPS standard for steam generators burning waste; (2) apply the applicable NSPS; or (3) apply the existing hazardous waste incinerator standard. These options are discussed in the 1989 supplemental notice (54 FR 43720).

Many commenters supported the proposed particulate standard of 0.08 gr/dscf. Several commenters, however, opposed this limit, arguing against

imposing a standard appropriate for incinerators on boilers and furnaces. Still other commenters suggested that the 0.08 gr/dscf limit did not go far enough in protecting the public health. These respondents argued for a lower limit comparable to that the Agency proposed for municipal waste incinerators.

The Agency continues to believe that the 0.08 gr/dscf PM standard, when used as a supplement to the risk-based metal controls provided by today's rule, provides substantial protection of human health and the environment.

2. *Basis for Standard.* Today's rule promulgates the proposed particulate emission limit of 0.08 gr/dscf because, as a supplement to the risk-based metals controls, it provides a common measure of protection from particulate emissions from boilers, industrial furnaces, and incinerators burning hazardous waste. In addition to providing control of particulate metals and adsorbed organic compounds, the 0.08 gr/dscf standard should also ensure that the Clean Air Act's National Ambient Air Quality Standard (NAAQS) for particulates is achieved in most cases. An analysis of existing sites shows that emissions of particulates at 0.08 gr/dscf could result in MEI levels of up to 30% of the maximum daily PM₁₀ (particulate matter under 10 microns) NAAQS (150 mg/m³). If background particulate levels at a site are high (i.e., the site is in an attainment area), particulate emissions from the device should also be addressed as part of the State Implementation Plan (SIP) (as they are now for hazardous waste incinerators in particulate non-attainment areas). Therefore, although the 0.08 gr/dscf standard may not ensure compliance with the NAAQS in every situation, this issue will be addressed by the SIP since the facility would be, by definition, in a non-attainment area for particulate emissions.

B. Interim Status Compliance Procedures

Facilities operating under interim status must comply with the PM emission standard. By the effective date of the rule, owners/operators must submit a certification of precompliance that documents their use of engineering judgment to show that, considering feed rates of ash from all feed streams, partitioning of ash to bottom ash or product, and the PM removal efficiency of the air pollution control system (APCS), PM emissions are not likely to exceed the 0.08 gr/dscf limit. Owners and operators must also establish and provide with the precompliance

certification limits on feed rates of ash in all feed streams consistent with those used to determine that emissions of particulate matter are not likely to exceed the standard. The facility may not exceed these feed rates during interim status (unless amended by a revised certification of precompliance). Further, within 18 months (unless extended) of promulgation, owners/operators must conduct emissions testing and certify that emissions do not exceed the limit. See section VII in part Three of this preamble for more information.

C. Implementation

Owners/operators must demonstrate compliance with the PM standard using Methods 1-5 of 40 CFR part 60, appendix A. The compliance test for certification during interim status and the trial burn for facilities applying for a RCRA operating permit must be representative of worst-case operating conditions with respect to particulate emissions that will occur during operation of the facility (i.e., because limits on operating conditions applicable for the remainder of interim status will be based on operating conditions during the compliance test).

The PM standard is implemented by limiting the feed rate of ash from all feed streams (i.e., hazardous waste, other fuels, raw materials) and by limits on APCS-specific operating parameters. The limits are established during interim status based on the compliance test, and in the operating permit based on the trial burn.

The final rule gives special consideration to cement and light-weight aggregate kilns because their raw material feed streams contain the vast majority of the ash input and resulting PM. Therefore, owners/operators of cement kilns and light-weight aggregate kilns are not required to monitor ash feed rates of feed streams. We emphasize, however, that cement kilns and light-weight aggregate kilns, like all BIFs, are still required to demonstrate conformance with the PM emission standard during a compliance test (under interim status) or trial burn (under a part B application). The Agency believes that the capacity limit on the facility (expressed in appropriate units such as raw material feed rate) and the limits on the air pollution control systems (APCS) operating parameters applicable during both interim status and under a subsequent operating permit will ensure that cement and light-weight kilns

continuously comply with the PM standard.⁹

II. Controls for Emissions of Toxic Organic Compounds

Burning hazardous waste that contains toxic organic compounds (i.e., organic compounds listed in appendix VIII of 40 CFR part 261) under poor combustion conditions can result in substantial emissions of the toxic compounds originally present in the waste as well as other compounds, due to partial but incomplete combustion of the constituents in the waste. The quantity of toxic organic compounds emitted depends on the concentrations of the toxic compounds in the waste, the waste firing rate (i.e., the percentage of total fuel provided by the hazardous waste to the boiler or industrial furnace), and the combustion conditions under which the waste is burned. The risk posed by the emissions depends on the quantity and toxicity of the compounds emitted and on the ambient levels to which persons are exposed. Hypothetical risk assessments show that under poor combustion conditions that achieve only 99 percent or 99.9 percent destruction and removal efficiency (DRE) of organic compounds, risks to the maximum exposed individual (MEI) from unburned carcinogenic organics found in hazardous waste can result in increased lifetime cancer risks of 10^{-4} .¹⁰

The Agency is controlling the emissions of toxic organic compounds from boilers and industrial furnaces that burn hazardous waste with two performance standards. First, a 99.99 percent destruction and removal efficiency (DRE) standard for principal organic hazardous constituents (POHCs) in waste feeds will ensure that constituents in the waste are not emitted at levels that could pose significant risk in virtually all scenarios of which the Agency is aware.¹¹ Second, limits on

flue gas concentrations of carbon monoxide (CO) and, where specified, hydrocarbons (HC) will ensure that combustion devices operate continuously at high combustion efficiency and emit products of incomplete combustion (PICs) at levels that will not pose adverse effects on public health and the environment. The basis for these standards is discussed below.

A. DRE Standard

As proposed, the Agency is promulgating a 99.9999% DRE standard¹² for those acutely hazardous wastes listed because they contain dioxin¹³ (and waste mixed with those wastes), and a 99.99 percent DRE performance standard for all other wastes. This standard is protective, it can be readily achieved by boilers and industrial furnaces, and it will ensure that the Agency's controls are consistent for all combustion devices (boilers, industrial furnaces, and incinerators) that pose similar risks.

Hypothetical risk assessments have shown that a 99.99 percent DRE standard for POHCs is protective of risks posed by emissions of organic constituents in the waste in virtually every scenario of which the Agency is aware.¹⁴ (EPA considers elsewhere in this notice the issue of products of incomplete combustion.) Increased lifetime cancer risks to the maximum exposed individual (MEI) from an incinerator operating at 99.99 percent DRE would generally be 10^{-6} or less. Threshold (i.e., noncarcinogenic) organic compounds also would not be expected to be present in emissions from hazardous waste burned in boilers and industrial furnaces at levels that could pose a health hazard under the 99.99 percent DRE standard.

EPA is aware, however, that the DRE standard does not directly control the mass emission rate (e.g., pounds per hour) of unburned toxic organic constituents in the waste. Although three are hypothetical situations in which risks from POHCs could be significant under a 99.99 percent DRE standard (e.g., boilers or industrial furnaces located in urban areas burning high volumes of waste with high concentrations of highly potent carcinogenic organics), the Agency is not aware that any such situations are

⁹ We note, moreover, that some boilers and many industrial furnaces are already subject to a particulate matter (PM) standard under a NSPS, SIP, or PSD program and the applicable PM standard is generally more stringent than the 0.08 g/dscf standard provided by today's rule. Thus, these devices are already under a regulatory compliance program for a PM standard. We note further that the more stringent PM standard applies.

¹⁰ Engineering Science, Background Information Document for the Development of Regulations to Control the Burning of Hazardous Waste in Boilers and Industrial Furnaces, Volume III, January 1987 (NTIS # PB 87 173645).

¹¹ Except that 99.9999% DRE is required for dioxin-listed hazardous waste.

¹² The proposed formula for calculating DRE has been revised in the final rule (see § 296.104(a)) to make it mathematically correct considering use of significant figures.

¹³ EPA Hazardous Wastes FO20, FO21, FO22, FO23, FO26, and FO27.

¹⁴ Engineering Science, op. cit.

actually occurring. If, however, during the permit process, it appears that a high-risk scenario may exist, permit officials may use the omnibus permit authority¹⁵ of section 3005(c)(3) of the Resource Conservation and Recovery Act (RCRA) codified at § 270.32(b)(2) to develop permit requirements, as necessary, to protect human health and the environment (e.g., by requiring a 99.9999 percent DRE, by limiting the feed rate of particular toxic compounds, or by setting a mass emissions rate).

1. Selection of POHCs for DRE Testing

In the April 27, 1990 proposed rule to amend the incinerator standards (55 FR 17890), EPA outlined the considerations to be made by applicants and permitting officials in selecting POHCs for DRE trial burns. Given that the DRE implementation procedures for boilers and industrial furnaces (BIFs) are identical to those for incinerators, the discussions in the incinerator proposed rule are pertinent to this rule.

A major factor in selecting a POHC for DRE testing is its incinerability relative to other toxic organic compounds. A number of indices can be used to predict incinerability including heat of combustion, autoignition temperature, thermal stability under excess oxygen conditions, and thermal stability under low oxygen (substoichiometric) conditions. An incinerability ranking based on thermal stability at low oxygen concentrations (TSLoO₂) shows promise and is currently seeing widespread use in incinerator permits. A number of commenters responded to EPA's request for comment on the use of the TSLoO₂ index for POHC selection. In general, they raised no problems with use of the index. Their main concern appeared to be that EPA choose one index and apply it consistently.

The Agency, however, is not requiring the use of a particular index. Due to the various "failure modes" different organic compounds are susceptible to during the destruction process in a combustion device, and the evolving state of knowledge in this area, the Agency feels that the POHC selection process is technically complex, and that it should involve a number of

¹⁵ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

considerations, rather than simply one incinerability ranking. Thus, EPA instead recommends that permit writers and applicants consider these indices and other relevant factors and use their judgment and applicable guidance on a case-by-case basis to select POHCs for the trial burn.

2. Use of POHC Surrogates

A number of laboratory-scale, pilot-scale, and field-scale tests have been conducted to investigate the use of nontoxic tracer surrogates (e.g., sulfur hexafluoride (SF₆)) rather than POHCs selected from appendix VIII of part 261. Sulfur hexafluoride, in particular, shows promise as a conservative tracer surrogate for compounds which are susceptible to the thermal failure mode (i.e., it is difficult to destroy unless sufficiently high temperatures are reached). It is readily available commercially, and is inexpensive and nontoxic. POHCs that are listed on appendix VIII, especially in situations where spiking is required to increase concentrations in a waste for DRE testing, are often difficult to obtain, are expensive, and are a health hazard to operators. Sampling and analysis techniques for SF₆ are well documented because of its long use as a tracer gas for monitoring ambient air and are more straightforward (simpler) and less expensive than sampling techniques for appendix VIII, part 261, compounds (e.g., VOST and MM5).

Numerous commenters responded to EPA's request for information on an approach for simplifying and standardizing DRE testing. Commenters supported standardization of DRE testing provided the approach is equitable for all boilers, industrial furnaces, and incinerators. Comments were received in support of all three approaches proposed by EPA ("POHC soup," surrogates, and specific waste analysis). Commenters generally supported use of surrogates in lieu of extensive waste analysis for design of DRE tests. Other commenters suggested using a limited number of major waste constituents as POHCs, such as carbon tetrachloride, perchloroethylene, trichloroethylene, and monochlorobenzene, until it can be shown that a universal surrogate, such as sulfur hexafluoride (SF₆), is comparable in demonstrating DRE performance. Sulfur hexafluoride was recommended by some commenters as a good surrogate choice based on the high accuracy of results with the compound and ease of use.

However, since the April 27 proposed rule, data have become available

showing cases where other organic compounds were more difficult to destroy than SF₆ under conditions of low oxygen. This is consistent with theory, since SF₆ can be destroyed under conditions of high temperature and low oxygen relatively easily compared to compounds which need oxygen to decompose. Thus, although SF₆ appears to show promise as a surrogate for testing the thermal failure mode because of its stability at high temperatures, it does not appear to be adequate as a "universal" surrogate, since it does not test for low oxygen or "mixing" failure.

Nevertheless, today's rule explicitly allows the use of surrogate, nontoxic compounds for selection as POHCs for DRE testing. As for any other type of POHC, the use of such compounds must be approved on a case-by-case basis by permit officials based on technical support provided by the applicant. The applicant's trial burn plan must adequately document the correlation between the DRE of the surrogate compound and the DREs of the appendix VIII compounds anticipated to be burned at the facility under the facility's permit.

3. Waiver of DRE Trial Burn for Boilers Operating Under the Special Operating Requirements

In 1987, the Agency proposed to waive the trial burn requirement to demonstrate DREs for boilers that operate under special operating requirements (SOR). The SOR required that, in addition to meeting the proposed 100 ppmv CO limit, a qualifying boiler must: (1) Burn at least 50 percent fossil fuel in the form of oil, gas, or coal; (2) operate at a load of at least 25 percent of its rated capacity; (3) burn hazardous waste fuel with an as-fired heating value of at least 8,000 Btu/lb; and (4) inject the hazardous waste fuel through an acceptable atomization firing system.

The SOR were based on the results of nonsteady-state boiler testing. From these results, the Agency believed that boilers operating under the SOR would maintain a hot, stable flame conducive to maintaining high combustion efficiency, resulting in maximum destruction of organic constituents in the hazardous waste fuel. The Agency believed that these boilers would achieve at least 99.99 percent DRE, and therefore, a trial burn to demonstrate DRE would not be necessary.

The Agency continues to believe that boilers operating under the SOR will achieve 99.99 percent DRE. However, based on comments received on the proposed SOR and on further examination of the previous steady-

state and nonsteady-state boiler test results, the Agency has made the following modifications to the SOR:

(1) Limit eligibility for the waiver to nonstoker, watertube boilers;

(2) Revise the requirement that the boiler fire 50 percent fossil fuel or fuels derived from fossil fuel to include tall oil, to allow permit officials to approve on a case-by-case basis other nonhazardous fuels with combustion characteristics comparable to fossil fuel, and to require for all such primary fuels (i.e., fossil fuels, tall oil, and other fuels approved on a case-by-case basis) a minimum heating value of 8,000 Btu/lb;

(3) Clarify that the hazardous waste fuel fired must have an as-fired heating value of 8,000 Btu/lb and require that each fuel fired in the burner where hazardous waste is fired must have an as-fired heating value of 8,000 Btu/lb;

(4) Increase the minimum load requirement from 25% to 40%; and

(5) Eliminate the lower viscosity requirements for the hazardous waste and decrease the upper viscosity limits for the hazardous waste to 300 seconds, Saybolt Universal (SSU), measured at the as-fired temperature of the fuel.

As proposed in 1987, boilers with a trial burn waiver under the SOR must meet the Tier I CO limit of 100 ppmv¹⁶ and must comply with all other requirements of the final rule (e.g., metals standards, PM limit).

The revised SOR are presented below, along with the basis for the revisions.

a. The Boiler Must Be a Nonstoker, Watertube Boiler. Commenters stated that the nonsteady-state testing of only three stoker and firetube boilers is insufficient to determine whether 99.99 percent DRE would always be achieved under the SOR. Commenters also maintained that the stoker and firetube boilers tested were not representative of all types and sizes.

The Agency agrees that there is limited data demonstrating that stoker and firetube boilers can achieve 99.99% DRE under the SOR. In the Agency's steady-and nonsteady-state testing, only three firetube boilers and one stoker boiler were tested under steady-state conditions, and one stoker boiler was tested under nonsteady-state conditions. The remainder of the boilers tested were watertube boilers.

The results from one of the firetube boiler tests generally support the ability of firetube boilers to achieve 99.99

percent DRE, but this boiler was specially designed to combust hazardous waste. The Agency is concerned whether more conventionally designed firetube boilers could easily achieve this level of DRE. DREs could not be calculated at one of the other firetube boiler tests due to inadequate waste feed levels, and sampling and analytical problems occurred at the third firetube boiler test. The stoker boiler tested under steady-state conditions did not demonstrate 99.99 percent DRE. In addition to the limited data for these boiler types, a greater potential exists for poor distribution of combustion gases and localized cold spots in firetube and stoker boilers that can result in poor combustion conditions. This is because these boilers generally burn fuels with a large and variable particle size on a bed, thus, making even distribution of combustion air difficult. Therefore, the final rule precludes stoker or firetube boilers from the automatic waiver of a DRE trial burn.

b. A Minimum of 50 Percent of the Fuel fired to the Boiler Must Be High Quality "Primary" Fuel Consisting of Fossil Fuels or Fuels Derived From Fossil Fuels, Tall Oil, or, if Approved on a Case-By-Case Basis, Other Nonhazardous Fuel Comparable to Fossil Fuel, and All Such Primary Fuels Must Have a Minimum As-Fired Heating Value of 8,000 Btu/lb. Thirteen commenters found the 50 percent fossil fuel requirement to be overly restrictive. In particular, one commenter proposed that the requirement be rephrased to allow the burning of no more than 50 percent hazardous waste in mixtures such that nonhazardous waste fuel supplements can be fired. Another commenter suggested eliminating the fossil fuel requirement for wastes that have heating values comparable to fossil fuels. Eleven commenters supported the burning of high quality non-fossil fuels, such as tall oil (i.e., fuel derived from vegetable and rosin fatty acids) and the by-products derived from the fractional distillation of tall oil. Many of these commenters said they have burned these materials and claimed they have heating values and combustion characteristics similar to fossil fuels. Three commenters requested that the burning of wood wastes as a primary fuel be allowed. One of these commenters presented the results from six trial burns for wood waste boilers which demonstrated that combustion zone temperatures in these types of boilers are consistent, and that a hot, stable flame conducive to the destruction of organic constituents in

the waste is present under these conditions.

Based on the comments and information presented regarding the use of tall oil (i.e., tall oil burns like commercial fuel oil), the Agency is revising the 50% primary fuel requirement to include tall oil. Also, the Agency believes that the combustion of other nonhazardous fuels that have heating values of at least 8,000 Btu/lb (representing the lower heating value range of most sub-bituminous coals), and combustion characteristics similar to fossil fuels, will ensure a hot, stable flame conducive to the destruction of organic constituents in the waste. An owner/operator who is planning to burn such a fuel supplement must present information on the supplement's combustion characteristics for the Director's review. Concerning wood wastes, the Agency continues to believe that these wastes may not provide the hot, stable combustion zone conditions needed to achieve 99.99 percent DRE. Due to the higher flue gas moisture, excess air, CO levels, and lower furnace temperatures associated with wood firing, the potential for less than 99.99 percent DRE exists. Therefore, boilers that fire wood wastes must demonstrate DRE capabilities through a trial burn.

The 50 percent minimum primary fuel requirement, on a total heat or volume input basis, whichever results in the greater volume of primary fuel, also is needed to ensure appropriate combustion zone conditions. This limit was based on the maximum levels of hazardous waste burned in the boilers tested by EPA under nonsteady-state conditions.

Finally, the Agency recognized that the term "fossil fuel" can include peat or other fuels with heating values below 8,000 Btu/lb. Because the test data used to support the waiver were from boilers fired with primary fuels with heating values higher than 8,000 Btu/lb, the final rule applies the minimum 8,000 Btu/lb as-fired heating value limit to all fuels, including fossil fuels, used to meet the minimum 50% primary fuel requirement.

c. Boiler Load Must Be at Least 40 Percent. Several commenters addressed the proposed minimum load level of 25 percent. Only one commenter considered it to be too low. This commenter advocated an 80 percent load requirement unless high efficiency combustion can be demonstrated at the trial burn. One commenter considered the 25 percent requirement to be arbitrary, but within current practice. Another commenter recommended that the level be more flexible for multiple burner boilers. One commenter

¹⁶ Boilers complying with the Tier II PIC controls where CO levels exceed 100 ppmv are not eligible for the automatic waiver of the DRE trial burn. This is because the DRE test data used to support the waiver was obtained for boilers operating at CO levels below 100 ppmv.

recommended that the requirement to maintain a boiler load of 25 percent be eliminated if the Btu value of the wastes burned is equivalent to that of coal thereby providing the heat input necessary to sustain normal combustion operations.

Boiler testing conducted at a load as low as 26 percent has demonstrated that certain boilers can achieve 99.99 percent DRE when operated at low loads. However, due to concerns related to flame stability, combustion control, and heat transfer effects associated with load turndown on some boilers, the Agency has raised the boiler load limit from 25 percent to 40 percent of design load. Operation of some boilers at loads of less than 40 percent can result in significantly higher excess air levels and localized decreases in flame temperatures. In addition, most of the boilers tested to develop the operating requirements operated at loads above 40%. Therefore, limiting the boiler to 40% is more consistent with the available test data. If an owner/operator expects to operate a unit at a lower load while firing hazardous waste, a trial burn to demonstrate 99.99 percent DRE is required.

d. The Heating Value of the Hazardous Waste Fuel Must Be at Least 8,000 Btu/lb, As-Fired, and Each Fuel Fired in a Burner Where Hazardous Waste Is Fired Must Have a Heating Value of at Least 8,000 Btu/lb, As-Fired. Eleven commenters expressed concern that the "as-fired" requirement proposed in 1987 will require the blending of wastes that have heating values of less than 8,000 Btu/lb with other wastes and/or the primary fuel before atomization. Four commenters documented a number of problems with blending low Btu wastes, including immiscibility and other mixing problems, increased quantity of materials requiring handling, difficulty of controlling feed during unit upsets, and impracticality for coal-fired systems. Five commenters requested that the heating value be determined on a total-burner basis, as a composite of primary fuel and waste. Three additional commenters recommended that the minimum heating value of wastes be lowered to 5,000 Btu/lb.

The Agency agrees that waste fuel blending can present problems in some instances. However, the Agency is concerned that allowing low Btu wastes to be fired separately from the fuel and then atomized in the flame region of the burner might make it difficult to ensure good atomization, proper feed system operation, and, consequently, adequate combustion of the hazardous waste.

Therefore, the 8,000 Btu/lb requirement, which represents the lower range of heating values of fossil fuels, applies to the as-fired heating value of the hazardous waste and to the as-fired heating value of any other fuel fired in the same burner with the hazardous waste.¹⁷

If hazardous waste with a heating value below 8,000 Btu/lb¹⁸ is mixed with the "primary" fuel to meet the as-fired minimum heating value for hazardous waste of 8,000 Btu/lb, that quantity of primary fuel may not be counted toward the 50% primary fuel requirement. This is because the purpose of requiring 50% of the fuel to be "primary" fuel is to ensure a hot, stable flame to combust the hazardous waste. If a portion of the primary fuel is blended with the hazardous waste to increase the heating value of the hazardous waste as-fired, then that portion of the primary fuel is not providing the hot, stable flame.

The following example shows how this requirement will work. Suppose a boiler is fired with 70% primary fuel and 30% hazardous waste, and that half of the primary fuel is blended with the hazardous waste to achieve an as-fired heating value of 8,000 Btu/lb. This boiler would not be eligible for the automatic waiver of the DRE trial burn because it is fired with only 35% primary fuel (half of the 70%) that is not blended with the hazardous waste to meet the minimum as-fired heating value limit of 8,000 Btu/lb.

e. The Hazardous Waste Must Be Fired with an Atomization System. Seven commenters argued that lower viscosity limits are unnecessary. Three commenters stated that it is common to atomize wastes well below 150–200 SSU, and that No. 2 oil has a viscosity of 32.6–37.9 SSU at 100 °F. One commenter indicated that the upper viscosity limits appear high for the atomization systems specified. One commenter disagreed and said that the high limits are in the correct range. Six commenters expressed concern that the particle size limits are overly restrictive. One

¹⁷ We note that the 8,000 Btu/lb minimum heating value also applies to the "primary" fuel that must comprise at least 50% of the boiler's fuel requirements. However, the remainder of the boiler's fuel requirements may be provided by hazardous waste and other fuels. There are no restrictions on the other fuels unless they are fired in the same burner with the hazardous waste. In that case, those other fuels, like the hazardous waste and "primary" fuel, must have a minimum heating value of 8,000 Btu/lb.

¹⁸ We note that, as discussed elsewhere in the text, the sham recycling policy stays into effect until an existing facility certifies compliance with the emissions standards (see § 266.103(c)). Thus, until that time, hazardous waste burned in a BIF must have an as-generated heating value of 5,000 Btu/lb, unless the waste is burned solely as an ingredient.

commenters stated that diverse waste streams can be handled to achieve good destruction without particle size limits. Another commenter disagreed with EPA by stating that they are not familiar with nozzles designed for particle sizes as small as 200 mesh. Three commenters said the waste viscosity should be left to the discretion of the owner/operator since it is industry practice to operate at viscosities which provide optimum atomization.

Based on the commenters' arguments, the Agency has eliminated the lower viscosity requirements and reduced the upper limit to 300 SSU (Seconds, Saybolt Universal) measured at the as-fired temperature of the hazardous waste. We eliminated the lower level because, after consideration of comments and re-evaluation, we believe that the concern stated at proposal—formation of a fog at low viscosity levels which could result in poor combustion conditions—is not likely to occur. At proposal, the Agency established upper viscosity limits ranging from 300 to 5,000 SSU, depending on the type of atomization system. Commenters noted that, as a practical matter, wastes with as-fired viscosities greater than 300 are not fired in an atomization system. These modifications will give facilities the flexibility to preheat wastes before atomization and are consistent with general industry practice for good atomization.

Regarding particle size limits the final rule establishes the proposed limits. When high pressure air or steam atomizers, low pressure atomizers, or mechanical atomizers, 70% of the waste must pass a 200 mesh (74 micron) screen. When a rotary cup atomizer is used, 70% of the waste must pass a 100 mesh (150 micron) screen. These mesh sizes are consistent with the design droplet size of the atomizers.

Owners/operators of boilers who propose to fire hazardous waste outside these viscosity and particle size limits must conduct a DRE trial burn.

B. PIC Controls

The burning of hazardous waste, like virtually any combustion process, results in emissions of incompletely burned organic compounds, or products of incomplete combustion (PICs). PICs can be unburned organic compounds that were present in the waste, thermal decomposition products resulting from organic constituents in the waste, or compounds synthesized during or immediately after combustion. If a device is operated under poor combustion conditions, substantial emissions of PICs can result (even if

99.99% DRE is demonstrated for POHCs; this just means that the POHC is not being emitted in its original form). However, it should be noted that estimates of risk to public health resulting from PICs, based on available emissions data, indicate that PIC emissions do not pose significant risks when BIFs and incinerators are operated under good combustion conditions.

Nonetheless, the Agency is concerned about the potential health risk from PICs because the available information has serious limitations. It is very difficult to identify and quantify emissions of thousands of different compounds, some of which are present in minute quantities. Although elaborate and expensive sampling and analytical techniques have been developed that can identify many PICs, many others cannot be identified and quantified with current techniques. Further, health effects information adequate to conduct a health risk assessment considering exposure via direct inhalation is not currently available on many organic compounds that may be emitted from combustion systems. Finally, the available public health and environmental risk assessment tools are incomplete. Data are currently available to conduct indirect exposure analyses (e.g., exposure via the food chain, drinking water, dermal exposure) on only a few organic compounds, and it will be some time before the Agency will be able to quantify impacts on ecological resources on a site-specific basis for purposes of establishing emissions standards.

Given the limited information about the hazards that PIC emissions may pose, EPA believes it is prudent to require that boilers and industrial furnaces operate at a high combustion efficiency to minimize PIC emissions.

EPA is promulgating today a two-tiered approach to control PICs as discussed in the October 29, 1989, supplemental notice (54 FR 43721-28). Under Tier I, CO is limited to 100 ppmv. Under Tier II, the Agency is providing an alternative standard. The facility need not meet the 100 ppmv CO limit provided the facility can demonstrate that the hydrocarbon (HC) concentration in the stack gas does not exceed a good operating practice-based limit of 20 ppmv. The alternative CO limit under Tier II must be established during the test burn based on the average over all runs of the highest hourly rolling average for each run.

1. Use of a CO Limit to Control PICs.

Generally accepted combustion theory holds that low CO flue gas levels combined with low CO flue gas levels

combined with low excess oxygen levels indicate a boiler, industrial furnace, or incinerator is operating at high combustion efficiency. Operating under high combustion efficiency helps to ensure minimum emissions of unburned (or incompletely burned) organics. In the first stage of the combustion of hazardous waste fuel, the POHCs thermally decompose in the flame to form other, usually smaller, compounds termed products of incomplete combustion. In this first stage of combustion, these PICs also decompose to form CO.

The second stage of combustion involves the oxidation of CO to CO₂ (carbon dioxide). The CO to CO₂ step is the slowest (rate-controlling) step in the combustion process because CO is considered to be more thermally stable (difficult to oxidize) than other intermediate products of the combustion of hazardous waste constituents. Because fuel is being fired continuously, these combustion stages occur simultaneously.

Thus, in the waste combustion process, the "destruction" of POHCs is independent of flue gas CO levels. CO flue gas levels cannot be correlated with DREs for POHCs, and may also not correlate well with PIC destruction. Although some emissions data indicate a weak correlation between CO and PICs, the data generally indicate that there is a relationship between the two parameters: When CO is low, PIC emissions are relatively low. The converse may not hold: when CO is high, PICs may or may not be high.

Low CO is an indicator of the status of the CO to CO₂ conversion process, the last rate-limiting oxidation process. Because oxidation of CO to CO₂ occurs after the destruction of a POHC and its (other) intermediates (PICs), the absence of CO is a useful indication of POHC and PIC destruction. The presence of high levels of CO in the flue gas is a useful indication of inefficient combustion, and at some level of elevated CO flue gas concentration, is an indication of the failure of the PIC and POHC destruction process.

EPA believes it is necessary to limit CO levels to levels that are indicative of high combustion efficiency because the precise CO level that indicates significant failure of the PIC and POHC destruction process is not known. In fact, this critical CO level may depend on site-specific and event-specific factors (e.g., fuel type, fuel mix, air-to-fuel ratios, and the rate and extent of changes in these and other factors that affect combustion efficiency). EPA believes that limiting CO levels is also reasonable because: (1) It is a widely

practiced approach for monitoring combustion efficiency—some boilers and industrial furnaces are already equipped with CO monitors, and many are equipped with flue gas oxygen monitors; (2) the monitors may pay for themselves through fuel savings resulting from operation of the boiler or industrial furnace closer to maximum combustion efficiency; and (3) well-designed and well-operated boilers and industrial furnaces can readily be operated in conformance with either the 100 ppmv CO limit under Tier I, or the 20 ppmv HC limit under Tier II.

2. Tier I PIC Controls: 100 ppmv CO Limit

a. Basis for the 100 ppmv CO Limit.
The May 6, 1987 proposed rule would have applied the same CO emission limits to all boilers and industrial furnaces: a lower limit of 100 ppmv over an hourly rolling average and a 500 ppmv limit over a 10-minute rolling average. The hazardous waste feed would be shut off automatically if either limit was exceeded. However, the hazardous waste would be cutoff immediately once the 500 ppmv limit was exceeded while the waste feed would be cutoff within 10 minutes if the 100 ppmv limit was exceeded. Further if the hazardous waste feed was cutoff more than 10 times in a month, the proposed rule would have prohibited further hazardous waste burning pending review and approval by enforcement officials. The lower limit of 100 ppmv was selected as representative of steady-state high efficiency combustion conditions resulting in PIC emissions that would not pose a significant risk. The higher limit of 500 ppmv was proposed to limit the frequency of emission spikes that inevitably accompany routine operational "upsets," such as load changes and start-ups of waste firing.

While two commenters stated that the proposed 100 ppmv CO limit is arbitrary, six commenters supported the Tier I CO limit of 100 ppmv. One commenter supported both the 100 ppmv CO limit over an hourly rolling average, and the 500 ppmv CO limit over a 10-minute rolling average. Three additional commenters also expressed support for the 500 ppmv CO limit over a 10-minute rolling average. Three other commenters supported a 500 ppmv CO limit over an hourly rolling average, and stated that a maximum 1,000 ppmv CO limit can be included in addition to a 10-minute average.

Many commenters opposed the CO trigger limits and associated limits on the number of waste feed cutoffs

proposed in May 1987. Primarily, commenters objected to one set of CO emission limits as applicable to all boilers and industrial furnaces. Further, they argued that PIC emissions will not be significant if, when the waste feed is cutoff, the combustion chamber temperatures are maintained while the waste remains in the chamber. Six commenters argued that the trigger limits will result in increased NO_x emissions. One commenter stated that NO_x and CO cannot be lowered simultaneously, and added that many low NO_x boilers may not be able to meet these CO limits. As an alternative, one commenter stated that a higher Tier I CO limit should be allowed for less toxic emissions; however, this commenter did not provide an alternative approach for identifying the toxicity of emissions. One commenter suggested that EPA retain two alternatives to the CO standard: establishing an alternative standard based on nonmethane, ethane hydrocarbon (NMEHC) emissions, and a case-by-case risk assessment approach.

As a result of these and other comments and further evaluation, EPA is promulgating the Tier I limits based on a maximum hourly rolling average CO limit of 100 ppmv, corrected to 7 percent flue gas oxygen content. If this limit is exceeded, the hazardous waste feed must be automatically and immediately cutoff. The final rule does not restrict the number of waste feed cutoffs because: (1) Combustion chamber temperatures must be maintained after a cutoff; and (2) the number of cutoffs will be minimized by allowing CO concentrations to be averaged over a 60-minute period (i.e., the hourly rolling average) and by the recommended use of pre-alarms to provide time to remedy the problem or to allow a staged waste cutoff before reaching the CO limit. Nonetheless, the Agency retains the authority to limit the frequency of cutoffs as the facts warrant. See § 266.102(e)(7)(ii). The final rule does not include the proposed 500 ppmv rolling average over a 10-minute limit on CO because we do not believe it is needed given that the final rule requires immediate waste feed cutoff when the 100 ppmv hourly rolling average limit is exceeded. In addition, several commenters argued that the 500 ppmv limit was arbitrary.

In addition, EPA is promulgating alternative (Tier II) standards (discussed below), as discussed in the October 1989 supplemental notice, for control of PIC emissions from boilers and industrial furnaces. The Agency believes that the alternative controls will allow facilities

flexibility in meeting both the PIC controls and NO_x emissions standards (imposed under different regulatory authorities) simultaneously. The Agency believes that the alternative, Tier II standards for control of PIC emissions are needed to address issues and concerns raised by commenters on the proposed rule.

The 100 ppmv CO limit promulgated today for Tier I is indicative of steady-state (i.e., normal), efficient combustion conditions. The time-weighted average for the CO limit is provided to accommodate the CO spikes that inevitably occur during routine "upsets," such as when hazardous waste fuel firing starts, when there is a load change on an industrial boiler, or when the composition of fuels varies. Given that CO is a sensitive indicator of overall combustion conditions, and that it may be a conservative indicator of POHC and PIC destruction, EPA is implementing CO control limits based on time-weighted averages of exceedances rather than implementing fixed CO limits. Fixed limits that do not acknowledge inevitable CO spikes and that do not give owners and operators time to adjust combustion conditions actually could result in greater emissions of PICs because each time hazardous waste firing is interrupted, CO concentrations increase, and emissions of incompletely burned organics may also increase. (Note, however, that there is a requirement to maintain combustion chamber temperature after a waste feed cutoff while waste remains in the chamber that is intended to minimize HC emissions after a cutoff.) Thus, any controls on CO must balance the effects of organic emissions that may result from overly stringent CO limits that require frequent waste feed interruptions with the effects of emissions resulting from less stringent controls that acknowledge inevitable CO spikes.

The Agency has considered whether the 100 ppmv CO limit is, in fact, too stringent given that we acknowledge the limit was chosen from within the range of reasonable values that may be considered indicative of good combustion conditions—50 to 250 ppmv. We attempted to obtain CO/time profiles from a number of well-operated devices to determine the percentage of time the facilities operated within particular CO ranges.¹⁹ We thought to

¹⁹ Energy and Environmental Research Corporation, "Guidance on Metal and PIC Emissions from Hazardous Waste Incinerators", Final Report, September 21, 1990.

use this data to predict the frequency of waste feed cutoffs that would be required at various CO limits. Unfortunately, the analyses could not be conducted because the facilities we evaluated were operating under specific CO limits and their CO levels never exceeded those limits when burning hazardous waste. We found that the facilities learned to comply with the CO limits they had to meet.

Moreover, we believe that the 100 ppmv CO limit is reasonable for a number of reasons. Not only is it within the range of CO levels that are indicative of good combustion conditions, but the Agency believes that it is not too low because: (1) It is higher than the technology-based 50 ppmv CO level EPA requires for boilers burning waste PCBs (see 40 CFR part 761); (2) it is higher than the CO limits included in many hazardous waste incinerator permits; ²⁰ (3) the Agency explicitly encourages the use of pre-alarms to minimize the frequency of automatic waste feed cutoffs; ²¹ and (4) the limit is implemented on an hourly rolling average basis which allows and minimizes the effects of short-term CO spikes.

We also note that the Agency may soon promulgate regulations for municipal waste combustors (MWCs) that, among other controls, may limit CO concentrations to 50, 100, or 150 ppmv (as proposed), depending on the type of MWC, over a four hour rolling average and dry-corrected to 7% oxygen. The MWC limits are technology-based—they represent levels readily achievable by well-designed and well-operated units. EPA does not believe that the MWC limits present a conflict with the 100 ppmv (with provisions for an alternative higher limit if HC concentrations are less than 20 ppmv) limit for BIFs under today's rule. The Agency is confident that the BIF rule is protective because the Agency has determined that, when CO levels are less than 100 ppmv, PIC emissions do not pose significant risk. Thus, although the 100 ppmv limit is not a best demonstrated technology-based limit (many BIFs (and hazardous waste incinerators) readily operate at CO levels well below 100 ppmv), the 100

²⁰ We note that the Agency proposed on April 27, 1990 to apply to hazardous waste incinerators the same CO/HC limits that today's rule applies to BIFs.

²¹ If the CO limit is "too low" for a given facility's design and operating conditions, then frequent waste feed cutoffs may occur. Frequent waste feed cutoffs may actually increase PIC emissions because the resulting perturbation to the combustion system may upset the temperature, oxygen, fuel relationships needed for complete combustion.

ppmv CO limit will ensure protection of human health and the environment.

As stated above, the CO limits are based on a flue gas oxygen content of 7 percent. One commenter indicated that EPA's reasoning for using the CO correction of 7 percent oxygen is not clear. The commenter believes the 7 percent correction factor is unfair for thermal units which, under normal conditions, need to operate at oxygen levels greater than 7 percent, yet operate with low levels of CO and HCs. EPA believes that correcting CO levels for flue gas oxygen content is necessary because without this correction, high CO flue gas concentrations could be diluted by high rates of excess oxygen. In today's rule, EPA is requiring that CO be corrected to a flue gas oxygen content of 7 percent because the majority of boilers and industrial furnaces achieve high combustion efficiency at optimum flue gas oxygen levels ranging from 3 percent to 10 percent. The optimum oxygen level to achieve high combustion efficiency for a given device will vary depending on factors such as fuel mix and boiler load. In general, large combustion devices (in terms of heat input capacity) have optimum oxygen requirements on the low end of the range of oxygen content, while smaller units require higher oxygen levels. EPA believes that a correction level of 7 percent is reasonable since this oxygen level is in the middle of the range of typical operation for all devices and since the majority of devices burning hazardous waste fuels have moderate heat input capacities (e.g., 20-150 MM Btu/hr). In addition, 7 percent oxygen is the reference level for the existing particulate standard for hazardous waste incinerators under 40 CFR 264.343(c).

Moreover, the oxygen level to which CO values are corrected is not significant since the CO levels for all facilities are corrected to a common basis. If the oxygen correction level were changed from 7% to some other value, then theoretically, the CO limit would have to be adjusted accordingly, and the effect on individual facilities would remain the same.

b. Implementation of the 100 ppmv CO Limit. The procedures used to implement the 100 ppmv CO limit are discussed below, including oxygen and moisture correction, format of the limit, and compliance with the limit.

Oxygen and Moisture Correction. The CO limit under Tier I (and Tier II) is on a dry gas basis corrected to 7 percent oxygen. The oxygen correction normalizes the CO data to a common base, accounting for the variation in design and operation of the various

combustion devices. In-system leakage, facility size, and waste feed type are other factors that cause oxygen concentrations to vary widely in flue gases and were considered in selection of the oxygen correction factor. The correction for moisture normalizes the CO data that results from the different types of CO monitors used at facilities (e.g., extractive, in situ, etc.). EPA's evaluation indicates that application of the oxygen and moisture corrections can change measured CO levels by a factor of two in some cases.

Measured CO levels must be corrected continuously for the amount of oxygen in the stack gas according to the formula:

$$CO_c = CO_m \times 14 / (E - Y)$$

Where:

CO_c is the corrected concentration of CO in the stack gas, CO_m is the measured CO concentration according to guidelines specified in Methods Manual for Compliance with the BIF Regulations (Methods Manual) ²², E is the percentage of oxygen contained in the air used for combustion, and Y is the measured oxygen concentration on a dry basis in the stack. Oxygen must be measured at the same stack location at which CO is measured under procedures that are also provided in the Methods Manual.

Format of the CO Limit. EPA proposed that the CO limits be implemented under either of two alternative formats, the hourly rolling average format or the time-above-a-limit format. Under this approach, applicants would select the preferred approach on a case-by-case basis. Comments were received in support of both alternative formats. Based on further evaluation of the two formats and for reasons explained below, EPA is requiring use of the hourly rolling average format for compliance with this rule.

Under the hourly rolling average format, a facility must measure and record CO levels as an hourly rolling average. This approach allows instantaneous CO peaks without requiring a cutoff provided that at other times during the previous hour CO levels were correspondingly below the limit. This approach requires a CO monitoring system that can continuously measure and adjust the oxygen correction factor and compute the hourly rolling averages.

Under the proposed time-above-a-limit format, dual CO limits would be established in the permit: the first as a never-to-exceed limit and the second as

a lower limit for cumulative exceedances of no more than a specified period of time in an hour. These limits and the time duration of the exceedances would be established on a case-by-case basis by equating the mass emissions (peak areas) in both the formats (time-above-a-limit and hourly rolling average formats) so that the regulation would be equally stringent in both cases. The instruments needed for the time-above-a-limit format would include a CO monitor, a recorder, and a timer that could indicate the cumulative time of exceedances in every clock hour, at the end of which it would be recalibrated (manually or electronically). Oxygen would not be measured continuously in this format; instead an oxygen correction factor would be determined from operating data collected during the trial burn. Subsequently, oxygen correction factors would be determined annually or at more frequent intervals specified in the facility permit.

EPA has re-examined the time-above-the-limit format in light of several comments received and has decided to delete this alternative in today's final rule because:

1. Since a facility would not be required to measure oxygen continuously under this format, there would be no assurance that a facility would be operated reasonably close to the oxygen level at which it operated during the trial burn. Even with a daily determination of an oxygen correction factor, there would be the possibility of "gaming" by the facility (operating the facility at low oxygen levels during the short test period when the oxygen is measured, getting a favorable correction factor established on the basis, and thereafter letting the facility operate at high oxygen levels). Since the major advantage of this format was the cheaper cost due to the omission of the oxygen monitoring requirement, adding continuous oxygen monitoring to this format would remove this advantage as well; and

2. The proposed computations for converting hourly rolling averages to this format would be cumbersome, inexact, and above all, very restrictive. To obtain a conservative conversion, a permit writer would have to assume that CO levels will remain at the established never-to-exceed limit for the full specified time in the hour, and at the lower established limit the rest of the time. The CO limits obtained by these computations would be very restrictive. As an example, a conversion of a Tier I limit of 100 ppmv hourly rolling average for a facility having a single CO excursion of 4-minutes duration in which the peak level was 1,000 ppmv, would result in a permit specifying that for the remaining 56 minutes, CO could not exceed 34 ppmv, a very restrictive limit. For example, a CO profile of 30 ppmv for 55 minutes and 40 ppmv for the remaining 5 minutes would result in a violation.

²² U.S. EPA, *Methods Manual for Compliance with the BIF Regulations*, December 1990. Available from the National Information Service NTIS, 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4600. The document number is PB 91-120-006.

Compliance with the Tier I CO Limit. The Agency considered a number of alternative approaches for evaluating CO readings during trial burns to determine compliance with the 100 ppmv limit, including: (1) The time-weighted average (or the average of the hourly rolling averages); (2) the average of the highest hourly rolling averages for all trial burn runs; or (3) the highest hourly rolling average. The time-weighted average alternative provides the lowest CO level that could reasonably be used to determine compliance, and the highest hourly rolling average alternative provides the highest CO level that could reasonably be used. EPA is requiring the use of the most conservative of these approaches, the highest hourly rolling average approach, for interpreting trial burn CO emissions for compliance with the 100 ppmv Tier I limit. (This approach is conservative because trial burn CO levels are compared to the maximum CO allowed under Tier I—100 ppmv.) EPA believes this conservative approach is reasonable since compliance with the Tier I CO limit allows applicants to avoid the Tier II requirement of evaluating HC emissions to provide the additional assurance (or confirmation) that HC emissions do not exceed levels representative of good operating practice.

3. Tier II PIC Controls: Limits on CO and HC

a. Need for Tier II PIC Controls. Commenters indicated that several types of boilers and many cement kilns will not be able to meet the (Tier I) 100 ppmv CO limit proposed in May 1987 even though HC concentrations will not be high at elevated CO levels. For example, boilers that burn residual oil or coal typically operate with CO emission levels above the Tier I 100 ppmv CO limit because of inherent fuel combustion characteristics, equipment design constraints, routine transient combustion-related events, requirements for multiple fuel flexibility, and requirements for compliance with NO_x emission standards established under the Clean Air Act. Attempts to reduce CO emissions from these devices to meet the Tier I limit could prove unsuccessful. In addition, there is a possibility that thermal efficiency could be adversely affected if these attempts are successful.

Similarly, industry and trade groups for the cement industry voiced strong opposition to the 100 ppmv CO limit for cement kilns. These commenters indicated that some cement kilns, especially modern precalciners, routinely emit CO above the Tier I 100

ppmv limit. In general, commenters indicated that while the Tier I limit may be appropriate for combustion devices in which only fuel (fossil or hazardous waste) enters the combustion chamber, it is inappropriate for cement kilns and other product kilns in which massive amounts of feedstocks are processed. These feedstocks can generate large quantities of CO emissions which are unrelated to the combustion efficiency of burning the waste and fuel. Whereas all the CO from boilers and some industrial furnaces is combustion-generated, the bulk of the CO from product kilns can be the result of process events unrelated to the combustion conditions at the burner where wastes are introduced.²³ Therefore, limiting CO emissions from these combustion devices to the Tier I 100 ppmv level may be difficult and may not be warranted as a means of minimizing risk from PICs.

In summary, commenters argued that these are specific instances and classes of combustion devices for which the Tier I CO limit would be difficult or virtually impossible to meet, and thus this limit is inappropriate since EPA has not established a direct correlation between CO emissions, PIC emissions, and health risks.

In light of these concerns, commenters suggested that EPA establish CO limits for specific categories of combustion devices based on CO levels achieved by units operating under best operating practices (BOP). The Agency considered this approach but determined that equipment-specific CO trigger limits would be difficult to establish and support and would not necessarily provide adequate protection from PIC emissions. Nonetheless, EPA believes that the CO limits should be flexible to avoid major economic impacts on the regulated community since no direct correlation has been established between exceeding the 100 ppmv CO limit and increasing health risks from PIC emissions. EPA believes, however, that at some elevated CO level PIC emissions would pose significant risk. At this time, EPA is unable to identify a precise CO trigger level since the trigger level may vary by the type and design of the combustion device and the fuel mix used in the device. Consequently, EPA has established a two-tiered approach to control PICs. Under Tier I, CO is limited to 100 ppmv or less, as discussed above. Under Tier II, CO levels can exceed 100

²³ For example, CO can be generated from the trace levels of organic matter contained in the raw materials as the materials move down the kiln from the "cold" feed end to the "hot" end where the fuel and waste is fired and the product is discharged.

ppmv provided that the owner or operator demonstrate that the HC concentration in the stack gas does not exceed a good operating practice-based limit of 20 ppmv (except that the Director may establish under § 266.104(f) an alternative HC limit for furnaces that feed raw material containing organic matter and, thus, cannot meet the 20 ppmv limit).

Under Tier II, the CO limit for a facility is based on the levels achieved during a successful compliance test. The Agency originally proposed two alternative approaches for establishing HC emission limits under the Tier II waiver: a health-based approach and a technology-based approach. These two alternatives and EPA's rationale for selecting the technology-based approach for the final rule are discussed below. Before moving to those discussions, however, it may be useful to summarize the conclusions of an evaluation by EPA's Science Advisory Board of the proposed PIC controls.

b. Comments by EPA's Science Advisory Board (SAB). We present below a summary of SAB's conclusions²⁴ on the scientific support for EPA's proposed PIC controls and EPA's response:

- *SAB:* The Agency has not documented that PICs from hazardous waste combustion can cause significant health risk to human health or the environment.

—*EPA Response:* While the Agency agrees that available data do not show that PICs are likely to pose a significant health risk, EPA's emissions testing to date has been able to identify and quantify only as much as 60% of the organic compounds being emitted during any test. During many of EPA's tests, less than 5 to 10% of organic emissions were characterized. The Agency is concerned that this large fraction of uncharacterized organic emissions could be comprised of compounds that can pose significant health risk. Therefore, the Agency believes that PICs have the potential to present a hazard and should be controlled.

- *SAB:* It is prudent to control PICs given the inability to show that they do not pose a health risk because of limitations of sampling and analytical techniques and health and environmental impact assessment data and methodologies.

²⁴ U.S. EPA, "Report of the Products of Incomplete Combustion Subcommittee of the Science Advisory Board", Report #EPA-SAB-EC-90-004, January 1990.

—*EPA Response:* The Agency agrees. Additional emissions testing cannot be used to determine if, in fact, PICs can pose significant risk because the sampling and analytical techniques are not available to identify the unknown compounds. Moreover, even if the techniques were available, health effects data are not likely to be available for the compounds so that a risk assessment could not be conducted.

• *SAB:* The use of CO and HC to ensure high combustion efficiency seems to be a reasonable approach to control PIC emissions.

• *EPA Response:* The Agency agrees.

• *SAB:* Under the Tier II controls when CO exceeds 100 ppmv, HC should be monitored continuously.

—*EPA Response:* The Agency agrees. Today's final rule requires continuous HC monitoring under the Tier II controls (see § 266.104(c)) when CO levels exceed 100 ppmv, and for certain industrial furnaces irrespective of CO level (see §§ 266.104(d) for permit furnaces and 266.103(a)(5) for furnaces operating under interim status).

• *SAB:* There is no scientific support for the health-based approach to establish HC limits on a site-specific basis based on a calculated "unit risk" value for total HC and stack gas monitoring of HC concentrations.

—*EPA Response:* The final rule does not allow the use of the proposed health-based approach to control HC. HC are controlled under the technology-based limit of 20 ppmv. See § 266.104(c).

• *SAB:* The risk assessment procedures are adequate, however, to show that the technology-based HC limit of 20 ppmv appears to be protective of human health.

—*EPA Response:* The Agency agrees.

• *SAB:* The agency should show that the proposed limits for CO and HC do not result in frequent automatic waste feed cutoffs that may increase PIC emissions.

—*EPA Response:* See discussion in section B.2.a above.

Thus, the SAB supported the overall reasonableness of the course adopted in this rule to control potential risks from emissions of PICs.

c. Health-Based Approach for HC Limits. Under the Tier II health-based approach, the Agency proposed to allow applicants to demonstrate that PIC emissions from combustion devices pose an acceptable risk (i.e., less than 10^{-6}) to the maximum exposed individual (MEI). Under this approach, EPA proposed to require that applicants quantify HC emissions during trail burns and assume

that all hydrocarbons are carcinogenic compounds with a unit risk value that would be calculated based on available data. The HC unit risk value would be $1.0 \times 10^{-5} \text{ m}^3/\text{ug}$ and would represent the adjusted 95th percentile weighted (i.e., by emission concentration) average unit risk of all the hydrocarbon emission data in EPA's database of field testing of boilers, industrial furnaces, and incinerators burning hazardous waste. The weighted unit risk value for HC considers emissions data for carcinogenic PICs (e.g., chlorinated dioxins and furans, benzene, chloroform, and, carbon tetrachloride) as well as data for PICs that are not suspected carcinogens and are considered to be relatively nontoxic (e.g., methane, and other C1 as well as C2 hydrocarbons).²⁵

The Agency proposed to implement this provision by back-calculating an acceptable HC emission rate (and, based on stack gas flow rates, a HC concentration) from the acceptable ambient level based on the calculated "total HC" unit risk value discussed above and allowing an incremental cancer risk of 1 in 100,000.

A number of commenters supported the health-based approach while several others pointed out that the approach was seriously flawed. EPA's Science Advisory Board reviewed the approach as discussed above and concluded that the site-specific, health-based approach of controlling HC was not scientifically supportable.

Upon re-evaluation, EPA believes that basing the HC limit on a health-based approach is not supportable and, thus, has not selected this approach for the final rule. Given the limited data base on the types and concentrations of PICs emitted over a range of operating conditions, we are concerned that the potency value that the proposed approach would apply to the total mass of hydrocarbons emitted may not be appropriate. It is not clear whether the proposed potency value may overstate or understate the risk posed by HC emissions. In addition, we are concerned that we do not fully understand what types of hydrocarbon emissions are actually detected by the continuous monitoring equipment. For example, as we discussed at proposal, certain halogenated compounds are under reported by the HC detection system. Finally, as we noted at proposal, the proposed risk-based approach could allow extremely high HC

concentrations—concentrations clearly indicated of combustion upset conditions.

d. Technology-Based Approach: 20 ppmv HC Limit. Under the technology-based approach, the Tier I CO limit of 100 ppmv will not have to be met if HC levels in the stack gas do not exceed a good operating practice-based limit of 20 ppmv²⁶ (measured on an hourly rolling average basis, reported as propane, dry corrected to 7% oxygen). As noted above, EPA developed this technology-based approach because of current scientific concerns (seconded by the SAB) related to a health-based approach. In addition, the health-based approach could allow HC levels of several hundred ppmv, levels that are clearly indicative of "upset" combustion conditions. The approach, as noted above, lacks a firm scientific basis and could allow facilities to operate under upset conditions. EPA would not authorize such operations unless reasonably certain they would not pose a significant risk to human health and the environment. Such reasonable certainty does not exist here.

One commenter agreed that the PIC standard should be protective without imposing a technology "fix." Although EPA believes the development of a health-based approach is a step in the right direction, the Agency is concerned about whether the health-based Tier II approach is adequately protective given the limited database on PIC emissions and the uncertainty as to what fraction of organic emissions would be detected by the HC monitoring system. Despite the limitations of the HC health risk assessment methodology, EPA believes (and the SAB concurs) it is reasonable to use this methodology to predict whether a technology-based limit appears to be protective. Accordingly, EPA used the health risk assessment methodology to show that a 20 ppmv HC limit would not result in an incremental lifetime cancer risk to the hypothetical maximum exposed individual greater than 1 in 100,000.

The final rule establishes limits for both CO and HC under the Tier II PIC controls. The CO limit is established as the average over all runs of the highest hourly rolling average for each run of the compliance test or trial burn. To demonstrate compliance with the HC limit, the highest hourly rolling average HC level during the compliance test or

²⁵ Additional information on the development of the unit risk factor can be found in U.S. EPA, Background Information Document for the Development of Regulations for PIC Emissions from Hazardous Waste Incinerators, October 1988.

²⁶ As discussed at proposal, the 20 ppmv limit represents a demarcation between good and poor combustion conditions based on HC emissions data from 24 facilities. The 20 ppmv limit is not based on best operating practice. A best operating practice limit would be set a level on the order of 5 ppmv.

trial burn cannot exceed 20 ppmv (except as otherwise provided for furnaces feeding raw materials containing organic matter), reported as propane, corrected to 7% oxygen on a dry basis.

The Agency considered whether to establish provision for a case-by-case waiver of the 20 ppmv HC limit based either on health-risk assessment or technical feasibility (i.e., feasibility of providing combustion conditions to minimize fuel-generated HC). The final rule does not provide for a waiver of the 20 ppmv HC limit as an indicator of good combustion conditions and minimum fuel-generated PIC emissions. (The final rule does, however, allow the Director to establish under the part B permit proceedings an alternative HC limit for industrial furnaces (e.g., cement kilns, light-weight aggregate kilns) to account for hydrocarbons that are emitted from trace levels of organic matter in the raw material. Any alternative HC limit established for a furnace will ensure that fuel-generated hydrocarbons (hazardous waste and other fuels) are less than 20 ppmv by establishing the HC limit based on HC concentrations when the system is designed and operated under good combustion conditions without burning hazardous waste.²⁷ See section II.B.5 of Part Three of this preamble for more discussion of the alternative HC limit for industrial furnaces.)

EPA did not provide a waiver of the HC limit in the final rule because: (1) The Agency believes, and SAB concurs, that a site-specific, health risk assessment approach to establishing HC limits (e.g., a waiver of the 20 ppmv limit) is not scientifically supportable; and (2) a technology-based waiver is not supportable because well-designed and operated hazardous waste combustion devices can readily meet a 20 ppmv HC limit.

Several commenters disagreed with EPA that both CO and HC should be monitored, stating that it is unnecessary to monitor CO if HC is monitored. The Agency continues to believe that it is reasonable to require both CO and HC monitoring when CO levels exceed 100 ppmv. When CO levels exceed the Tier I level, the facility is not operating at high combustion efficiency and the potential for high PIC emissions exists. The Agency believes that, since CO monitoring is a widely practiced

²⁷ We note that this approach should limit fuel-generated hydrocarbon concentrations to well below 20 ppmv because fuel-generated hydrocarbons from a well-designed and operated cement or light-weight aggregate kiln should not exceed 5 ppmv.

approach for improving and monitoring combustion efficiency, and since CO emission levels may respond more quickly to process upsets than HC levels, the apparent redundancy in requiring both CO and HC monitoring is warranted to ensure protection of human health.

Another commenter added that HC monitoring could be supplemented by frequent testing for common PICs that respond poorly to HC monitors, such as carbon tetrachloride, formaldehyde, perchlorethylene, and chlorobenzene. At this time, the Agency believes that continuous HC monitoring combined with CO monitoring is adequate in most cases to detect when the facility is operating under combustion upset conditions (this is another reason, however, that monitoring both CO and HC is reasonable when CO levels exceed the level normally indicative of good combustion—100 ppmv). We note that, as discussed in section II.D below the final rule requires a hot HC monitoring system (i.e., unconditioned gas sample heated to a minimum of 150 °C) which ensures minimum loss of organic compounds. Nonetheless, the Agency is currently developing sampling and analytical techniques to continuously monitor indicator organic compounds such as those suggested by the commenter.

e. Basis for Final Rule. EPA believes that the 20 ppmv HC limit in the final rule for the Tier II PIC controls is representative of an HC limit that distinguishes between good and poor combustion conditions. (When a facility operates under poor combustion conditions, PIC emissions can increase and may result in adverse health effects to exposed individuals.) This HC limit is within the range of values reported in the Agency's data base for hazardous waste incinerators, boilers, and industrial furnaces that burn hazardous waste, and the limit is also protective of human health based on risk assessments conducted for 30 incinerators. See 54 FR 43723. Under Tier II, HC must be monitored continuously, recorded on an hourly rolling average basis, reported as ppmv propane, and corrected to 7 percent oxygen on a dry basis. In addition, CO must be monitored continuously, corrected to 7 percent oxygen on a dry basis, recorded on an hourly rolling average basis, and may not exceed the limit established during the test burn (i.e., the average over all runs of the highest hourly rolling average for each run).

4. Special Requirements for Furnaces

The final rule provides several special requirements for industrial furnaces

stemming from the fact that: (1) Some industrial furnaces, notably cement kilns, are not able to meet the 20 ppmv HC limit because trace levels of organic matter in raw materials can emit substantial levels of hydrocarbons; and (2) the PIC controls may not be protective for furnaces (e.g., cement kilns and mineral wool cupolas) that feed hazardous waste at locations other than where normal fuels are fired. These special requirements are discussed below.

a. Alternative HC Limit. EPA requested comment on whether alternative HC limits may be appropriate for certain industrial furnaces. See 54 FR 43724 (Oct. 26, 1989). A number of commenters²⁸ requested that EPA allow cement kilns, light-weight aggregate kilns, and lime kilns that cannot meet the 20 ppmv HC limit because of the hydrocarbons generated by trace levels of organic materials in the normal raw materials to establish a site-specific alternative HC limit that does not allow HC levels when burning hazardous waste to be significantly higher than when burning normal fuels, processing normal raw materials, and producing normal products in a system that is designed and operated to minimize hydrocarbon concentrations in stack gas. Nineteen commenters pointed out that baseline HC emission levels from cement kilns can be attributed to the naturally-occurring raw materials that are used in the production of cement. Use of shale as a raw material, for example, can result in HC emissions from kerogens in the shale. Use of fly ash as a source of iron and silica could result in increased CO emissions from partial oxidation of free carbon in the fly ash. Commenters claim that approximately 6 to 10 cement plants may not be able to comply with the HC limit of 20 ppmv even though they generate minimal HC from sources other than raw materials (e.g., hazardous waste fuels, other fuels, organic compounds in slurry water). The organic compounds in normal raw materials would not ordinarily be hazardous, so that their emissions (e.g., through volatilization) would not raise the types of concerns normally addressed by RCRA.²⁹

²⁸ In addition to comments on the October 26, 1989 supplement to the proposed rule, see minutes of the EPA meetings with the Cement Kiln Recycling Coalition of April 17, 1990; May 23, 1990; June 4, 1990; June 20, 1990; July 19, 1990; and October 10, 1990. See also minutes of the EPA meeting with Southdown, Inc. on May 11, 1990, and the letter from the Cement Kiln Recycling Coalition to Bob Holloway, EPA, dated June 15, 1990.

²⁹ We note, however, that nonhazardous organic constituents in feedstreams may be partially

Continued

The Agency believes that it will be possible in some situations to develop an approach on a case-by-case basis to effectively implement an alternative HC limit under the principle stated above. (If the 20 ppmv HC limit were health-based, the Agency would be more reluctant to develop an alternative to it. Given, however, that the limit is a measure of combustion efficiency, the Agency believes it reasonable to develop an alternative means for this class of furnaces to demonstrate combustion efficiency.) The Agency considered a number of approaches to establish an alternative HC level and determined in the time available that none appeared to be workable in all situations. The Agency is therefore adopting a more individualized approach in the present rule that allows permit writers to establish an alternative HC limit (i.e., a HC limit that exceeds 20 ppmv) in a facility's operating permit, and allows permit writers to grant an extension of time to comply with the HC limit during interim status, based on the following showings:

- 1) For cement kilns, the kiln is not equipped with a by-pass duct that meets the requirements of § 266.104(f)(1);
- (2) the applicant demonstrates that the facility is designed and operated to minimize hydrocarbon emissions from fuels and raw materials;
- (3) the applicant develops an approach to effectively monitor over time changes in the operation of the facility that could reduce baseline HC levels—for example, changes in raw materials, fuels, or operating conditions—which could result in establishing a new baseline and corresponding adjustment of the HC limit; and
- (4) the applicant demonstrates that the hydrocarbon emissions are not likely to pose a significant health risk. See § 266.104(f)(2). We explain these provisions in more detail below, along with an explanation of which provisions apply during interim status and which are part of permit application and issuance.

Interim Status Facilities. Today's rule requires facilities operating in interim status to comply with CO and, if required, a 20 ppmv HC limit within 18 months of the rule's date of promulgation. The rule provides for a case-by-case extension from these requirements (as well as the particulate, metals, and HCl/Cl₂ standards) "if compliance is not practicable for reasons beyond the control of the owner or operator." See § 266.103(c)(7)(ii). The situation where a furnace may be

unable to achieve the 20 ppmv HC limit because of organics present at baseline conditions (i.e., when the facility is designed and operated to minimize HC emissions from raw materials and fuels while producing normal products under normal operating conditions and when no hazardous waste is burned) may be eligible for the extension of time provided the following conditions are satisfied:

1. The applicant for the extension of time must have submitted a complete part B permit application. The application must include the following information pertinent to the question of an alternative HC limit: (a) Documentation that the system is designed and operated to minimize HC emissions from all sources when the baseline level is established and when hazardous waste is burned; (b) documentation of the baseline HC flue gas concentrations when the facility is operated to minimize HC emissions and when feeding normal raw materials and normal fuels to produce normal products under normal operating conditions and when not burning hazardous waste; (c) a test protocol to confirm the baseline HC (and CO) level; (d) a trial burn protocol to demonstrate that, when hazardous waste is burned, HC (and CO) concentrations do not exceed the baseline level; and (e) a procedure to show if and when HC emissions from nonhazardous waste sources may decrease (in which case, the overall HC limit might be adjusted downward after a new baseline is established). See § 270.22(b). (The substantive basis for these requirements is explained in more detail below.)

2. During interim status, the applicant must not only conduct emissions testing when burning hazardous to certify compliance with all remaining emissions controls—dioxins and furans, PM, metals, and HCl/Cl₂—but also establish and comply with interim limits on CO and HC presented in the part B permit application as levels the applicant has determined by testing (without burning hazardous waste) are baseline levels. We note that the Director may not have time during the review of the extension request (and a preliminary review of the part B application) to confirm the adequacy of the interim CO and HC limits proposed by the applicant. Moreover, to do so would require the types of oversight of test protocols, emissions testing, and review of data that will be applied under the permit process. Thus, the interim limits are subject to revision based on (confirmation) testing in support of the operating permit. Nonetheless, EPA believes that establishing interim CO and HC limits and requiring the owner/operator to comply with them until a permit is issued (or denied) is reasonable and provides a measure of protection of human health and the environment.

It should be noted that the Agency does not believe that it is possible to establish an alternative HC limit during interim status. This is because the level of interaction between an applicant and permit writer over evaluation of the various protocols to establish a HC baseline and determine when

it should be reduced, plus conducting test burns to confirm the HC baseline and that HC levels do not increase when hazardous waste is burned, plus conducting a health-risk assessment for organic emissions when hazardous waste is burned are beyond the scope of interim status. Consequently, the rule is structured so that the alternative HC limit (if warranted) would be established as part of the permit, and the interim status certification of compliance deadline can be extended, if the Director finds this is warranted, while the permit is being processed. The Director may also make the extension of time conditional on the time estimated to process the permit application or other factors, and can be conditioned on operating conditions that ensure the facility will operate in a manner that protects human health and the environment. Any such condition would be embodied in an interim status extension determination that is enforceable as a requirement of subtitle C (much as conditions in a closure plan are enforceable), and would be documented in an administrative record for the determination.

3. Cement kilns with a by-pass duct meeting the requirements of § 266.104(g)(2) are ineligible for an extension. The rule precludes cement kilns operating with a by-pass duct from eligibility for the extension of the certification of compliance date for compliance with the CO and HC limit, as well as for obtaining an alternative HC limit in a permit.

Fully Permitted Facilities. The Director may establish an alternative HC limit in the facility's operating permit provided that the applicant meets the following requirements. Information and data documenting compliance with these requirements must be included in the part B permit application. See § 270.22(b). First, the applicant must document in the permit application that facility is designed and operated to minimize HC emissions from all sources, including raw materials and fuels. Examples of situations where the system is not designed and operated to minimize HC (and CO) levels during baseline testing are when: (1) Coal is mixed with raw material which is fed into a cement kiln preheater such that the coal can contribute to HC emissions; (2) cement kiln slurry water contains enough organic compounds to significantly contribute to HC emissions; (3) waste fuels such as tires are burned in a manner that could contribute to HC emissions; (4) the furnace is not operated and designed to minimize emissions of hydrocarbons emitted from raw material (in general, the more quickly the raw material is exposed to elevated temperatures, the lower the hydrocarbon emissions); and (5) normal fuels are not burned under good combustion conditions.

Second, the applicant must propose in the permit application baseline flue gas

CO and HC levels. These proposed baseline levels also serve as interim values under which the facility must operate under a conditional time extension for certification of compliance with the HC standard until permit issuance (or denial). The proposed baseline levels must be supported by emissions testing under baseline conditions (i.e., when the facility is designed and operated to minimize HC emissions from raw materials and fuels while producing normal products under normal operating conditions and when no hazardous waste is burned). Baseline levels must be determined from test data as the average over all valid runs of the highest hourly rolling average value for each run. This is the same approach specified by the rule to determine limits on other operating parameters (e.g., maximum feed rate limits, maximum temperatures, etc). EPA believes that this approach is workable for cement kilns³⁰ given that commenters have asserted that when hazardous waste is burned, hydrocarbon levels do not increase and often decrease. As discussed in section II.E of Part Three of the preamble, HC levels from a cement kiln with HC levels of 66 to 70 ppmv when burning coal decreased to 38 to 63 ppmv when burning hazardous waste fuel. If the facility cannot install continuous monitors for HC (and CO and oxygen) in time to conduct these baseline tests prior to submittal of the permit application (which must be sufficiently prior to 18 months after promulgation of the rule to give the Director time to consider whether to grant the time extension), the facility may use portable monitors. We note that the HC monitoring system must be a hot, unconditioned system. In addition, we note that different baseline values may be necessary for different modes of operation if the baseline HC (or CO) level changes significantly under those modes of operation. Examples are when the raw material mix is changed to make a different cement product or when different fuels are burned.

Third, the applicant must develop emissions testing protocols to: (1) Confirm the baseline HC and CO levels proposed in the permit application (and under which the facility must operate in interim status upon receipt of an extension of time to comply with the HC limit and until an operating permit is

³⁰ Although any industrial furnace that cannot meet the 20 ppmv HC limit because of organic matter in raw material is eligible to apply for an alternative HC limit, only one commenter expressed concern that industrial furnaces other than cement kilns may not be able to meet the 20 ppmv HC limit.

issued (or denied)); and (2) to demonstrate that, when hazardous waste is burned, HC and CO levels do not exceed baseline levels (and emissions of other pollutants do not exceed allowable levels). If a baseline HC or CO level is to be established for more than one mode of operation, a baseline confirmation test (comprised of at least three valid runs) must be run for each mode.

Fourth, the applicant must develop an approach to effectively monitor over time changes in the operation of the facility that could significantly reduce baseline HC or CO levels. If baseline levels are significantly reduced, then the alternative HC and CO limits that apply when burning hazardous waste must also be reduced. Such changes could include: (1) Changes in the concentration of organic matter in raw materials; (2) changes in the concentration of organic matter in the raw material mix due to changes in the mixture of raw materials needed to produce different types of product; (3) changes in fuels; and (4) changes in the concentration of organic compounds in slurry water used for a wet cement kiln. The approach must be workable and enforceable.

EPA is requiring this condition in order to avoid establishing a high baseline which is then reduced without also lowering the HC limit, potentially allowing the hazardous waste to be burned under poor combustion conditions creating high, but undetected, HC levels (i.e., hazardous waste could be burned under poor combustion conditions and could be emitting high HC levels even though the HC limit was not exceeded). (The Agency notes that the problem of establishing a HC baseline and for determining when the baseline might change for this type of industrial furnace is more difficult than determining when the raw material baseline changes in documenting when co-combustion of hazardous waste with raw materials in a Bevill device might affect the composition of residues. See section XIII of Part Three of the preamble. This is because, in the case of the HC baseline, not only must the raw materials' and fuels' composition be monitored, but the units design and operating conditions as well to determine whether the baseline has changed. Thus, the rule provides for more interaction in establishing baseline conditions and determining when they change for assessing alternative HC limits for cement kilns than it does when making determinations as to whether co-combustion of hazardous waste can

remove residues from eligibility for exclusion under the Bevill amendment.)

Finally, EPA is concerned that hazardous waste burning may affect the type and concentration of organic compounds emitted from an industrial furnace that has elevated HC concentrations attributable to raw materials. For example, the chlorine in the hazardous waste may result in higher concentrations of chlorinated organic compounds. Therefore, the rule requires the owner or operator, as part of the permitting process, to use state-of-the-art emissions testing procedures and risk assessment to demonstrate that organic emissions are not likely to pose unacceptable health risk. The owner or operator must conduct emissions testing during the trial burn to identify and quantify the organic compounds listed in appendix VIII, part 261, that may be emitted using test procedures specified by the Director on a case-by-case basis. As noted above, although EPA does not believe such risk-based approaches to be adequate as the basis for a national risk-based PIC standard, we think the approach is part of the best means of assuring that cement kilns combust hazardous waste fuels properly in those instances where HC levels are greater than 20 ppmv as a result of organics in normal raw material feed.

Two sampling and analysis approaches that the Director may use are discussed below. One protocol involves the following steps to identify and quantify concentrations of organic compounds in stack emissions:

1. Sample volatile organic compounds using the VOST train of Method 0030 as prescribed in SW-846. Analytical work is conducted using GC/MS according to Method 5040 in SW-846.
2. Sample semi-volatile organic compounds using the sampling train prescribed in Method 0010 in SW-846. Analytical work is conducted using GC/MS according to Method 8270 in SW-846.
3. Sample aldehydes and ketones using an impinger train with 2,4-di-nitro-phenyl hydrazine. (2,4-DNPH) in the impinger solution as prescribed in Method 0011 in the *Methods Manual*, and analysis of impinger solution by high performance liquid chromatography (HPLC) as specified in "Analysis for Aldehydes and Ketones by High Performance Liquid Chromatography" in the *Methods Manual*.

Another protocol is a screening approach that has been described in the literature³¹ that uses the following protocols as specified in SW-846:³¹

³¹ Johnson, Larry, et al., "Screening Approach for Principal Organic Hazardous Constituents and Products of Incomplete Combustion". JAPCA Journal, Volume 39, No. 5, May 1989.

1. Soxhlet extraction sample preparation;
2. Gas chromatography (GC) coupled with flame ionization detector (FID) or mass spectrography (MS) screening;
3. Total chromatographic organics (TCO) and gravimetric (GRAV) procedures; and
4. High performance liquid chromatography-ultraviolet/MS (HPLC-UV/MS) screening and compound identification.

To select an appropriate protocol, the Director will consider the state-of-the-art of sampling and analytical techniques and the expected nature of organic emissions considering emissions data or other information.

We note that, under this PIC risk assessment, emission rates must also be determined for the 2,3,7,8-chlorinated tetra-octa congeners of chlorinated dibenzo-*p*-dioxins and dibenzofurans (CDDs/CDFs) using Method 23, "Determination of Polychlorinated Dibenzo-*p*-Dioxins and Polychlorinated Dibenzofurans (PCDFs) from Stationary Sources" in Methods Manual for Compliance with the BIF Regulations (Methods Manual), incorporated in today's rule as appendix IX of part 266. The risks from these congeners must be estimated using the 2,3,7,8-TCDD toxicity equivalence factor prescribed in "Procedures for Estimating the Toxicity Equivalence of Chlorinated Dibenzo-*p*-Dioxin and Dibenzofuran Congeners" in Methods Manual.

The owner or operator must then conduct dispersion modeling to predict the maximum annual average ground level concentration of each such organic compound. On-site ground level concentrations must be considered if a person resides on-site; otherwise, only off-site concentrations may be considered. Dispersion modeling must be conducted in conformance with EPA's Guideline on Air Quality Models, EPA's "Hazardous Waste Combustion Air Quality Screening Procedure" provided in Methods Manual, or EPA's Screening Procedures for Estimating Air Quality Impact of Stationary Sources. The Methods Manual and the Guideline on Air Quality Models are incorporated in today's rule as appendices IX and X, respectively, to part 266. The Screening Procedures document is incorporated by reference in § 260.11.

Stack heights exceeding good engineering practice (GEP, as defined in 40 CFR 51.100(ii)) may not be used to predict ground level concentrations. See section V.B.1.c of Part Three of this preamble.

If the owner or operator applies for an alternative hydrocarbon limit for more than one industrial furnace such that

emissions from the furnaces are from more than one stack, emissions testing must be conducted on all such stacks and dispersion modeling must consider emissions from all such stacks.

To demonstrate that the noncarcinogenic organic compounds listed in appendix IV of the rule do not pose an unacceptable health risk, the predicted ground level concentrations cannot exceed the levels established in that appendix.

To demonstrate that the carcinogenic organic compounds listed in appendix V of the rule do not pose an unacceptable health risk, the sum of the ratios of the predicted ground level concentrations to the levels established in the appendix cannot exceed 1.0. This is because the acceptable ambient levels established in appendix V are based on a 10^{-5} risk level. To ensure that the summed risk from all carcinogenic compounds does not exceed 10^{-5} (i.e., 1 in 100,000) the sum of the ratios described above must be used. (We note that the 2,3,7,8-TCDD toxicity equivalency factor is to be used to estimate the risk from 2,3,7,8-chlorinated CDDs/CDFs, and the risk from these congeners must be added to the risk from other PICs to ensure that the summed risk does not exceed 1 in 100,000.)

To demonstrate that other compounds for which the Agency does not have adequate health effects data to establish an acceptable ambient level are not likely to pose a health risk, the predicted ambient level cannot exceed $0.1 \mu\text{g}/\text{m}^3$. This is the 5th percentile lowest reference air concentration for the compounds listed in appendix IV of the rule.

b. Feeding Waste at Locations other than the Hot End. If hazardous waste is fed into an industrial furnace at locations other than the "hot" end where the product is normally discharged and where fuels are normally fired, the rule requires the owner/operator to monitor HC irrespective of whether CO levels do not exceed the Tier I limit of 100 ppmv and to comply with special restrictions during interim status. These provisions are discussed below.

*Mandatory HC Monitoring.*³² Except as indicated below, facilities that fire

³² Continuous HC monitoring is required for a furnace if hazardous waste is fired at any location other than the "hot", product discharge end where fuels are normally fired irrespective of the CO level in stack emissions (i.e., irrespective if CO levels are lower than the Tier I limit of 100 ppmv) and irrespective of whether furnace off-gas is passed through another combustion chamber.

hazardous waste into an industrial furnace at locations other than the "hot" end where the product is normally discharged and where fuels are normally fired must comply with the HC limit even if CO levels do not exceed the Tier I limit of 100 ppmv. See § 266.104(d). This is because the Agency is concerned that the hazardous waste could conceivably be fired at a location in a manner such that nonmetal compounds in the waste may be merely evaporated or thermally cracked to form pyrolysis by-products rather than completely combusted. If so, little CO may be generated by the process and, thus, monitoring CO alone would not ensure that HC emissions were minimized.

However, if hazardous waste is burned (or processed) solely as an ingredient, HC monitoring is not automatically required because emissions of nonmetal compounds are not of concern. This is because the metals emissions controls will ensure that metals emissions do not pose a hazard. (The rule establishes the restrictions discussed below because we are concerned that the interim status controls on *organic* emissions may not be protective when hazardous waste is fed at locations other than the "hot" end of a furnace.) See discussion in section VII.H of Part Three of this preamble for when a waste is considered to be burned solely as an ingredient.³³

Interim Status Restrictions. In addition to requiring HC monitoring when hazardous waste is fed into a furnace at locations other than the "hot" end where the product is discharged and where fuels are normally fired, today's rule applies other restrictions to hazardous waste burning during interim status. See § 266.103(a)(5). The hazardous waste may not be fed at any location where combustion gas temperatures are less than 1800 °F, and the owner or operator must demonstrate that adequate oxygen is present to combust the waste. In addition, for cement kilns, the hazardous waste must be fed into the kiln itself. These requirements are provided to ensure adequate destruction of the waste given that the DRE standard (which requires a demonstration by trial burn that organic constituents in the waste are destroyed)

³³ Regulated entities have indicated that there is substantial confusion over the terms "use as an ingredient" and "material recovery". Under the RCRA hazardous waste regulatory program, EPA considers a hazardous waste to be burned or processed as an ingredient if it is used to produce a product. EPA considers a hazardous waste to be burned or processed for material recovery if one or more constituents of the waste is recovered as a product.

is not applicable during interim status. Like the requirement for mandatory HC monitoring, however, these restrictions do not apply if the hazardous waste is burned (processed) solely as an ingredient. For further discussion, see section VII.H of Part Three of this preamble.

5. Special Considerations for Cement Kilns

a. Monitoring in the By-Pass Duct of a Cement Kiln. The final rule provides that cement kilns with by-pass ducts may monitor CO and, if required, HC concentrations in the by-pass duct. Most precalciner and some preheater kilns are equipped with by-pass ducts where a portion (e.g., 5–30%) of the kiln off-gas is diverted to a separate air pollution control system (APCS) and, sometimes, a separate stack. A portion of the kiln gases are so diverted to avoid a build-up of metal salts that can adversely affect the calcination process. Dust collected from the by-pass APCS is usually disposed of while dust collected from the main APCS is usually recycled back into the kiln to make the clinker product.

Several comments were received regarding sampling at cement kilns. Five commenters suggested that HC (and CO) measurements should be allowed in the by-pass duct rather than in the main stack because: (1) The by-pass gas is representative of the kiln off-gas; and (2) this approach would preclude the problem of nonfuel HC emissions from the raw material exceeding the 20 ppmv limit. The raw material would be heated and partially calcined in the precalciner or preheater and HC from that process would be emitted from the main stack. The by-pass duct draws the kiln off-gas prior to the precalciner or preheater and, so, would not be affected by that process.

Another commenter specifically supported monitoring CO (and HC, if required) only in the bypass duct provided that hazardous waste is fed only to the kiln and not to the preheater or precalciner.

The Agency conducted testing³⁴ at a cement kiln to gather information relevant to the issue of HC monitoring in the bypass duct for preheater and precalciner cement kilns. The data showed that the gases in the bypass duct are representative of the combustion of waste in the kiln.

Based on this test data and public comment, the final rule allows CO and, where required, HC monitoring in the bypass duct of a cement kiln provided

that: (1) Hazardous waste is fired only into the kiln (i.e., not at any location downstream from the kiln exit relative to the direction of gas flow); and (2) the bypass duct diverts a minimum of 10% of kiln off-gas. See § 266.104(g). The 10% diversion requirement is based on engineering judgment that, at this level of kiln-gas diversion, the bypass gas will be representative of the kiln off-gas. Industry representatives indicate³⁵ that the bypass duct capacity of most facilities actively involved in burning hazardous waste exceeds the 10% limit.

b. Use of Hazardous Waste as Slurry Water for Wet Cement Kilns. Some kiln operators have inquired as to what regulatory standards apply, if any, if hazardous wastes are used as slurry water. The Agency does not regard the practice as an excluded form of recycling. The Agency has long been skeptical of claims that hazardous wastes are "recycled" when they substitute for very commonly available and economically marginal types of raw materials. In particular, the Agency has been skeptical that liquid hazardous wastes serve as a substitute for water. Cf. 48 FR at 14489 (April 4, 1983). In the case of hazardous waste used as slurry water, the hazardous constituents in the waste are ordinarily unnecessary to the claimed recycling activity and are being gotten rid of through the slurring process. Given the possibility of hazardous levels of air emission is high, the practice certainly can be part of the waste disposal problem. Consequently, the Agency regards such practice as a form of waste management subject to regulation under today's rule.

EPA considered prohibiting the use of hazardous waste as slurry water for wet cement kilns because of concern that toxic organic constituents in the waste could be volatilized and emitted without complete combustion. The final rule does not prohibit using (or mixing) hazardous waste with slurry water because we believe that the controls provided by the rule both during interim status and under a RCRA operating permit adequately address the hazard that the practice may pose.

If hazardous waste is fed into any industrial furnace during interim status at a location other than the hot, product discharge end, combustion gas temperatures must exceed 1800 °F at the point of introduction, and the owner or operator must document that adequate oxygen is present to combust organic constituents in the waste. See discussion above. EPA believes that these

restrictions will, as a practical matter, preclude use of hazardous waste in slurry water during interim status.

Although these restrictions on hazardous waste burned at locations other than the hot end of an industrial furnace do not apply under a RCRA operating permit, the permit proceedings will ensure that organic constituents in a hazardous waste that is fed into the kiln in slurry water (or in the slurry itself) will be destroyed. The Director will require that toxic nonmetal constituents in the waste are destroyed to a 99.99% destruction and removal efficiency, and that adequate oxygen is present to completely destroy the organic compounds.

C. Automatic Waste Feed Cutoff Requirements

Today's rule requires that boilers and industrial furnaces combusting hazardous waste be equipped with automatic waste feed cutoff systems to limit emissions of hazardous compounds during combustion "upset" situations and to ensure stable combustion conditions. The automatic waste feed cutoff system must be connected to the CO and HC monitoring system, such that an exceedance of a CO or HC limit would trigger a cutoff of the waste feed. Additionally, the automatic waste feed cutoff system must engage when other key operating conditions deviate from specified unit operating limits, which are determined during compliance testing or which are based on manufacturer specifications. See §§ 266.102(e)(7)(ii) and 266.103(g).

Some commenters disagreed with the proposed automatic waste feed cutoff requirements. One commenter argued against any waste feed cutoffs for light-weight aggregate kilns. Six commenters expressed concern that waste feed cutoffs would increase the instability of the combustion conditions and would possibly increase air emissions. Three commenters requested a controlled waste feed reduction over several minutes rather than an automatic waste feed shutoff. Three commenters suggested different levels of CO emissions be set for waste feed cutoffs.

The Agency acknowledges that there can be performance and other problems associated with automatic waste feed cutoffs, and recognizes that they may be undesirable for some applications. For example, when the facility operates without the use of hazardous waste fuel, use of fossil fuel is increased, and the opportunity is lost for safe disposal of hazardous waste. Further, HC emissions may actually increase if the automatic waste feed cutoff is triggered frequently

³⁴ U.S. EPA, "Emissions Testing of a Precalciner Cement Kiln at Louisville, Nebraska", November 1990.

³⁵ Letter dated August 16, 1990, from Dr. Michael von Seebach, Southdown, Inc., to Dwight Hlustick, EPA.

even though combustion chamber temperatures must be maintained while hazardous waste or residues remain in the combustion chamber. However, the Agency continues to believe that automatic waste feed cutoff systems are necessary to avoid adverse effect on human health and the environment that could result if hazardous waste is fired into the device when it is operating under combustion upset conditions.

To address the concerns raised by commenters, EPA recommends installing pre-alarm systems that alert an owner/operator of potential problems and provide time either for corrective measures to be taken or for a staged cutoff of the hazardous waste feed. Thus, the use of pre-alarms should minimize waste feed cutoffs. In addition, we have included in the rule some additional requirements related to waste feed cutoffs and restarts, as discussed below.

One commenter stated that cutoffs are inappropriate for combustion devices where the waste is destroyed immediately upon injection into the combustion chamber (e.g., devices that burn liquid wastes), or if the combustion conditions supported by the waste fuel continue to destroy residual waste after waste feed cutoff. The Agency continues to believe that the best method for returning a combustion system to good operating conditions, thereby minimizing unacceptable emissions, is to stop the input of hazardous waste. Further, the burden associated with automatic cutoffs should not be substantial because frequent automatic waste feed cutoffs should not occur given that the parameters tied into the automatic cutoff system may be monitored on an hourly rolling average basis (which allows high values to be offset by low values) and that the Agency recommends the use of pre-alarms to warn the operator of a pending cutoff (which may give the operator time to take corrective measures to avoid an automatic cutoff).

In the event of a waste feed cutoff, monitoring for CO and HC (and other operating parameters for which limits in the permit are based on a rolling average basis) must continue, and the waste feed cannot be restarted until CO and HC levels (and levels of the other parameters) come within allowable limits. See § 266.102(e)(7)(ii). (For permit operating conditions not established on a rolling average basis, the Director will specify, on a case-by-case basis, an adequate period of time during which the parameters must remain within permit limits to demonstrate steady-state operation prior to restarting the

hazardous waste feed.) In addition, consistent with the April 27, 1990 incinerator amendments proposal, the provision of the final boiler and industrial furnace rule requiring compliance with the permit operating conditions states that compliance must be maintained at any time there is waste in the unit. See § 266.102(e)(1). This language clarifies that activation of the automatic waste feed cutoff does not relieve the facility of its obligation to comply with the permit conditions if there is waste remaining in the unit (such as in a rotary kiln). Thus, for example, the air pollution control system must continue to be operated within the applicable permit conditions.

Furthermore, after a cutoff, the temperature in the combustion chamber must be maintained at levels demonstrated during the compliance test for as long as the hazardous waste or residue remains in the combustion chamber. The Agency believes this temperature requirement will help ensure that hydrocarbon emissions will be minimized after a cutoff.

To comply with this requirement, the operating permit must specify the minimum combustion chamber temperature after a waste feed cutoff while waste remains in the combustion chamber. An uninterruptable burner using auxiliary fuel (i.e., nonhazardous waste fuel) of adequate capacity may be needed to maintain the temperature in the combustion chamber(s) and to allow destruction of the waste materials and associated combustion gases left in the system after the waste feed is automatically cut off. The safe startup of the burners using auxiliary fuel requires approved burner safety management systems for prepurge, pilot lights, and induced draft fan starts. If these safety requirements preclude immediate startup of auxiliary fuel burners and such startup is needed to maintain temperatures (i.e., if the combustion chamber temperatures drop precipitously after waste feed cutoff), the auxiliary fuel may have to be burned continuously on "low fire" during nonupset conditions.

Furthermore § 266.102(e)(7)(ii)(B) requires that the combustion gases must continue to be routed through the air pollution control system as long as waste remains in the unit. One effect of this clarifying requirement, in combination with the requirement to maintain compliance with permit conditions as long as there is waste in the unit, is that opening of any type of air pollution control system bypass stack while there is waste in the boiler or furnace would be a violation of the

permit (unless the facility demonstrates compliance with the performance standards during the trial burn, with the vent stack open).

Although we believe that such emergency bypass stacks are not prevalent on boilers and industrial furnaces, our discussion of this topic in the preamble to the incinerator amendments at 55 FR 17890 (April 27, 1990) would also apply to any boiler or industrial furnace with such a bypass or vent stack. We received a number of comments from the incinerator industry expressing concern that use of a bypass stack for safety purposes would be considered a violation. We agree that there can be mitigating circumstances to warrant the use of a bypass stack and do not discredit their use as a safety device. However, the Agency continues to believe that the facility can and should implement measures to minimize situations where use of the emergency vent stack is necessary.

One commenter stated that the use of hazardous waste should be prohibited during startup or shutdown periods for a cement kiln until normal operating temperatures are achieved. The final rule does not restrict hazardous waste burning during kiln startup or shutdown provided that the compliance (or trial burn) covers those periods of operations. In other words, hazardous waste may be burned during startup and shutdown if the facility demonstrates conformance with the standards during those operations.

Another commenter argued that accurate measurement of combustion chamber temperature for some combustion devices will be difficult. Because of this difficulty, the final rule does not require that this temperature be directly measured in the combustion chamber if an owner/operator can demonstrate to permitting officials that the combustion chamber temperature correlates with a more easily measured downstream gas temperature.

One commenter agreed with EPA's revised proposal not to limit the number of automatic waste feed cutoffs, but disagreed with EPA's requirement that combustion chamber temperatures must be maintained at the levels that occurred during the trial burn for the duration of time that the waste remains in the combustion chamber. This commenter believed that electric utility boilers and other burning devices will have difficulty in accurately measuring combustion chamber temperatures. For this reason, the commenter suggested that waste feed cutoffs alone be used to control HC emissions rather than also requiring that combustion chamber

temperatures be maintained. EPA believes that the flexibility that the final rule allows for monitoring combustion chamber temperature and in setting the frequency of waste feed cutoffs as discussed above should address this commenter's concerns.

Another commenter supported the proposed 10 times per month limit on the number of automatic waste feed cutoffs and the proposed requirement that any facility exceeding that frequency would be required to cease burning hazardous waste, to notify the Director, and not to resume burning hazardous waste until reauthorized by the Director. Another commenter supported monthly cutoff limits because they would provide an incentive for the facility to take corrective measures to preclude frequent cutoffs. Some commenters stated that this requirement is overly restrictive.

After careful consideration, EPA has decided to modify this requirement for the following reasons: (1) The Agency does not have data indicating a specific frequency of cutoffs which would be unacceptable at all boilers and furnaces given that the combustion chamber temperature and other conditions are maintained as described above; (2) the Agency believes that operating costs associated with cutoffs will provide sufficient incentive to encourage owners/operators to minimize automatic waste feed incidents; and (3) the recommended use of pre-alarm systems will reduce the number of waste feed cutoffs. However, the final rule allows the Director to use his discretion to determine whether a limit on the frequency of cutoffs is warranted at a specific facility.

Waste Feed Restarts. Today's rule provides that when the automatic waste feed cutoff is triggered by a CO limit or when applicable, an HC exceedance, the waste feed can be restarted only when the hourly rolling average CO/HC levels meet the permitted limits (e.g., 100 ppmv for CO under Tier I).

The Agency proposed two alternative approaches for restarting the waste feed when a cutoff is triggered by a CO exceedance: (1) Restart the waste feed after an arbitrary 10-minute time period to enable the operator to stabilize combustion conditions; or (2) restart the waste feed after the instantaneous CO level meets the hourly rolling average limit. Eight commenters supported restarting the waste feed after the instantaneous CO level meets the permit limit. Five commenters suggested that waste feed can be restarted once the instantaneous CO level meets the hourly rolling average limit. The Agency considered the comments, but continues

to believe that allowing a waste feed restart after the hourly rolling average equals or falls below the permitted limit is preferable. After the waste feed is cutoff, the facility will be burning nonhazardous waste (typically fossil fuel), which should result in CO and HC levels well below the allowable limits. Therefore, the hourly rolling average should fall below the permitted limit within a relatively brief period of time. Allowing the waste feed to be restarted when the instantaneous CO level has dropped to the permitted level may not be desirable, because restarting the waste feed immediately may trigger another cutoff due to a CO spike when the waste feed is restarted.

Three commenters supported the proposed approach to require the HC hourly rolling average to be met before restarting the waste feed cutoff because of a HC exceedance. Three commenters opposed this approach. Instead, these commenters suggested a 10-minute waiting period be used. EPA considered these comments but continues to believe that meeting the hourly rolling average is a conservative approach and is appropriate after a HC exceedance, because the HC is a better surrogate for toxic organic emissions than CO.

D. CEM Requirements for PIC Controls

The final rule promulgates the proposed performance specifications for continuously monitoring CO, HC, and oxygen. See Methods Manual for Compliance with the BIF Regulations, incorporated as appendix IX of part 266 in today's rule. The performance specifications for HC monitoring, however, include specifications for both hot and cold monitoring. Although hot monitoring is generally required by the final rule, cold monitoring may be used for interim status facilities if they certify compliance with the emissions standards within 18 months of promulgation of the rule. Even if cold monitoring is used to certify initial compliance, however, hot monitoring is required for these facilities when they recertify compliance and when they are issued a RCRA operating permit.

One commenter stated that an HC monitoring system is readily available for continuous emissions monitoring (CEM), while five commenters maintained that HC analyzers have serious operational problems. Several commenters requested that alternate HC CEM methods be allowed, specifically monitors with non-dispersive infra-red (NDIR) detectors rather than the required flame ionization detector (FID). One commenter noted that EPA has not validated the FID method for HC analysis nor has it provided any critical

discussion of the current methods of HC analysis.

The Agency considered the use of NDIR detectors for HC monitoring but believes that NDIR systems have limitations compared to FID systems. EPA believes that FID systems are more sensitive than NDIR systems and that an equivalent response is not found with NDIR detectors. The final rule requires the use of FID detectors for HC monitoring.

Four commenters recommended monitoring nonmethane hydrocarbons (NMOC) as opposed to "total" HC because methane, which is predominately emitted from fuel sources, has a high FID response factor. Furthermore, these commenters would like EPA to require testing for specific PICs that respond poorly to HC monitors during test burns. One commenter stated that HC monitors can be varied easily to detect NMOC. EPA does not agree with either suggestion. The Agency is requiring HC monitoring to indicate whether the device is operating under good combustion conditions. We acknowledge that the largest fraction of organic compounds that the HC monitoring system required by the final rule will detect for facilities operating under good combustion conditions will be compounds that are relatively nonhazardous (e.g., methane). In addition, some hazardous compounds, particularly highly chlorinated compounds) will be under-reported. Thus, although the promulgated approach would not be adequate for the purpose of assessing the risk that HC may pose from a given facility, the approach is adequate for its intended purpose—a measure of whether the facility continues to operate within good combustion conditions. This is because EPA's emissions testing has shown that when combustion conditions deteriorate, the compounds that are readily detected by the promulgated HC monitoring system increase correspondingly.

In addition, if a NMOC system were used, the 20 ppmv HC limit would have to be lowered to account for the methane fraction that would no longer be counted. Commenters did not provide support for so adjusting the proposed HC limit. Further, the Agency is concerned that NMOC detectors may not be able to provide continuous data due to the time required for methane separation. The Agency has also found that HC CEMs are more durable than NMOC CEMs, and thus less prone to reliability problems. As a result, the Agency has concluded that HC CEMs are more likely to provide a continuous

indication of combustion conditions than is possible with an NMOC monitor.

Hot Versus Cold HC Monitoring Systems. Except as indicated below, the final rule requires the use of a hot or unconditioned HC monitoring system that must be maintained at a temperature of at least 150 °C until the sample gas exits the detector. See performance specifications in Methods Manual for Compliance with the BIF Regulations (incorporated in today's rule as appendix IX of part 266). Given, however, that the technology has just recently been demonstrated³⁶ to be continuously operational on hazardous waste combustion devices, the final rule allows the use of a conditioned gas monitoring system during the initial phase of interim status operations. Facilities in interim status that certify compliance with the emission standards for metals, HCl, Cl₂, particulate matter, CO and HC within 18 months of promulgation of the final rule may use a conditioned gas system. Facilities that elect to obtain the automatic 12-month extension (or a case-by-case extension) of the 18-month certification deadline, however, may not use a conditioned gas system because the additional time provided by the extension will also provide time to install an unconditioned HC monitoring system. These facilities must demonstrate compliance with the HC limit using an unconditioned gas monitoring system. Further, facilities that certify initial compliance using a conditioned gas (cold) system must use an unconditioned gas (hot) system when they recertify compliance within three years of certifying initial compliance.

EPA is requiring the use of a hot monitoring system because it represents best demonstrated technology given that a larger fraction of HC emissions can be detected with a hot system. As discussed at proposal, a hot HC monitoring system can detect a substantially larger fraction of hydrocarbon emissions than a cold system. This is because the cold system uses a gas conditioning system that removes semi- and nonvolatile hydrocarbons and a substantial fraction of water-soluble volatile hydrocarbons.

EPA received numerous comments regarding gas conditioning (heated versus unheated) for HC monitoring. Eight commenters are in favor of gas conditioning. The purpose of gas

conditioning is to remove moisture from the combustion gases that can degrade instruments or plug sample lines. Sample conditioning, however, can also remove some of the water soluble hydrocarbons and the semi- and nonvolatile hydrocarbons in the flue gas such that methane and other nonhazardous volatile hydrocarbons are frequently the dominant constituents measured by the detector. Some commenters were concerned that fewer PICs would be detected by a conditioned (i.e., cooled) monitoring system. However, one commenter stated that even though the constituents contributing most of the hypothetical risk are relatively nonvolatile they are relatively nondetectable through an unconditioned (heated) monitoring system because of their halogen content.

As discussed at proposal, the Agency is using HC monitoring to implement the technology-based HC limit of 20 ppmv as an indicator of good combustion conditions. The HC monitor is not used in an attempt to quantify organic emissions for risk assessment purposes. Emissions testing has shown that during combustion upset conditions, both the hot and cold HC monitoring systems detect an increase in HC levels because under upset conditions there is a substantial increase in hydrocarbon compounds that are readily detected by either monitoring system.³⁷

One commenter suggested that, rather than specifying a range of 40-64 °F for operation on the conditioner as proposed, a specific conditioning temperature (32 °F) should be required to precisely define the conditioned sampling procedure. We agree that a minimum temperature should be specified rather than the range. The final rule allows a conditioned monitoring system during the initial phase of interim status, and requires that the sample gas temperature must be maintained at a minimum of 40 °F at all times prior to discharge from the detector. EPA selected a minimum temperature of 40 °F from the range of 40 to 64 °F to ensure that moisture was effectively removed from the gas sample to preclude plugging and fouling problems with the monitoring system.

Three commenters suggested that the HC limit of 20 ppmv be re-examined because gas conditioning temperatures or other changes in the measurement

method may influence the amount of HC measured. Given that the 20 ppmv limit is based primarily on test burn data using heated (i.e., unconditioned) monitoring systems, the Agency considered lowering the 20 ppmv limit when a cold (i.e., conditioned) monitoring system is used. (Limited field test data indicate that a heated system would detect from 30% to 400% more of the mass of organic compounds than a conditioned system.) We believe, however, that the 20 ppmv HC limit is still appropriate when a conditioned system is used because: (1) The data correlating heated vs conditioned systems are very limited; (2) the data on HC emissions are limited (and there apparently is confusion in some cases as to whether the data were taken with a conditioned or unconditioned monitoring system); and (3) the Agency's risk methodology is not sophisticated enough to demonstrate that a HC limit of 5 or 10 ppmv using a conditioned system rather than an unconditioned system is needed to protect human health and the environment. The SAB³⁸ also concurs with this view. (More detailed responses to comments on this issue are found in a separate background document.)

E. Control of Dioxin and Furan Emissions

For facilities that may have the potential for significant emissions of chlorinated dibenzodioxins and dibenzofurans (CDD/CDF), the final rule requires emissions testing for both interim status and new facilities to determine emissions rates of all tetra- to octa congeners, calculation of a toxicity equivalency factor, and dispersion modeling to demonstrate that the predicted maximum annual average ground level concentration (i.e., the hypothetical maximum exposed individual) does not exceed levels that would result in an increased lifetime cancer risk of more than 1 in 100,000.³⁹ The Agency considers a facility to have the potential for significant CDD/CDF emissions if it is equipped with a dry particulate matter control device (e.g., fabric filter or electrostatic precipitator)

³⁶ U.S. EPA, "Report of the Products of Incomplete Combustion Subcommittee of the Science Advisory Board", Report # EPA-SAB-EC-90-004, January 1990.

³⁹ EPA is not requiring that the estimated cancer risk from CDD/CDF be added to the risk from metal emissions to demonstrate that the summed risk to the maximum exposed individual is less than 10⁻⁵. The Agency believes that it is inappropriate to sum the estimated health risk from metals that are known or probable human carcinogens with a toxicity equivalency factor for CDD/CDF that is designed to be very conservative.

³⁶ Entropy Environmental Inc., "Evaluation of heated THC Monitoring Systems for Hazardous Waste Incinerator Emission Measurement", Draft Final Report, October 1990; and Shamat, Nadim, et al., "Total Hydrocarbon Analyzer Study", Paper presented at the 83rd Water Pollution Control Federation Conference in Washington, DC, October 8, 1990.

³⁷ EPA is requiring the use of a hot, unconditioned HC monitoring system (except under certain circumstances during the initial phase of interim status) because hot systems are, nonetheless, more conservative in that they detect a larger fraction of organic compounds in emissions. Further, hot systems represent best demonstrated technology for monitoring HC levels.

with an inlet gas temperature within the range of 450 to 750 °F, or if it is an industrial furnace that has hydrocarbon levels exceeding 20 ppmv. See § 266.104.

Dispersion modeling must be conducted in conformance with EPA's "Hazardous Waste Combustion Air Quality Screening Procedure" provided in Methods Manual for Compliance with the BIF Regulations or EPA's Guideline on Air Quality Models (Revised) which are incorporated in today's rule as appendices IX and X, respectively, of part 266, or "EPA SCREEN Screening Procedure" as described in Screening Procedures for Estimating Air Quality Impact of Stationary Sources. The latter document is incorporated by reference in today's final rule at § 260.11. To evaluate potential cancer risk from the congeners, prescribed procedures must be used to estimate the 2,3,7,8-TCDD toxicity equivalence of 2,3,7,8-chlorinated congeners. See "Procedures for Estimating Toxicity Equivalence of Chlorinated Dibenzo-p-Dioxin and Dibenzofuran Congeners" in Methods Manual for Compliance with the BIF Regulations incorporated in the rule as appendix IX of part 266.

Studies conducted by the Agency⁴⁰ and others⁴¹ during development of regulations for municipal waste combustors (MWCs) concluded that PM control devices operated at temperatures greater than 450 °F have the potential for emitting elevated levels of CDD/CDF. At these temperatures, precursor organic materials and chlorine in the flue gas can be catalyzed by PM captured in the PM collection device to form CDD/CDF. Based on these findings, the Agency proposed to restrict the combustion of hazardous waste in BIFs that operate with PM control device temperatures greater than 450 °F.

A number of commenters opposed the proposed limitation on the flue gas temperature to less than 450 °F. Several commenters pointed out technical distinctions among types of boilers and industrial furnaces that affect the ability of a unit to change flue gas temperature and the potential of an ESP to form CDD/CDF. For example, many boiler and industrial furnaces either combust wastes that are very low in chlorine or that have high levels of chlorine capture within the process (e.g., cement kilns).

⁴⁰ See U.S. EPA, "Municipal Waste Combustion Study: Combustion Control of Organic Emissions", EPA/530-SW-87-021C, NTIS Order No. PB87-206090; U.S. EPA, "Municipal Waste Combustion Study: Flue Gas Cleaning Technology", EPA/530-SW-87-021D, NTIS Order No. PB87-208108; and 54 FR 52251 (December 20, 1989).

⁴¹ Vogg H. and L. Stieglitz, "Thermal Behavior of PCDD/PCDF in Fly Ash from Municipal Waste Incinerators", *Chemosphere*, pp. 1373-1378, 1988.

As a result, the CDD/CDF emission potential will vary for different boilers and industrial furnaces, as well as between boilers and industrial furnaces and MWCs. Commenters also stated that there is no direct evidence of CDD/CDF emissions from several types of boilers and industrial furnaces, and that compliance testing to demonstrate 99.99 percent DRE of POHCs and continuous monitoring of CO and HC levels is adequate to ensure minimal emissions of organic compounds.

The Agency has reviewed the available data on the theory of CDD/CDF formation as well as CDD/CDF emissions from BIFs. Based on this review, the Agency agrees that most, but not necessarily all, BIFs burning hazardous waste have low CDD/CDF emission rates. For example, EPA recently tested a cement kiln burning hazardous waste that operates with an ESP at a temperature of 500-500 °F and found it to have relatively high CDD/CDF emissions.⁴² (EPA conducted a risk assessment, however, that estimated the increased lifetime cancer risk to the hypothetical maximum exposed individual from the CDD/CDF emissions ranged from 7 in 10,000,000 to 2 in 1,000,000 without burning hazardous waste and from 2 in 1,000,000 to 4 in 1,000,000 when burning hazardous waste, well under the 1 in 100,000 limit established in today's rule.) The Agency suspects that the elevated CDD/CDF concentrations in the stack gas at this cement kiln are the result of the ESP's operating temperature and the level of HC precursor material in the flue gas. HC concentrations ranged from 66 to 70 ppmv (measured with a hot system, reported as propane, and corrected to 7% oxygen, dry basis) without hazardous waste burning and from 38 ppmv to 63 ppmv with hazardous waste burning. (We note that to continue burning hazardous waste under today's rule, the Director must establish during the part B permit proceedings an alternative HC level for this kiln based on a demonstration by the applicant that HC levels are not higher when burning hazardous waste than under normal conditions and that the facility is designed and operated to minimize HC emissions from all sources—fuels and raw materials. At certification of compliance with the emissions controls other than the HC limit, this facility must also propose a HC concentration limit for the remainder of interim status (until that limit or another limit is established under permit proceedings)

⁴² U.S. EPA, Emissions Testing of a Wet Cement Kiln at Hannibal, MO, December 1990.

that will ensure that HC levels when hazardous waste is burned will not be higher than baseline levels (i.e., HC levels when the system is designed and operated to minimize HC emissions from all sources, when burning normal fuels and feeding normal raw materials to produce normal products, and when not burning hazardous waste.) In addition, trial burn emissions testing must demonstrate that emissions of organic compounds are not likely to result in an increased lifetime cancer risk to the hypothetical maximum exposed individual exceeding 1 in 100,000. See § 266.104(f) and discussion in section II.B.4.b of part three of this preamble.) There may be other factors that influence CDD/CDF levels at this facility (and other facilities), but this is uncertain. In addition, the exact HC concentration in combustion gas below which elevated CDD/CDF concentrations will not occur is unknown.

The Agency continues to believe that the operating temperature of the PM control device (and HC concentrations in flue gas) plays a significant role in CDD/CDF emissions. For a given HC concentration in the flue gas, the available data suggest that the potential for elevated CDD/CDF emissions is low if the PM control device operates at temperatures of less than 450 °F or above 750 °F. Consequently, today's rule does not require BIFs with PM control devices operating at temperatures outside of the 450-750 °F window to determine CDD/CDF emission rates (unless it is an industrial furnace with HC levels greater than 20 ppmv). Owners and operators of units operating within the temperature window, however, are required to conduct stack testing to determine CDD/CDF emission rates and to conduct a risk assessment using prescribed procedures to demonstrate that the estimated increased lifetime cancer risk to the hypothetical maximum exposed individual is less than 1 in 100,000.

The Agency notes that the final rule municipal waste combustors (MWCs) may take a slightly different approach to control dioxin and furans by limiting temperatures at the inlet of the PM air pollution control system to within 30 °F of those achieved in a dioxin/furan compliance test. The preamble to that rule, however, will probably continue to note the possibility of dioxin/furan formation in the temperature range of 230 °C (450 °F). In today's rule, the Agency believes that using temperature and HC levels as a trigger to dioxin/furan testing and risk assessment will be fully protective of human health and the

environment and somewhat easier to implement than the MWC approach.

III. Risk Assessment Procedures

The Agency uses assessment of health risk to develop and implement the final rules for metals, hydrochloric acid (HCl), and chlorine gas (Cl₂). Specifically, the Agency has used risk assessment to: (1) Establish ambient air concentrations of appendix VIII compounds that do not pose an unacceptable health risk for purposes of this rulemaking; and (2) establish risk-based, conservative feed rate and emissions Screening Limits for metals and HCl. In addition, if facilities fail the Screening Limits or elect to conduct dispersion modeling to obtain less conservative limits, the rule allows facilities to use site-specific dispersion modeling to establish emission limits, and ultimately feed rate limits for metals and chlorine.

To establish health-based acceptable ambient concentrations for noncarcinogenic toxic metal and nonmetal compounds (except for HCl, Cl₂ and lead), EPA converted oral reference doses to reference air concentrations (RACs) by assuming average breathing volumes and body weights, and by applying a safety and a background level factor. See 54 FR at 43756. Health-based concentrations for carcinogenic pollutants were derived by converting cancer potency factors, or slopes (unique for each carcinogen), into Risk Specific Doses (RSDs) at a risk level of 1 in 100,000.⁴³ Since carcinogens are assumed to pose a small but finite risk of cancer even at very low doses, the RSD reflects a certain risk level, corresponding to 1 chance in 100,000, or 10⁻⁵ excess risk of cancer for the maximally exposed individual if exposed continuously to multiple carcinogenic chemicals for a 70-year lifetime. RACs for HCl and Cl₂ are based on inhalation data, and a RAC for lead is based on the National Ambient Air Quality Standard (NAAQS).

To establish the Screening Limits for metals and HCl, air dispersion modeling was applied to back-calculate maximum acceptable feed rates and stack emissions rates from risk-based, acceptable ambient concentrations. These calculations were performed for various terrain types, effective stack heights, and land use classifications. The resulting permissible Screening Limits reflect plausible, reasonable

worst-case assumptions about a generic facility that are not site-specific. The Screening Limits process provides a rapid and convenient risk-based mechanism to determine compliance. Conservative assumptions used to estimate health impacts exposure in the Screening Limit process include: (1) Use of reasonable, worst-case estimate of dispersion of stack emissions; and (2) for the Tier I feed rate Screening Limits, assuming that all metals and chlorine fed into the BIF in all feedstreams are emitted (i.e., there is no partitioning to bottom ash or product, and not removal by an air pollution control system.⁴⁴ See 52 FR 17002 (May 6, 1987) and 54 FR 43729 (October 26, 1989). Thus, assumptions and the Screening Limits tend to err intentionally on the side of protecting human health.⁴⁵

If emission levels exceed the Screening Limits (or if the owner/operator so elects), the rule allows a facility to conduct its own site-specific air dispersion modeling in order to establish metals, HCl, and Cl₂ emission limits. Incorporation of site-specific information allows less conservative assumptions (than the reasonable worst-case, nonsite-specific defaults) to be used in the dispersion models. Consequently, site-specific air dispersion modeling may predict lower ambient concentrations than the nonsite-specific modeling reflected in the Screening Limits, thus allowing higher emissions and feed rate limits.

A. Health Effects Data

1. Carcinogens

Health effects evaluations for carcinogens have been summarized in Part Three, I. D, "Evaluation of Health Risk" in the April 27, 1990 proposal (see 55 FR 17873). To summarize briefly, in contrast to noncarcinogens, carcinogens are assumed to present a small but finite risk of causing cancer, even at very low doses. The slope of the dose-response curve in the low dose region is assumed to be linear for carcinogens. Because of

⁴⁴ To obtain credit for partitioning to residue or product and for APCS removal efficiency, owners and operators must conduct emissions testing to demonstrate the overall System Removal Efficiency (SRE)—partitioning plus APCS removal efficiency. The Agency has not assumed an SRE in developing the Tier I feed rate Screening Limits because there are many site-specific factors that can affect the SRE.

⁴⁵ We note that the Screening Limits may not always be conservative, however. Today's rule identifies criteria whereby the Screening Limits may not be used because they may not be conservative. See § 266.100(b). That paragraph in the rule also gives the Agency authority to determine whether the Screening Limits may not be protective in a particular situation. In that case, the owner and operator must use the Tier III procedures—site-specific dispersion modeling.

this, the slope of the curve in the low dose region may be used as an estimate of carcinogenic potency. The unit risk is defined as the incremental lifetime risk estimated to result from exposure of an individual for a 70-year lifetime to a carcinogen in air containing 1 microgram of the compound per cubic meter of air (μg/m³). At an air concentration of 1 μg/m³, the cancer potency slope is numerically equivalent to the unit risk. Thus, at a preselected risk level, the corresponding air concentration which would cause that risk may be calculated by dividing the desired risk level by the unit risk value. Although the resulting value represents an air concentration with units of μg/m³, this concentration is referred to as the Risk Specific Dose (RSD).

When exposed to more than one carcinogen, the Guidelines for Carcinogenic Risk Assessment (51 FR 33992 (September 24, 1986)) recommend adding risks from the individual carcinogens to obtain the aggregate risk (i.e., cancer risks from exposure to more than one carcinogen are assumed to be additive). For today's rule, the Agency has proposed that an aggregate risk level for metals (i.e., arsenic, beryllium, cadmium, and hexavalent chromium) of 10⁻⁵ is appropriate because it would limit the risk level for individual carcinogens to the order of 10⁻⁶. The Agency points out, however, that in selecting the appropriate risk level for a particular regulatory program, it considers such factors as the particular statutory mandate involved, nature of the pollutants, control alternatives, fate and transport of the pollutant in different media, and potential human exposure. See, e.g., 54 FR at 38049 (Sept. 14, 1989). Particular factors bearing on the Agency's choice here include the wide array and potentially large volumes of carcinogenic pollutants that can be emitted by these devices (unlike the situation in such rules as the benzene NESHAP when a single pollutant with well-understood effects was at issue), the need to guard against environmental harm as well as harm to human health, potential synergistic effects of the carcinogens emitted by these devices (which effects are not accounted for by the risk assessment), and legislative history indicating Congressional preference for parity of regulation between BIFs burning hazardous waste fuels and hazardous waste incinerators (S. Rep. No. 284, 98th Cong. 1st Sess. 38). In addition, the increased recognition of the need to control net air emissions of toxic pollutants generally, manifest in Title III of the Clean Air Act Amendments of

⁴³ We note that the cancer risk from the carcinogenic metals must be summed to ensure that the summed risk is not greater than 1 in 100,000. Thus, when more than one carcinogenic metal is emitted, the allowable ground level concentration for each carcinogenic metal is less than the 10⁻⁵ Risk Specific Dose for that metal.

1990, influences the Agency's choice of a conservative risk target in this rule. These same factors can also influence choice of a risk level where the Agency is making site-specific determinations.

The following section discusses comments on health effects data on carcinogens.

a. Unit Risk Factors/Risk Specific Doses. A few commenters argued for deletion of category C carcinogens from consideration in the risk assessment process.

Given that the carcinogenic metals arsenic, beryllium, cadmium, and hexavalent chromium are classified as either A or B carcinogens, this discussion pertains only to the C nonmetal appendix VIII compounds for which the Agency established 10^{-5} RSDs for purposes of implementing the low risk waste exemption, risk assessments for cement kilns with HC levels exceeding 20 ppmv, and health-based limits for Bevill excluded waste.

As a conservative element in the risk assessment process, and especially for purposes of implementing an exemption from some of the emission controls, EPA does not believe that exposure to category C carcinogens should be ignored at this time for those chemicals with cancer potency slopes. The classification schemes categorize chemicals based upon weight of the evidence, not carcinogenic potency. Therefore, a highly potent carcinogen may be classified in the C category and present a threat to health.

b. Quality of the Toxicological Data Base. Several commenters questioned the quality and extent of the toxicology data base and EPA's selection of specific studies used to calculate the cancer potency factors and unit risk values for a particular chemical. For example, one commenter noted that the molecular species of a metal compound emitted from an incinerator may be markedly different from the metallic complex actually tested for carcinogenicity and used to calculate that metal's cancer potency factor. This would distort the risk assessment process. This same commenter argued that beryllium oxide, which would be formed preferentially at the extreme temperatures of a furnace, is relatively inert compared to the molecular complex of beryllium which forms the basis of the cancer potency factor. Another commenter contended that, in general, the less water soluble (and, therefore, less bioavailable) metallic oxides are emitted from incinerators whereas the metallic species tested for cancer were more water soluble and bioavailable (i.e., absorbable into the organism).

EPA acknowledges the concern that the metal complex tested for carcinogenicity in animals reflects that to which humans are exposed. However, the particular metal complex being emitted may not have been tested in animals. In such cases, it is sometimes necessary to use that toxicological data which is available (on the same metal but complexed with a different ligand), limitations notwithstanding, until appropriate data on the complex of concern become available. EPA believes the use of the available data base will result in risk assessment methodology that is protective of human health and the environment.

Moreover, EPA notes that soluble metallic salts may also be emitted under some conditions (e.g., metallic chlorides). For screening purposes, the conservative assumption that soluble (i.e., bioavailable) metallic complexes are emitted, is assumed to protect health. For the site-specific risk assessment option, historical or test burn data may be used to identify probable emitted metallic species. If permit officials conclude during the permit process that appropriate fate, transport, and toxicological data exist for the actual emitted complex to support risk assessment, this could then be used in the site-specific risk assessment option.

c. High Dose to Low Dose Extrapolation. Several commenters questioned the scientific merit of extrapolating from high dose experimental data to low dose cancer risks using existing statistical models, asserting that the process is not biologically-based and is extremely conservative (i.e., overly health-protective). Two commenters asserted that the linearized multistage model should not be applied to non-genotoxic carcinogens because such "carcinogens" promote rather than initiate cancer, thus acting as a classical toxicant with a threshold. These commenters maintained that a chemical such as chloroform, which they claim is non-genotoxic (i.e., has not tested positive in mutation assays), would have a threshold below which there is no risk of cancer. Another commenter argued that biological evidence indicates a threshold for arsenic-induced cancer due to its known benefit as an essential trace element at low doses. This same commenter asserted that hexavalent chromium (Cr+6) is quickly converted in the body to the essential trace element Cr+3 and, therefore, should be treated as a "threshold carcinogen."

The Agency is following closely recent developments in scientific consensus regarding the basic molecular

biology of cancer. EPA will revise its guidelines for carcinogen risk assessment, and other guidance documents, to reflect developing scientific theory on high to low dose extrapolation threshold effects, and other related issues. Until that time, EPA will continue to use its current approach, believing that a more conservative approach is warranted in the face of uncertainty.

d. Chromium Oxidation State. Several commenters argued that the current proposal does not differentiate chromium in the +6 oxidation state from chromium +3. They contend that most chromium emitted from boilers, industrial furnaces, and incinerators exists in the +3 state. Consequently, the proposed approach, which assumes that all chromium is +6, may overstate risks drastically. The commenters recommended that EPA assume that only a fraction of the chromium emitted by incinerators exists in the +6 oxidation state.

EPA concludes that assuming that 100% of the chromium is in the hexavalent oxidation state is a conservative assumption taken in the face of limited data. In a test⁴⁶ of hazardous waste incinerator emissions under varying levels of total chlorine in the waste burned, a high percentage of the total chromium emitted was in the hexavalent state under certain conditions. Until more data is available, showing consistently lower proportions of Cr⁺⁶ under a variety of combustion conditions, EPA believes it is health-protective to assume that chromium from incinerator emissions exists in the hexavalent state. Facilities may elect to conduct emissions testing to determine the actual emission rate of Cr⁺⁶.

e. Additive Risks. One commenter criticized EPA's selection of 10^{-5} as the acceptable aggregate risk level (for carcinogenic metals) for deriving screening limits, and claimed the selection is arbitrary and inconsistent with other EPA policy. EPA policy, the commenter notes, has traditionally embraced a range of risks from 10^{-7} to 10^{-4} , with the final EPA-selected risk level dependent upon site-specific conditions (i.e., characteristics and size of the exposed population).

EPA's rationale for selecting 10^{-5} risk for the MEI is described in the October 26, 1989 supplemental notice (54 FR 43754). In summary, EPA continues to believe that the aggregate cancer risk to

⁴⁶ U.S. EPA, "Pilot Scale Evaluation of the Fate of Trace Metals in a Rotary Kiln Incinerator with a Venturi Scrubber/Packed Column Scrubber, Vol. I, Technical Results", April 1989.

the MEI of 10^{-5} for metals is appropriate because: (1) It provides adequate protection of public health; (2) it considers weight of evidence of human carcinogenicity; (3) it limits the risk from individual Group A and B carcinogens to risk levels on the order of 10^{-6} ; and (4) it is within the range of risk levels the Agency has used for hazardous waste regulatory programs. See also the discussion in section III.A.1 of part three above.

2. *Noncarcinogens.* For toxic substances not known to display carcinogenic properties, there appears to be an identifiable exposure threshold below which adverse health effects usually do not occur. Noncarcinogenic effects are manifested when these pollutants are present in concentrations great enough to overcome the homeostatic, compensating, and adaptive mechanisms of the organism. Thus, protection against the adverse health effects of a toxicant is likely to be achieved by preventing total exposure levels that would result in a dose exceeding its threshold. Since other sources in addition to the controlled source may contribute to exposure, ambient concentrations associated with the controlled source should ideally take other potential sources into account. Therefore, the Agency has conservatively defined reference air concentrations (RACs) for noncarcinogenic compounds that are defined in terms of a fixed fraction of the estimated threshold concentration. The RACs for lead and hydrogen chloride, however, were established differently, as discussed below. The RACs established in today's final rule are identical to those proposed. (See appendix H of the Supplement to Proposed Rule at 54 FR 43762 (October 26, 1989)). (The Agency notes that it does not intend for RACs to be used as a means of setting air quality standards in other contexts. For instance, the RAC methodology does not imply a decision to supplant standards established under the Clean Air Act.)

We note, however, that the RACs proposed in appendix H of the supplement to proposed rule (and promulgated today as appendix IV to the rule) included both Agency-verified and unverified values. Unverified values are subject to revision as the Agency's Reference Dose Workgroup continues to establish verified inhalation RfDs. (Occasionally, the Agency may also revise verified values based on new and significant information.) Since the supplemental notice, the Workgroup has established inhalation RfDs for eight compounds on proposed appendix H

(and promulgated appendix IV to the rule). The basis for the newly-verified RfDs is set forth in the Health Effects Assessment Summary Tables, Fourth Quarter—FY90, U.S. EPA, OERR 9200 6-303 (90-4), September 1990.⁴⁷ Consequently, RACs based on those RfDs are different from the proposed and promulgated RACs. The RACs based on verified inhalation RfDs are shown in the table below. EPA will use the omnibus permit authority of § 270.32(b)(2) to use these revised RACs where the facts warrant.⁴⁸

Compound	RAC in appendix IV of final rule ($\mu\text{g}/\text{m}^3$)	RAC based on recently verified RfD ($\mu\text{g}/\text{m}^3$)
Acroelin (107-02-8)	20	0.03
Carbon Disulfide (75-15-0).....	200	3
p-Dichlorobenzene (106-46-7).....	10	200
Bromomethane (74-83-9).....	0.8	2
Hydrogen Sulfide (7783-06-4).....	3	0.2
Mercury (7439-97-6).....	0.3	0.08
Methoxychlor (72-43-5).....	50	4
Toluene (108-88-3).....	300	500

RACs have been derived from oral reference doses (RfDs) for those noncarcinogenic compounds listed appendix VIII of 40 CFR part 261 (except for lead, HCl, and Cl_2) for which the Agency considers that it has adequate health effects data. An oral RfD is an estimate (with an uncertainty of perhaps an order of magnitude) of a daily oral dose (commonly expressed with units of mg/kg-day) for the human population (including sensitive subgroups) that is likely to be without an appreciable risk deleterious effects, even if exposure occurs daily for a lifetime. Since these oral RfDs are subject to change, EPA will undertake rulemakings as necessary if the derivative RACs change in a way that affects the regulatory standard (see also the discussion of this issue in the Boiler/Furnace supplemental notice published on October 26, 1989 at 54 FR 43718). We note that, in the interim before any such rulemaking is complete,

⁴⁷ The document is available from the National Technical Information Service (NTIS), 5285 port Royal Road, Springfield, VA 22161, (703) 487-4600. The document number is PB90-921-104.

⁴⁸ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

and as discussed above, permit officials may use the omnibus permit authority⁴⁹ of the statute to consider revised health effects data in establishing permit conditions.

The Agency's rationale for using oral RfDs as a basis for RAC-derivation is described in 54 FR 43755 (October 26, 1989). EPA believes the approach to derive RACs is reasonable because: (1) the RfDs are verified by an EPA workgroup whose decisions are subject to public review; (2) the verification process addresses long term (lifetime) exposure; (3) the RfDs are based on the best available information meeting specific scientific criteria; (4) the most sensitive individuals are considered; and (5) the RfD determination takes into account the confidence in the quality of the information on which they are based. Nevertheless, the Agency's Inhalation RfD Workgroup is developing reference dose values (concentrations) for inhalation exposure for several chemicals, and some are currently available. As reference concentrations are established by the Workgroup, the Agency will consider the need to change the RACs established in today's rule as discussed above.

The final rule regulates HCl emissions based on an annual exposure (long-term) RAC of $7 \mu\text{g}/\text{m}^3$.⁵⁰ The RAC is based on the threshold of priority effects resulting from exposure to HCl. Background levels were considered to be insignificant given that there are not many large sources of HCl and that this pollutant generally should not be transported over long distances in the lower atmosphere.

The Agency also proposed a short-term (i.e., 3-minute exposure) RAC for HCl. The Agency agrees with commenters, however, that the proposed RAC was not technically supportable. See discussion in section V of part three of this preamble. Consequently, the final rule does not establish a short-term RAC for HCl.

To consider the health effects from lead emissions, we adjusted the National Ambient Air Quality Standard (NAAQS) by a factor of one-tenth to account for background ambient levels

⁴⁹ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

⁵⁰ U.S. EPA, Integrated Risk Information System (IRIS) Chemical Files.

and indirect exposure from the source in question. Thus, although the lead NAAQS is $1.5 \mu\text{g}/\text{m}^3$, for purposes of this regulation, sources could contribute only up to $0.15 \mu\text{g}/\text{m}^3$. Given, however, that the lead NAAQS is based on a quarterly average, the equivalent annual exposure is $0.09 \mu\text{g}/\text{m}^3$.

Finally, section 109 of the Clean Air Act (CAA) requires EPA to establish ambient standards for pollutants determined to be injurious to public health, allowing for an adequate margin of safety. Secondary NAAQS, also authorized by section 109, must be designed to protect public welfare in addition to public health, and, thus, are more stringent. As discussed above, the Reference Air Concentration (RAC) used in today's rule for Lead is based on the Lead NAAQS. As the Agency develops additional NAAQS for toxic compounds that may be emitted from hazardous waste incinerators, we will consider whether the acceptable ambient levels (and, subsequently, the feed rate and emission rate Screening Limits) ultimately established under this rule should be revised. We note again that the reference air concentration values (and risk-specific dose values for carcinogens) presented here in no way preclude the Agency from establishing NAAQS as appropriate for these compounds under authority of the CAA.

a. Derivation of Oral RfDs/RACs. Many commenters responded to the issue of derivation of oral RfDs/RACs, questioning the scientific basis for the oral RfDs and conversion of RfDs to RACs. Some commenters stated that use of oral RfDs do not factor in differences in routes of exposure (e.g., absorption, first-pass effects) when extrapolating from oral to inhalation routes of exposure. As discussed above, we acknowledge the limitations of developing RACs from oral RfDs but continue to believe the approach used is reasonable and the best available approach until the Agency's Inhalation RfD Workgroup can provide inhalation values.

Other commenters directed their comments exclusively to lead, indicating that the lead RAC was arbitrary. EPA has based the lead RAC on the National Ambient Air Quality Standard (NAAQS). This was done in part because no reference dose or cancer potency slope is currently available for this metal. The final rule uses 10%, rather than 25% as is used for other compounds, as an apportionment factor (as proposed) because the Agency is particularly concerned with: (1) The possible high contribution of lead exposure by indirect pathways,

particularly in urban environments; and (2) the growing concern of low level lead exposure in children since the lead NAAQS was established. (The Agency currently plans to propose to readjust the lead NAAQS in 1991.)

b. Apportionment. Some commenters questioned EPA's proposal apportioning 75% of the RfD to other non-specified sources, thus causing the RAC to correspond to 25% of the RfD. The commenters indicated that the figure of 75% from other sources was arbitrary and could vary from one chemical to another. They suggested that unless other sources of exposure were identified, the RAC should reflect 100% of the RfD.

EPA has chosen a fraction (25%) of the RfD to serve as the basis for the RACs because indirect pathways, known to contribute to risks, are not quantified in these regulations. Even apart from exposures contributed by sources separate from the boiler, industrial furnace, or incinerator, indirect pathways from emissions from these devices themselves may contribute 75% or more to risk. Such indirect (i.e., non-inhalation) pathways include deposition of emitted chemicals on: (1) Gardens and crops directly consumed by humans; (2) meadows used for grazing by beef cattle and other edible livestock; and (3) meadows and fodder used by dairy cattle (and subsequent milk consumption by humans).

Such real exposures, which are not quantified in these rules, are accounted for by the allowance for 75% contribution from other sources. Moreover, it is questionable whether any single facility should be allowed to consume 100% of an individual's exposure allowance, above which any further exposure might cause adverse health effects.

B. Air Dispersion Modeling

The Agency used air dispersion modeling to develop the Screening Limits and dispersion modeling is available as the exposure assessment component of the site-specific risk assessment option. A more extensive discussion of air dispersion modeling is included in the 1989 supplemental notice (see 54 FR 43752-54). This discussion focuses on derivation of Screening Limits wherein the dispersion models are used to "back-calculate" emission rates from acceptable ground level concentrations. The section is also applicable to dispersion modeling used for the risk assessment option (where ground level concentrations are predicted from estimated emissions rates). The reader is referred to this discussion for further information about

air dispersion modeling. It should be noted that for the purposes of the risk assessment option, more site-specific information may be used in place of some of the conservative default assumptions used to derive the Screening Limits, generally resulting in lower predicted ambient air concentrations.

1. Option for Site-Specific Modeling

In responding to this provision in the proposal, many commenters argued for procedures which would allow greater flexibility in the air dispersion modeling process. Many commenters seemed to confuse the issues of dispersion modeling used for the Screening Limits, and modeling for the site-specific risk assessment. EPA concedes that many assumptions used to develop the Screening Limits are, by design, conservative to ensure that the Limits are protective in most cases. These assumptions do not apply, however, when an owner or operator conducts site-specific dispersion modeling under the Tier III standards. For site-specific dispersion modeling, procedures specified in EPA's Guideline on Air Quality Models must be used.

2. Terrain-Adjusted Effective Stack Height

Two commenters stated that in adjusting the stack height to account for local terrain and differentiating for terrain in the screening limits, EPA is "double counting" the influence of terrain unnecessarily. One commenter added that such terrain adjustment of stack height is not supported by the current EPA Guideline on Air Quality Models (Revised) and should be eliminated.

EPA acknowledged this "double counting" of terrain in the supplement to the proposed rule (54 FR 43759), stating that this additional conservatism is necessary to account for the wide range of terrain complexities encountered at real facilities. EPA continues to believe that this double counting is necessary. Without this conservatism, additional criteria would have to be added to the existing list (see § 266.106(b)(7)) for determining when the screening limits may not be conservative and, thus, may not be used. Commenters did not propose (and provide support for) additional criteria for determining when the use of less conservative screening limits would be appropriate. Further, EPA believes that additional criteria would complicate and delay the implementation of the rule by placing additional burden on regulatory officials. Moreover, if a facility cannot

meet the screening limits, then site-specific dispersion modeling may be used to demonstrate compliance with the Tier III standards. Detailed, comprehensive dispersion modeling generally costs less than \$5,000 and, thus, should not pose a substantial burden. In fact many BIFs have already conducted such modeling to comply with applicable standards under the Clean Air Act. Finally, the final rule minimizes the burden of dispersion modeling by allowing the use of screening models.

3. Conservatism in Screening Limits

Five commenters stated that EPA's approach to setting the screening limits is overly conservative and illustrated this by calculating the difference in estimated ground level concentrations using site-specific information as opposed to the default assumptions recommended for the Screening Limits.

It should be noted that the Agency would expect that the use of site-specific information would lead to higher emission limits than under the screening limits. However, the Agency developed feed rate and emission rate screening limits with the intent of minimizing the need of site-specific dispersion modeling and thus reducing the burden of demonstrating compliance with the emissions standards. To ensure that the limits are protective in most cases, however, the Agency derived the limits using conservative assumptions. The Agency believes that, although the assumptions are reasonable, they would likely limit emissions by a factor of 2 to 20 times lower than would be allowed by site-specific dispersion modeling (54 FR 43758).

4. GEP Stack Height.

Two commenters stated that EPA should not impose a GEP stack height limitation for existing stacks. The commenters went on to state that EPA should allow modeling of emissions at actual stack height for existing stacks or, at a minimum, adopt a grandfather provision to exclude GEP from applying to stacks constructed prior to December 31, 1970. One commenter also indicated that EPA should recognize that the stack height used for conducting a site-specific dispersion modeling analysis may exceed GEP formula height, as allowed under section 123 of the Clean Air Act.

The Agency maintains that in complying with the metals and HCl/Cl₂ controls credit will not be allowed for stack heights greater than GEP. GEP stack heights are determined in a manner consistent with the Guideline for Determination of Good Engineering Practice Stack Height (Technical

Support Document for the Stack Height Regulations), Revised (EPA 450/480-023R).

EPA's position here is consistent with the prohibition on using physical stack height in excess of GEP in the development of emission limitations under EPA's Air Program at 40 CFR 51.118 and 40 CFR 51.164. Stack heights higher than GEP cannot be used for compliance purposes because such stacks merely provide added dispersion and dilution of ambient levels. EPA prefers that pollutants be removed from the stack gas to avoid build-up of persistent pollutants (e.g., metals) in the environment and subsequent indirect exposure through, for example, the food chain. In addition, better dispersion of emissions of carcinogenic compounds can merely expose larger populations to (albeit lower) concentrations of pollutants and may not decrease the aggregate population risk (i.e., cancer incidents/year in the affected population).

5. Plume Rise Table

One commenter recommended that EPA extend Table F-2 (plume rise) and Tables E-1 through E-10 (feed rate and emissions screening limits) of the October 26, 1989 supplemental notice to account for the high flow rates typical of many cement plant stacks. Another commenter stated that the effective stack height of most utility boilers exceeds the maximum stack height contained in Tables E-1 through E-10. One commenter indicated that the plume rise values presented in Table F-2 are not conservative for conditions of neutral atmospheric stability at average to high wind speeds or for stable atmospheric conditions at all typical wind speeds. This commenter added that the screening limits based on Table F-2 plume rise may not be conservative for regions having complex terrain.

For the final rule, the plume rise values presented in Table F-2 of the supplement to the proposed rule were revised and the table was expanded to include higher stack exit flow rates indicative of cement kiln stacks (exit flow rates were increased up to a level of 200 m³/s). See appendix VI to the final rule. The plume rise table values were originally developed based on plume rise equations presented in the 1979 User's Guide to the Industrial Source Complex (ISC) model. The plume rise formulation in the ISC model has since been changed to correspond to the way other EPA models determine plume rise. Consequently, the entire table was revised, based on conservative application of the updated neutral and

stable buoyant plume rise equations.⁵¹ The revised values of plume rise represent the lowest value of conservative stable buoyant and neutral buoyant plume rise for each flow rate/temperature level.

The range of terrain-adjusted effective stack heights, shown in Tables E-1 through E-10 of the supplemental notice, was not increased beyond the height of 120 meters. This height was determined to be the maximum terrain-adjusted effective stack height based on the stack parameter and site location data used in the development of the dispersion coefficients (as described in appendix F of the proposed, supplemental rule). Facilities with terrain-adjusted effective stack heights that exceed 120 meters have the option of conducting site-specific dispersion modeling to demonstrate compliance.

6. Compliance by Manipulating Effective Stack Height

One commenter claimed that facilities may elect to circumvent compliance by manipulating their effective stack heights. This commenter added that additional exposures could result from the increased dispersion from taller stacks. The Agency acknowledges that an owner or operator could increase physical stack height up to the GEP maximum to achieve better dispersion and hence a higher allowable emission rate. The Agency maintains, however, that it is more protective of human health and the environment (see discussion in section III.B.4 above) and it may be more cost-effective to upgrade emission control equipment to state-of-the-art control, rather than to increase stack height, particularly given that the Agency plans to consider in the future whether additional controls are needed to better control metals emissions. See discussion in section I of Part Three of this preamble.

7. Effect of HCl Emissions on Acid Rain

One commenter disagreed with the use of Screening Limits for HCl which are based solely upon effective stack height, terrain and land use. This commenter maintained that this approach ignores the effects of HCl in atmospheric reactions and acid rain.

Addressing potential effects of HCl in atmospheric reactions and acid rain is beyond the scope of this rule. The screening limits were developed to

⁵¹ Memorandum from Sue Templeman, Radian Corp., to Dwight Hlustick, EPA, entitled "Derivation of Plume Rise Values for BIFs", dated November 30, 1989.

protect human health in the vicinity of facilities burning hazardous waste.

8. Building Wake Effects

One commenter stated that emissions limits based on effective stack height, terrain, and land use would not be conservative in cases where stacks are subject to building wake effects. This commenter added that only consideration of building wake effects will lead to conservative concentrations for stacks influenced by nearby structures and recommended that site-specific dispersion modeling be required in all cases where the "Guideline for Air Quality Models (Revised)" indicates the necessity for consideration of building wake effects.

The development of the conservative dispersion coefficients incorporated an eleventh hypothetical source in order to represent facilities whose release heights do not meet good engineering practice and whose plumes would thus be subject to building wake effects (54 FR 43752). In addition, the Agency acknowledges that the dispersion coefficients used to establish the Tier I and II Screening Limits may not be conservative in extremely poor dispersion conditions or when the ambient-air receptor is located close to the source and has therefore defined five situations for which the permit writer should require site-specific dispersion modeling (54 FR 43754). Furthermore, the Agency is reserving the right to require that a site-specific dispersion modeling analysis be conducted, irrespective of whether the facility meets the specific Screening Limits. Thus, the permit writer has the option of overruling use of Tier I or II, if a probability exists that application of this methodology would not be protective of the health-based standards. The Tier III approach of conducting site-specific dispersion modeling requires incorporation of building wake effects, as necessary, in the modeling analysis. The Tier I and II Screening Limit methodology was not further modified to account for these factors, as it already embodies repeated use of conservative assumptions.

C. Consideration of Indirect Exposure and Environmental Impacts

1. Indirect Exposure

During the proposal stages of these regulations, a few commenters recommended incorporating indirect exposure pathways into the risk assessment process. Indirect exposure is defined, in these regulations, as any exposure pathway other than direct inhalation of emissions from a boiler or

industrial furnace. One commenter maintained that emissions such as metals, chlorinated dioxins, and furans would be environmentally persistent and able to enter the food chain after deposition on the ground (including crops, pasture land, surface waters). Consequently, the commenter argued that indirect exposures should be factored into the risk assessment.

EPA recognizes that the contribution of indirect pathways may be significant. However, the Agency believes that other conservative procedures, such as apportioning 75% of exposures to either indirect pathways or other emission sources (that can contribute to background levels) in the calculation of RACs, will help offset the contribution of indirect pathways. Another significant source of conservatism, offsetting the contribution of indirect pathways, is represented by the inherent uncertainty, and consequent conservatism, in the models used to estimate unit risk values. Use of the MEI in the Screening Limits procedure comprises yet another conservative element in the risk assessment process which would offset direct estimation of indirect pathway exposure. Therefore, the Agency has not modified the risk assessment process to address indirect pathways.

2. Non-human Health Related Environmental Impacts

One commenter noted that for many pollutants, environmental standards for certain flora and fauna may be more stringent than for humans. Therefore, the effect on non-human receptors should not be ignored in the regulations and the environmental risks should be evaluated.

EPA is concerned about the potential effects of BIF emissions on non-human receptors. While some environmental standards are available for the protection of environmental receptors (notably EPA water quality criteria for aquatic organisms), methods for quantifying exposure and defining acceptable levels for non-human receptors are still largely in the developmental stages. Thus, until these critical procedures are better established, the Agency is not requiring such an evaluation at this time. However, as noted earlier, some of the conservatism in the human health risk assessment is designed to compensate for the absence of direct environmental standards.

D. Acceptable Risk Level for Carcinogens

Today's rule limits the incremental lifetime cancer risk to the hypothetical

maximum exposed individual (MEI) to 10^{-6} . This risk level is within the range of levels historically used by EPA in its hazardous waste and emergency response programs— 10^{-4} to 10^{-6} .

Under the rule, we are limiting the aggregate risk to the MEI from carcinogenic metals to 10^{-6} , and the aggregate risk from carcinogenic organic compounds (dioxins and furans and other PICs under provisions of the alternative HC limit) to 10^{-6} . This will limit in most cases the risk from individual carcinogenic compounds to levels on the order of 10^{-6} but below 10^{-6} . The rule does not require that the risk from carcinogenic organic compounds be added to the risk from carcinogenic metals. This is because the Agency does not believe it is appropriate to sum the risk from metals (i.e., arsenic, beryllium, cadmium, and chromium) that are known or probable human carcinogens (Group A or B carcinogens under the weight-of-evidence approach) with the risk from organic compounds, many of which are possible human carcinogens (Group C carcinogens).

In selecting a 10^{-6} aggregate risk threshold level for this rule, we considered risk thresholds in the range of 10^{-4} to 10^{-6} , the range the Agency generally uses for various aspects of its hazardous waste programs.

We considered limiting the aggregate risk of the MEI to 10^{-6} but determined that this risk threshold would be unnecessarily conservative for the purpose of this rule. In reaching this determination, we considered that, at an aggregate risk level of 10^{-6} , the risk level for individual metals would be on the order of 10^{-7} , which we believe is overly conservative for this rule.

Alternatively, we considered limiting the aggregate risk to the MEI to 10^{-4} . An aggregate risk threshold of 10^{-4} would result in limiting the risk level for individual carcinogens on the order of 10^{-6} . We did not select a 10^{-4} aggregate risk threshold for this proposed rule for a number of reasons. In selecting the appropriate risk level for a particular regulatory program, the Agency considers such factors as the particular statutory mandate involved, nature of the pollutants, control alternatives, fate and transport of the pollutant in different media, and potential human exposure. The Agency believes that a 10^{-6} risk level is appropriate for this rule because: (1) The rule limits emissions considering only direct exposure via inhalation of dispersed emissions. Other routes of exposure (e.g., soil ingestion, uptake through the food chain) are not accounted for by this methodology,

which means the risk is somewhat higher; (2) the carcinogenic metals that the rule controls are Group A or B (i.e., known or probable) human carcinogens; (3) we are concerned about the potential risks posed by the unknown pollutants these devices can emit—i.e., products of incomplete combustion (PICs);⁵² and (4) the 10^{-5} risk level does not result in a rule that poses a substantial burden on the regulated community given that it is neither a major rule as defined by Executive Order 12291 nor will it significantly impact small entities.

When the proposed regulations were published and comments were solicited from affected parties, several commenters responded to the issue of acceptable risk levels for exposure to carcinogens. These commenters questioned the basis of 10^{-5} as representing an acceptable risk level. They maintained that the discussion in the rule, serving as the rationale or justification for selecting this level of risk, was inadequate. Others asserted that the selected acceptable level of cancer risk was not consistent with other regulations (specifically, 10^{-4} cancer risk to the MEI was used to set a national emission standard (NESHAP) for benzene, and 10^{-5} for individuals living "some distance from the source").

The Agency continues to believe that the aggregate cancer risk to the MEI of 10^{-5} is appropriate here because: (1) It provides adequate protection of public health; (2) it limits the risk from individual Group A and B carcinogens to risk levels on the order of 10^{-6} ; and (3) it is within the range of risk levels the Agency has used for hazardous waste regulatory programs. See also discussion in section III.A above.

E. Use of MEI/Consideration of Aggregate Risk

The Agency considered the use of aggregate population risk or cancer incidence (i.e., cancer incidents per year) in developing the national emission limits and in site-specific risk assessments. This approach could, in some situations, be more conservative than considering only MEI risk because, even if the "acceptable" MEI risk level were not exceeded, large population centers may be exposed to emissions such that the increased cancer incidence could be significant. However, it would be difficult to develop acceptable aggregate cancer incidence rates. Nevertheless, it is likely that many facilities that perform a site-specific MEI exposure and risk analysis would also

generate an aggregate population exposure and risk analysis that could be considered by the Agency.

Several commenters addressed the issue of using the maximum exposed individual (MEI) as a basis for risk estimation and recommended using population (aggregate) risks as a more realistic alternative. They maintained that health risks are overstated if based only on exposure of the Maximum Exposed Individual (MEI). Aggregate population-based exposures, which are usually much lower would more realistically represent site-specific health risks. Many commenters noted that using the MEI exposure implicitly assumes that population risks are similar.

EPA believes that evaluation of the MEI only (and not aggregate population risk) is usually a conservative feature of the risk assessment. For screening purposes, a simplified approach is necessary. While site-specific demographic data is usually readily available from 1980 census data, its incorporation into a screen would complicate the screening process unnecessarily. Calculation of screening limits based on the risks to the MEI requires much less site-specific information, facilitating application of the screen to a broad range of sites. If the facility does not meet the screening limits, the option of site-specific risk assessment is still available. While MEI exposures are estimated routinely in a site-specific risk assessment, aggregate population risks may also be estimated, if desired.

Several commenters also contended that even the risk estimates for the MEI may be overly health-protective since the MEI is assumed to reside at this high exposure location 24 hours per day, 365 days per year, for a 70-year lifetime. A more fair evaluation of MEI risk would account for the attenuating effects of time spent indoors and off-site, and include estimates of average residence times and facility lifetimes. Moreover, some exposure assessments assume the MEI is located at the point of maximum ground level concentration predicted by the dispersion model, when in fact, no one may live at this site.

EPA acknowledges that use of the hypothetical MEI is a conservative feature of the rule but maintains that it is reasonable to balance against the potentially nonconservative features of the rule discussed below.

F. Risk Assessment Assumptions

As indicated in the above discussion, we have used a number of assumptions in the risk assessment, some conservative and others

nonconservative, to simplify the analysis or to address issues where definitive data do not exist.

Conservative assumptions include the following:

- Individuals reside at the point of maximum annual average ground level concentrations. Furthermore, risk estimates for carcinogens assume that the maximum exposed individual resides at the point of maximum annual average concentration for a 70-year lifetime.
- Indoor air contains the same levels of pollutants contributed by the source as outdoor air.
- For noncarcinogenic health determinations, background exposure already amounts to 75% of the RfD. This includes other routes of exposure, including ingestion and dermal. Thus, the BIF is only allowed to contribute 25% of the RfD via direct inhalation. The only exception is for lead, where a BIF is only allowed to contribute 10% of the NAAQS. This is because ambient lead levels in urban areas already represent a substantial portion (e.g., one-third or more) of the lead NAAQS. In addition, the Agency is particularly concerned about health risks from lead in light of health effects data available since the lead NAAQS was established. EPA is currently reviewing the lead NAAQS to determine if it should be lowered.
- Risks are considered for pollutants that are known, probable, and possible human carcinogens.
- Individual health risk numbers have large uncertainty factors implicit in their derivation to take into effect the most sensitive portion of the population.

Nonconservative assumptions include the following:

- For carcinogenic compounds, indirect routes of exposure are not considered, such as uptake of arsenic, beryllium, cadmium, and chromium through the food chain.
- Although emissions are complex mixtures, interactive effects of threshold or carcinogenic compounds have not been considered in this regulation because data on such relationships are inadequate.
- Environmental effects (i.e., effects on plants and animals) have not been considered because of a lack of adequate information. Adverse effects on plants and animals may occur at levels lower than those that cause adverse human health effects. (The Agency is also developing procedures and requesting Science Advisory Board review to consider environmental effects resulting from emissions from all

⁵² This rule is, thus, unlike the Benzene NESHAP where EPA targeted one known pollutant will known effects.

categories of waste combustion facilities.)

Many commenters responded broadly on the impact of assumptions and uncertainty in risk assessment. While generally supporting the concept of risk assessment, some asserted that EPA's proposed assumptions were too conservative regarding estimated emission levels, dispersion modeling, and health impact estimation. Further, they maintained that assumptions were not well enough justified and the conservative bias used for each of the multiple assumptions required in a risk assessment tends to accumulate, resulting in gross over-estimation of health impacts. Some of the specific assumptions that commenters considered too conservative are discussed in the following paragraphs.

Two commenters asserted that emission control technology should not be assumed absent when estimating emission levels. One commenter recommended that sensitivity analysis be incorporated into the risk assessment process. This commenter also recommended incorporation into the risk assessment of population mobility (i.e., time spent away from the site), facility lifetimes less than 70 years, and an attenuation factor for time spent indoors, rather than assume 24 hr/day, 70-year exposure.

Many of the respondents argued that economic impacts resulting from overly-conservative risk assessments are substantial. To avoid some of the default assumptions is also burdensome in the commenters' judgment, requiring trial burns, emissions measurements, slag and product assays, and detailed air quality dispersion modeling.

Although many of the assumptions discussed by the commenters are conservative in nature, it is difficult to determine how less conservative assumptions could be used in light of the considerable associated uncertainty. Much of the conservatism referred to originates from assumptions used to derive screening levels. When screening levels are derived, either: (1) No site-specific information is available (nor may be assumed if the procedure is intended to screen a variety of sites); or (2) incorporation of site-specific information in the derivation of screening levels would so complicate the process as to render it prohibitively time-consuming and defeat its utility as a screen. Thus, in light of the uncertainty (i.e., no site specific-information), conservative assumptions are used to derive the screening limits that EPA believes to be protective of human health and the environment.

If the facility fails to meet the screening criteria, the option of site-specific risk assessment is still available. For site-specific risk assessment, more realistic and less conservative assumptions may be incorporated, reflecting actual site or facility conditions.

V. Controls for Emissions of Toxic Metals

The Agency has identified 12 toxic metals in appendix VIII of 40 CFR part 261 that may pose a hazard to human health and the environment: antimony, arsenic, barium, beryllium, cadmium, hexavalent chromium, lead, mercury, nickel, selenium, silver, and thallium. Five of these metals (or their compounds) are known or suspected carcinogens: arsenic, beryllium, cadmium, hexavalent chromium, and nickel.

Many of these toxic metals are contained in hazardous waste that is burned in boilers and industrial furnaces. Many hazardous waste fuels contain metals at levels orders of magnitude higher than levels found in No. 6 fuel oil. Metal-bearing wastes typically used as fuel in boilers and industrial furnaces include spent halogenated and nonhalogenated degreasing solvents used for metals cleaning, paint manufacturing wastes, and other organic liquid wastes with high heating values. Currently, metals emissions from the burning of these wastes are not controlled under RCRA for boilers and the types of industrial furnaces that burn hazardous wastes. Emissions of carcinogenic metals can potentially result in increased lifetime cancer risks of greater than 1×10^{-4} and emissions of noncarcinogenic metals such as lead can result in ambient levels that result in adverse health effects.

Today's final rule promulgates the controls as discussed in the October 1989 supplement to the proposed rule (see 54 FR 43728-29).⁵³ See § 266.106. The rules establish metals emission limits for 10 toxic metals)⁵⁴ listed in

⁵³ Given time constraints in developing the final rule for promulgation, response to major comments could not be provided in the preamble. Responses to comments are provided in the Comment Response Document for the BIF Regulation.

⁵⁴ As proposed, the rule does not limit emissions of nickel and selenium (see 54 FR 43729). Limits cannot be established for selenium because the Agency has inadequate health data to establish a reference air concentration. Nickel is not controlled because the two nickel compounds suspected at this time of being potential human carcinogens, nickel carbonyl and subsulfide, are not likely to be emitted from combustion devices, given their highly oxidizing conditions. In the 1989 supplemental notice to the proposed rule, EPA requested comments on whether the reduced carcinogenic forms of nickel were likely to be emitted from

appendix VIII of 40 CFR part 261 based on projected inhalation health risks to a hypothetical maximum exposed individual (MEI). The standards for the carcinogenic metals (arsenic, beryllium, cadmium, and chromium) limit the increased lifetime cancer risk to the MEI to a maximum of 1 in 100,000. The risk from the four carcinogens must be summed to ensure that the combined risk is no greater than 1 in 100,000. The standards for the noncarcinogenic metals (antimony, barium, mercury, silver, and thallium) are based on Reference Doses (RfDs) below which adverse health effects have not been observed. The standard for lead is based on the National Ambient Air Quality Standard (NAAQS) for lead.

The owner and operator must analyze the hazardous waste to be burned and comply with the standard for each of the 10 metals that could reasonably be expected to be in the waste. The metals excluded from analysis must be identified and the basis for their exclusion explained to ensure that there is adequate justification for not analyzing for a particular metal.

The standards are implemented through a three-tiered approach. Compliance with any tier is acceptable. The tiers are structured to allow higher emission rates (and feed rates) as the owner or operator elects to conduct more site-specific testing and analyses (e.g., emissions testing, dispersion modeling). Thus, the feed rate limits under each of the tiers are derived based on different levels of site-specific information related to facility design and surrounding terrain. Under tier I (see § 266.106(b)), the Agency has provided conservative waste feed rate limits in reference tables as a function of effective stack height and terrain and land use in the vicinity of the stack. The owner or operator demonstrates compliance by waste analysis, not emissions testing or dispersion modeling. Consequently, the Tier I feed rate limits are based on an assumed reasonable, worst-case dispersion scenario, and an assumption that all metals fed to the device are emitted (i.e. no partitioning to bottom ash or product, and no removal by an air pollution control device (APCD)).

Under Tier II (see § 266.106(c)), the owner or operator conducts emissions testing (but not dispersion modeling) to get credit for partitioning to bottom ash

hazardous waste burning devices, especially those furnaces that may not use highly oxidized conditions. However, the Agency did not receive any comments on this issue pertinent to boilers and industrial furnaces.

or product, and APCD removal efficiency. Thus, the Agency has developed conservative emission rate limits in reference tables, again as a function of effective stack height and terrain and land use in the vicinity of the stack. The Agency also assumed reasonable, worst-case dispersion under Tier II.

Under Tier III (see § 266.106(d)), the owner or operator elects to conduct emissions testing and site-specific dispersion modeling to demonstrate that the actual (measured) emissions do not exceed acceptable levels considering actual (predicted) dispersion.

The metals controls apply both to facilities applying for a part B operating permit and to facilities operating during interim status. See section VII of part Three of this preamble for discussion of how the standards apply during interim status.

A. Background Information

The following sections summarize EPA's regulation of metals emissions from boilers and industrial furnaces under other statutes, the 1987 proposed rule and comments received on that proposal, and the basis for the 1989 revision to the proposed rule and comments received on that revised approach.

1. Metal Standards Under Other Statutes

As discussed below, EPA has promulgated standards applicable to boilers and industrial furnaces under other statutes for some but not all of the 10 toxic metals controlled by today's rule. Under the Clean Air Act (CAA), EPA established National Emissions Standards for Hazardous Air Pollutants (NESHAPS) for arsenic, beryllium, and mercury for certain categories of sources (40 CFR part 61). These emission standards were developed considering the quantities and types of metals emissions from various source categories, current control practices, and the economic impacts of reducing emissions. In addition, EPA has established National Ambient Air Quality Standards⁵⁵ (NAAQS) for lead and particulate matter. These ambient standards are implemented by states under the State Implementation Plan (SIP) program to control major sources of lead and particulate emissions. The Agency does not believe that lead emissions standards have been

⁵⁵ We note that the reference air concentration values for noncarcinogens and risk-specific dose values for carcinogens established by today's rule are not intended to, and in no way, preclude the Agency from establishing NAAQS as appropriate for these compounds under authority of the Clean Air Act.

established under the SIPs for any boilers and for many industrial furnaces that burn hazardous waste fuels (e.g., cement and light-weight aggregate kilns) because they are not major lead emitters as defined under the NAAQS. Therefore, EPA believes that today's metals controls are not redundant to existing Agency standards, and, thus, are necessary to ensure adequate protection of human health and the environment.

Particulate emission standards, however, established under the SIPs in conformance with the particulate, NAAQS, or by EPA as New Source Performance Standards (NSPS), do apply to some boilers and industrial furnaces that burn hazardous waste. The particulate standards generally limit metals emissions to the extent that state-of-the-art particulate control technologies will allow. High efficiency electrostatic precipitators (ESPs) or fabric filters are usually required to meet these standards. However, these particulate emission standards may not adequately control metals emissions from the burning of hazardous wastes in many boilers and industrial furnaces for service reasons: (1) The particulate standards do not apply to gas and oil-fired boilers (which represent a large number of hazardous waste fuel burners); (2) smaller coal-fired boilers are not subject to NSPS standards and may not be required under the SIPs to be equipped with ESPs or fabric filters; (3) large volumes of hazardous waste fuels are burned by light-weight aggregate kilns that are equipped with low-pressure wet scrubbers that may not be highly efficient at collecting particulates in the less than 1 micron range, the size range that contains the bulk of the particulate metals; and (4) the risks posed by metals emissions from these boilers and industrial furnaces that are equipped with ESPs, fabric filters, and wet scrubbers can increase substantially when hazardous waste fuel is burned since the levels of some metals, particularly chromium and lead, can be much higher in hazardous waste than in coal.

2. 1987 Proposed Rule

The 1987 proposed rule would have established a four-tiered standard to control emissions of arsenic, cadmium, hexavalent chromium, and lead. Each tier represented a standard protective on its own, and demonstration of compliance with any Tier would have been sufficient. Tiers I through III established hazardous waste metals concentrations, feed rates, and emission screening limits, respectively, as a function of device type and thermal capacity. Tier IV would have provided

for site-specific dispersion modeling to demonstrate that, when the screening limits were exceeded, emissions would nevertheless not pose an unacceptable health risk. Data available to the Agency indicated that only four of the 12 toxic metals listed in appendix VIII of part 261 were likely to be present in hazardous waste burned in boilers and industrial furnaces at levels posing a significant health risk. The permit writer would have determined on a case-by-case basis if any of the other toxic metals were present at levels posing a significant risk.

Public comments submitted on the 1987 proposal stated that EPA's database on the metals composition of hazardous waste was both limited and out of date in light of the Agency's data collection efforts at that time and the HSWA statutory requirement to pretreat waste that heretofore had been land disposed. As a result of HSWA, more hazardous waste is being burned, and pretreatment operations are often likely to involve combustion. The hazardous waste burned currently and in the future in boilers and industrial furnaces may include toxic metals other than the four targeted for regulation in the 1987 proposal. Therefore, the Agency requested comment in the October 1989 supplemental notice on expanding the list of regulated metals to include all 10 appendix VIII metals. (Nickel and selenium were not included as discussed above.) In addition, if standards for all of the toxic metals were included in the rule, the burden on permit writers would actually be reduced because explicit standards would be provided for all metals of potential concern. Without explicit standards, permit writers would have to rely on the omnibus permit authority of the statute to add permit conditions as necessary to protect human health and the environment. Using the omnibus permit authority can involve a lengthy and cumbersome interaction between permit officials and the applicant.

3. 1989 Supplement to Proposed Rule

Based on public comments submitted on the 1987 proposed rule and on additional evaluation of the risk assessment approach used for the proposal, the Agency discussed in the 1989 supplemental notice whether to (1) expand the list of metals for which emissions standards would be established in the rule to include all the toxic metals listed in appendix VIII of part 261 (except nickel and selenium, for the reasons discussed above); (2) establish the screening limits as a function of effective stack height,

terrain, and land use rather than as a function of device type and capacity; and (3) rather than provide the screening limits in the rule itself as proposed in 1987, provide them in a guidance document that would be entitled "Risk Assessment Guideline (RAG) for Permitting Hazardous Waste Thermal Treatment Devices".

a. Expanded List of Metals. In the 1989 supplemental notice, EPA proposed to expand the list of metals for which emissions standards would be established in the rule to include antimony, arsenic, barium, beryllium, cadmium, hexavalent chromium, lead, mercury silver, and thallium. Thus, of the 12 toxic metals listed in appendix VIII, only selenium and nickel would not be controlled for reasons discussed above. Today's final rule establishes standards for all 10 metals. We note that the controls apply only to metals that are present in the hazardous waste feed at detectable levels using procedures specified in SW-846. See § 266.106(a).

b. Revised Basis for Screening Limits. In the 1989 supplemental notice, EPA also proposed to revise the bases for the feed rate and emission rate screening limits to correlate them with stack height and terrain and land use in the vicinity of the facility because these parameters more directly relate emission controls to key parameters that affect the dispersion of emissions, and ultimately, ambient levels (i.e., more so than the proposed approach of correlating the screening limits to device type and heat input capacity). When developing the Tier I through Tier III screening limits proposed in 1987, the Agency made a simplified assumption that effective stack height correlated with thermal capacity (e.g., if the thermal capacity of one device was 10 percent greater than the thermal capacity of another, the effective stack height was also 10 percent greater). The Agency acknowledges that this assumption may not always hold. Stack height is often more a function of the height of nearby buildings and surrounding terrain than a function of the heat input capacity of the device. Thus, the final rule correlates the Tier I and Tier II screening limits to stack height, terrain, and land use.

c. Establishing the Screening Limits in the Rule. As originally proposed in 1987, the final rule incorporates the Tier I feed rate screening limits and the Tier II emissions rate screening limits in the rule itself rather than in a separate guidance document. Our concern (and many commenters concurred) is that a guidance document would not carry the weight of a regulation—permit writers

would be free to accept or reject the guidance (i.e., in this case, the screening limits and the reference air concentration (RACs) and risk-specific dose (RSD) values used to develop the limits). In addition, permit writers would be obligated to justify use and appropriateness of the guidance on a case-by-case basis. This would place a substantial burden on the permit writer and result in inconsistent, and perhaps, inappropriate permit conditions. Finally, implementing the emission standards during interim status as required by the final rule would be virtually impossible without incorporating the screening limits and RACs and RSDs in the rule.

We note that revisions to the RACs and RSD values will undoubtedly need to be made over time as the Agency obtains additional health effects information on the regulated pollutants, and corresponding revisions to the screening limits will be made by formal rulemaking (i.e., proposed revisions, opportunity for public comment, and promulgation of final revisions). In the interim, however, permit writers may apply stricter limits than contained in the rule (if the facts justify it) pursuant to the omnibus permit authority⁵⁶ in section 3005(c)(3).

In the 1989 proposal, as a possible alternative to monitoring waste feed rates and compositions, EPA requested comment on using the results of analyses of emission control residues to monitor compliance with the metals emission standards. Several commenters supported this approach. The final rule allows for this or other alternative approaches to implement the metals controls. See section IV.C.4 of Part Three of the preamble.

B. How the Standards Work

1. Tier III Standards

Tier III standards are discussed first because the Agency believes that the majority of facilities will elect to comply with these standards rather than the Tier I or Tier II screening limits to obtain more flexible permit limits. The Tier III standards (see § 266.106(d)) require: (1) Emissions testing to determine actual emissions taking into account partitioning of metals to combustion gas versus ash or product; and removal of

⁵⁶ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

metals from flue gas by the air pollution control system (APCS); and (2) site-specific dispersion modeling to take into account actual, predicted dispersion conditions at the facility.

To comply with the Tier III standards, predicted ambient concentrations of the carcinogenic metals, arsenic, beryllium, cadmium, and hexavalent chromium at the hypothetical maximum exposed individual (MEI) may not result in an increased cancer risk of more than 1 in 100,000. The risk from each metal must be summed to ensure that the summed risk does not exceed 1 in 100,000. As proposed, the final rule establishes a risk-specific dose (RSD) for each metal at the 10^{-5} (i.e., 1 in 100,000) risk level. If a person is exposed to the 10^{-5} RSD (an ambient air concentration) over a lifetime, the probability of increased cancer incidence is not expected to exceed 1 in 100,000. To ensure that the summed risk from the four carcinogens is no greater than 1 in 100,000, the ratios of the predicted ambient concentration to the 10^{-5} RSD must be summed for all metals to demonstrate that the sum does not exceed 1.0.⁵⁷

For the noncarcinogenic metals, antimony, barium, mercury, silver, and thallium, predicted MEI ambient air concentrations may not exceed the reference air concentrations (RACs), as proposed. The RAC for lead is based on 10% of the National Ambient Air Quality Standard (NAAQS) for lead, as proposed. One commenter stated that the lead RAC may be appropriate for facilities in urban areas but that it is not appropriate for rural areas with low background lead levels. This commenter suggested a waiver of the lead RAC where a facility can show that measured ambient air lead levels do not exceed the NAAQS. Although this approach is reasonable, the final rule does not include a waiver provision for the lead RAC based on site-specific ambient air monitoring⁵⁸ because: (1) the lead

⁵⁷ To implement the metals controls, metals feed rates are limited to levels during the compliance test or trial burn. Thus, if the owner/operator would like to have the flexibility to burn wastes with varying (higher) levels of carcinogenic metals, he/she may choose to develop two or more operating modes with varying feed rates of carcinogenic metals. If so, a compliance test or trial burn would be required for each mode of operation to demonstrate that the summed risk from the carcinogenic metals does not exceed 1 in 100,000. Under this approach, the operator is required to identify the mode of operation at any time, and to comply with the metal feed rate limits for that mode of operation.

⁵⁸ We note, however, that EPA's Guideline on Air Quality Models allows the use of ambient air monitoring to develop site-specific dispersion models.

NAAQS may not be protective given that the Agency has been developing for some time a proposal to lower the NAAQS (perhaps by as much as 50%) based on health effects data obtained since the NAAQS was established initially (the Agency plans to propose a lower lead NAAQS in the fall of 1991); (2) the time and cost of conducting ambient monitoring in conformance with procedures established by EPA's Office of Air Quality Planning and Standards (OAQPS) would make this approach impracticable; (3) a waiver provision would add extra complexity to the rule; and (4) such a waiver would make eventual further regulation under amended section 112 of the Clean Air Act more likely.

a. Emissions Testing. Stack emissions testing for metals must be conducted in conformance with "Methodology for the Determination of Metals Emissions in Exhaust Gases from Hazardous Waste Incineration and Similar Combustion Processes" (Multiple Metals Train) provided in section 3.1 of Methods Manual for Compliance with the BIF Regulations (incorporated in today's rule as appendix IX of part 266).

b. Dispersion Modeling. Dispersion modeling must be conducted in conformance with EPA's "Hazardous Waste Combustion Air Quality Screening Procedure" provided in Methods Manual for Compliance with the BIF Regulations or EPA's Guideline on Air Quality Models (Revised) which are incorporated in today's rule as Appendices IX and X, respectively, of Part 266, or "EPA SCREEN Screening Procedure" as described in Screening Procedures for Estimating Air Quality Impact of Stationary Sources. The latter document is incorporated by reference in today's final rule at § 260.11. The Guideline on Air Quality Models is the Agency's primary guide for dispersion modeling. The "Hazardous Waste Combustion Air Quality Screening Procedure" is included in EPA's Guidance on Metals and Hydrogen Chloride Controls for Hazardous Waste Incinerators. Draft Final Report, August 1989. The derivation of this procedure, which was developed specifically for hazardous waste combustion facilities, is also included in that document. The data base used in the derivation is the same as that used for deriving the Tier I and Tier II screening limits as summarized in the October 26, 1989 supplement to the proposed BIF rule (54 FR 43752). Finally, the EPA SCREEN screening procedure has been in general use since 1988 when it was developed by EPA's Office of Air Quality Planning and Standards. It has been used by

Regional Offices, States, and sources for air dispersion modeling required by EPA air regulations.

If a user determines that there is an inconsistency between either of the screening procedures discussed above and EPA's Guideline on Air Quality Models, the Guideline shall have primacy.

c. GEP Stack Height. As proposed, stack heights used to demonstrate conformance with the final rule may not exceed Good Engineering Practice (GEP) as defined in 40 CFR part 51.100(ii).

d. MEI. As proposed, the hypothetical MEI concentration is the maximum annual average ground level concentration at an off-site location. On-site MEI locations need not be used to demonstrate conformance with the standards, unless a person resides on-site.

e. Bubble Approach for Multiple Stacks. Given that the standards for metals (and HCl and Cl₂) are health risk-based, the final rules are implemented using a limited "bubble" approach as proposed. Under the limited bubble approach, emissions from all hazardous waste combustion stacks at a facility subject to metals and chlorine feed rate limits must be considered in demonstrating conformance with the acceptable ambient levels. This includes all boilers and industrial furnaces regulated under today's rule, and also those RCRA-regulated incinerators and thermal treatment units where feed rate or emission limits have been established for metals, chlorine, HCl, or Cl₂ by EPA. (The Agency considered expanding the bubble to consider other stack emissions such as from nonhazardous waste incinerators or process stacks, but believes that effective implementation would be difficult given the different types and levels of regulatory control and procedures applicable to a variety of stack emission sources.)

To implement the bubble approach, dispersion modeling must consider emissions from all regulated stacks (see discussion above) to predict the maximum annual average off-site ground level (i.e., MEI) concentration of each metal. The MEI location will generally vary for each metal.

2. Tier II Standards

See § 266.106(c). The final rule incorporates the Tier II emission rate screening limits (see appendix I of the final rule) as presented in the 1989 supplemental notice as a function of terrain-adjusted effective stack height, and noncomplex versus complex terrain and urban versus rural land use in the vicinity of the facility. The limits were back-calculated from the RACs and 10⁻⁵

RSDs established by today's rule using reasonable, worst-case dispersion scenarios. Conformance with the Tier II emission rate screening limits is demonstrated by emissions testing (i.e., the facility's actual emissions are compared to the maximum allowable screening limits).

The methodologies for determining terrain-adjusted effective stack height and terrain type are established in §§ 266.106(b) (3) and (4), and the methodology for determining land use in the vicinity of the stack are provided in "Simplified Land Use Classification Procedures for Compliance with Tier I and Tier II Limits in Methods Manual for Compliance with the BIF Regulations (incorporated in today's rule as appendix IX of part 266).

a. Special Requirements for Carcinogens. We note that the Tier II emission rate screening limits for the carcinogen metals arsenic, beryllium, cadmium, hexavalent chromium, are back-calculated from the 10⁻⁶ RSD for each metal. Thus, if the actual emission rate of one of those metals was at the Tier II screening limit, the resulting risk to the MEI is estimated to be 1 in 100,000. Given that the rule requires that the summed risk for all carcinogenic metals cannot exceed 1 in 100,000, the ratios of the actual emission rate to the Tier II allowable emission rate for all of the carcinogenic metals must be summed and the sum cannot exceed 1.0.

b. Bubble Approach for Multiple Stacks. Although we believe that most facilities will use Tier III dispersion modeling to demonstrate conformance with the metals (and HCl and Cl₂) controls when they have multiple stacks to obtain credit for actual dispersion conditions, Tier II (or Tier I) may be used. To use the Tier I feed rate limits or Tier II emissions rate limits for multiple stacks, the owner/operator must conservatively assume that all hazardous waste is fed to the source with the worst-case stack (i.e., considering dispersion). The worst-case stack must be determined from the following equation⁵⁹ as applied to each stack:

$$K = HVT$$

where:

K = a parameter accounting for relative influence of stack height and plume rise;
H = physical stack height (meters);
V = stack gas flow rate (M³/second); and
T = exhaust temperature (Kelvin).

⁵⁹ This equation was proposed at 54 FR 43762 (Oct. 26, 1989). It is derived from a similar equation on pp. 2-3 of Screening Procedures for Estimating Air Quality Impact of Stationary Sources, EPA-450/4-89-010, August 1988.

The stack with the lowest value of K must be used as the worst-case stack.

c. Facilities Ineligible To Use the Tier II (and Tier I) Screening Limits. The screening limits were back-calculated from the RACs and 10^{-5} RSDs established by today's rule using dispersion modeling scenarios that the Agency considers reasonable, worst-case dispersion scenarios. However, dispersion characteristics at a particular facility may, in fact, provide worse dispersion of emissions than used to calculate the screening limits. Consequently, the final rule, as discussed in the 1989 supplemental notice, establishes criteria for facilities that are ineligible to use the screening limits. See § 266.106(b)(7).

3. Tier I Standards

See § 266.106(b). The final rule incorporates the Tier I feed rate screening limits (see appendix I to the rule) as presented in the 1989 supplemental notice as a function of terrain adjusted effective stack height, and noncomplex versus complex terrain and urban versus rural land use in the vicinity of the facility. Conformance with the Tier I feed rate screening limits is demonstrated by sampling and analysis of all feed streams (hazardous waste, other fuels, and raw materials).

By complying with the conservative Tier I feed rate screening limits, applicants burning hazardous waste with very low concentrations of metals would not have to conduct emissions testing. The feed rate limits are back-calculated from the emission screening limits, assuming that all metals present in feedstreams are emitted to the atmosphere. Thus, no metals are assumed to partition to the bottom ash or product, and no allowance is made for removal of metals from the stack gas by an air pollution control system. Consequently, the Tier I feed rate screening limits are equivalent to the Tier II emission rate screening limits and are provided in the same table in appendix I to the rule. (At proposal, the feed rate and emission rate screening limits were provided in separate tables because the Agency presented the limits in different units—lb/hr (pound per hour) for feed rate limits, and g/s (grams per second) for emission rate limits. To avoid confusion and for simplicity, however, the final rule combines the Tier I and II screening limits and presents the limits in g/hr (grams per hour)).

The Tier II discussions above on special requirements for carcinogenic also applies to the Tier I feed rate limits. Thus, to demonstrate conformance with

the feed rate limits for the carcinogenic metals, the sum of the ratios of the actual feed rate to the Tier I allowable feed rate for all of the carcinogenic metals must be summed, and the sum cannot exceed 1.0.

In addition, the Tier II discussions above on the bubble approach for multiple stacks and criteria for facilities that are ineligible to use the screening limit apply to the Tier I feed rate screening limits as well.

Finally, we note that the Tier I feed rate limits may be adjusted upward to reflect site-specific dispersion modeling. This is a hybrid of Tiers I and III. See § 266.106(e). Under this approach, site-specific dispersion modeling may be conducted using the procedures discussed above to back-calculate allowable emission rates for each metal. These allowable emission rates then become the adjusted feed rate limits. Given that emissions testing is not conducted under this modified Tier I approach, no credit is given for partitioning of metals to bottom ash or product, or removal by the air pollution control system.

C. Implementation

As discussed above, EPA developed a three-tiered standard to ensure that metals emissions do not pose an unacceptable risk to human health and the environment. Tier I consists of conservative feed rate screening limits, Tier II establishes conservative emission rate screening limits, and Tier III allows the use of site-specific air dispersion modeling to demonstrate compliance. The decision of which tier to use depends on the physical characteristics of the facility and surrounding terrain, on the anticipated waste compositions and feed rates, and on the level of resources available for conducting the analysis. It is acceptable to use different tiers to comply with the standards for different metals.

1. Tier I Implementation

The Tier I feed rate limits are implemented by sampling and analysis as necessary and flow rate monitoring of each feedstream (i.e., hazardous waste, other fuels, and raw materials) to ensure that the total feed rate of each metal does not exceed the Tier I limit on either an hourly rolling average or instantaneous basis (i.e., at any time), except as provided for the carcinogenic metals and lead as discussed below.

a. Special Procedures for Carcinogenic Metals. Given that, for the carcinogenic metals, the sum of the ratios of the actual feed rates to the Tier I allowable feed rates cannot exceed 1.0, there are no fixed feed rate limits for

individual carcinogenic metals. Rather, the operator must ensure that on an hourly rolling average or instantaneous basis (or as allowed below for carcinogenic metals and lead) that the mixture of carcinogenic metals fed into the BIF does not exceed allowable levels. To demonstrate conformance with this standard, the operator must: (1) Know the concentration of metals in each feedstream and the flow rate of each feedstream; (2) calculate on an hourly rolling average or instantaneous basis (or as allowed below for carcinogenic metals and lead) the sum of the ratios of the actual feed rate to the allowable feed rate; and (3) ensure that the sum of the ratios for all carcinogenic metals (on an hourly rolling average or instantaneous basis or as allowed below) does not exceed 1.0.

b. Averaging Periods. As discussed in the 1989 supplemental notice, the final rule provides an alternative averaging period to the hourly rolling average or instantaneous basis for the carcinogenic metals arsenic, beryllium, cadmium, and chromium, and for lead. For these metals, an averaging period not to exceed 24 hours (i.e., 24-hour rolling average) may be used provided that the feed rate at any time (i.e., instantaneously) does not exceed 10 times the feed rate on an hourly rolling average basis. The Agency believes that an averaging period greater than an hourly rolling average is reasonable given that the metals controls are based on lifetime exposures. However, the Agency is concerned that averaging periods greater than 24 hours may be difficult to enforce. A ten-fold higher emission rate should not pose adverse health effects from short-term exposures for the carcinogenic metals because the 24-hour rolling average would not exceed the level that could pose a 10^{-5} health risk over a lifetime of exposure and the threshold (i.e., noncancer) health effect would not be likely at exposures only ten times higher than the 10^{-5} RSD. A ten-fold higher instantaneous ambient level for lead should not pose adverse health effects given that the acceptable ambient level for long-term exposure to lead (i.e., the lead RAC) is based on only 10% of the National Ambient Air Quality Standard.

We do not believe that a similar approach for the other noncarcinogenic metals would be appropriate given the uncertainty in the level of protection provided by the long-term acceptable ambient (e.g., the RACs are based on oral RfDs converted 1 to 1 to inhalation values).

2. Tier II Implementation

Conformance with the Tier II emission rate screening limits is based on emissions testing (see section IV.B.1.a) using the Multiple Metals Train prescribed in Methods Manual for Compliance with the BIF Regulations (incorporated in today's rule as appendix IX of part 266). The Tier II emission limits are implemented by permit limits on the following parameters based on operations during the trial burn:

- Maximum feed rate of each metal in total feedstreams (e.g., hazardous waste, raw material, other fuel), except as discussed below;
- Maximum feed rate of each metal in total hazardous waste feedstreams;
- Maximum feed rate of each metal in all pumpable hazardous waste feedstreams;
- Maximum feed rate of total hazardous waste and pumpable hazardous waste;
- Maximum feed rate of chlorine in total feedstreams;
- Maximum production rate in appropriate units (e.g., total heat input, pounds of steam produced, raw material feed rate);
- Maximum temperature at the inlet to the air pollution control system (APCS);
- Maximum combustion chamber temperature; and
- Key parameters to ensure proper operation of the APCS.

The approach that must be used to measure these parameters and the approach to establish limits on each parameter based on trial burn data is specified in § 266.102(e)(6).

In addition, the permit must specify sampling and analysis procedures for all feedstreams and all flow rates of all feedstreams must be continuously monitored and recorded.

The final rule establishes limits on these parameters because they can affect metals emissions. The feed rate of metals in both total hazardous waste feeds and pumpable hazardous waste feeds is limited because the physical form of the waste (e.g., solid vs liquid) can affect the partitioning of the metal between bottom ash (for a boiler) or product (for a furnace) and combustion gas entering the PM control system. Metals partition to the combustion gas more readily when fired in a liquid or pumpable form.

The rule limits the metal feed rate from total feedstreams to account for metals in raw materials and nonhazardous fuels. When added to the emissions from hazardous waste, noncarcinogenic metals from these

sources can cause the MEI concentration to exceed the threshold level for health effects and carcinogenic metals from these sources can cause the MEI concentration to exceed the incremental lifetime cancer risk limit for the rule of 1 in 100,000. Thus, these controls ensure that burning hazardous waste does not result in unacceptable risks.

The rule limits the chlorine feed rate because chlorine can increase the volatility of metals, thus increasing the rate of partitioning to the combustion gas and, in some cases, resulting in smaller metal particulates in flue gas that can be more difficult to control with a PM collection system.

The rule limits the maximum capacity of the device to ensure that, during the compliance test (under interim status) or the trial burn (under a part B permit application) the device is feeding raw materials and nonhazardous fuels at a rate that will not be exceeded after the compliance test or trial burn. Thus, the gas flow rate and particulate loading are maximized during the compliance test or trial burn, which tests the ability of the PM collection system to control metals.

The rule limits the maximum temperature at the inlet to the PM collection system because temperature affects the volatility of a metal—some metal species may be partially (or totally in the case of mercury) in the vapor form at high temperatures at the inlet to the PM collection system which will reduce the amount of the metal collected. Limiting the inlet temperature to that occurring during the compliance test or trial burn will ensure that the temperature cannot be increased later which could result in an increase in metals emissions.

Finally, the rule limits key operating parameters of the PM air pollution control system to ensure that it continues to operate as efficiently as it did during the compliance test or trial burn.

3. Tier III Implementation

Conformance with Tier III is demonstrated by emissions testing and site-specific dispersion modeling showing that ambient levels of metals do not exceed allowable levels. Permit limits are established for the same parameters as required for Tier II.

4. Special Requirements for Furnaces that Recycle Collected Particulate Matter

Metal emissions are not feasibly monitored on a continuous basis. Thus, some other means of demonstrating compliance is necessary. For most types of BIFs, compliance is demonstrated by

monitoring feed rates of metals from all feedstreams. EPA requested comment on whether approaches other than monitoring feed rates of metals may be more appropriate to implement the metals controls. See 54 FR 43760 (Oct. 26, 1989). A number of commenters argued that the material balance approach for implementing the metals controls was impractical and nonconservative for cement kilns. The material balance approach for metals limits the feed rate of each metal in three types of feeds: (1) Pumpable hazardous waste; (2) total hazardous waste; and (3) total feedstreams. Although limiting the feed rate of each metal in the total hazardous waste feed and the pumpable hazardous waste feed was workable, commenters argued that limiting the feed rate of metals in total feedstreams was impractical for cement kilns because of the variety of raw materials they feed. Raw materials to a cement kiln are a blend of several components including calcium sources such as limestone, sea shells, marl, or chalk, silica sources such as clay, shale, slate, or sand, and iron sources such as iron ore or mill grindings. The proportions of the components of the blend are changed frequently according to the type of cement desired and the composition of the sources. This can make it very difficult to accurately determine the metals feed rate in the blended raw materials.

Of even more concern to the Agency, however, is the fact that the material balance approach is not likely to be conservative (i.e., protective) for furnaces, like cement kilns, that recycle collected PM back into the furnace. Because the dust is recycled, an increase in the feed rate of a metal in one of the feedstreams—such as spiking during a compliance test (under interim status) or a trial burn (under a part B permit application)—leads to a gradual increase in the concentration (and feed rate) of the metal in the recharged kiln dust which leads to a gradual increase in the metal emissions. Several recharge cycles may be necessary for the kiln to reach steady state condition. Thus, until the system reaches equilibrium, metals feed rates do not correlate with metals emissions.

EPA considered a number of alternatives to address the problem that the recycled dust creates a system that is out of equilibrium when a metal is spiked. We considered handling the recycled dust as another feedstream. Under this approach, the feed rate of metals in the recycled dust would be considered along with those from other feedstreams. (Or alternatively, the feed

rate of metals in the recycled dust would be considered as a fourth level of metals feed rate controls—that is, the feed rate of metals in pumpable hazardous waste, total hazardous waste, recycled dust, and total feedstreams would be limited.) We did not adopt this approach because: (1) The recycled dust is an internal recycled stream so that limits on the recycled dust coupled with limits on other feedstreams would probably correlate with metals emissions in the kiln off-gas, but not necessarily with stack emissions; and (2) during an emissions test when metals are spiked, the system will not be in equilibrium and we do not know enough about metal behavior in the system to determine whether the metals feed rate in the dust would be higher or lower after reaching equilibrium (i.e., we did not know whether this approach would be conservative).

To address this concern that the material balance approach to implementing metals controls is not likely to be conservative (i.e., protective) for furnaces that recycle dust, today's rule requires owners and operators of such devices to comply with one of three alternatives: (1) Daily monitoring of collected PM to ensure that metals levels do not exceed limits that relate concentration of the metal in the collected PM to emitted PM; (2) daily stack sampling for metals; or (3) conditioning of the furnace system prior to compliance testing to ensure that metals emissions are at equilibrium with metals feed rates. We discuss each of these procedures below.

We note first, however, that today's rule gives owners and operators the option of selecting one of these methods only during interim status. The Director will determine under the part B permit application proceeding which of these methods (or whether another method) may be more appropriate on a case-by-case basis considering the facts. See § 266.106(f). In addition, we note that experience with these methods during interim status may indicate the need to refine them for use under a RCRA operating permit. Finally, we note that this provision of the permit standards is not limited to furnaces that recycle collected PM. (However, the methods discussed below may be used during interim status only by furnaces that recycle collected PM.) The permit standards provide this flexibility because, although we believe that these methods (as they may be refined with experience) or other methods that adequately address the concerns described below must be required for systems that recycle collected PM, the

first two methods (i.e., monitoring collected PM or daily stack sampling) may be preferable for other types of devices as well. This is because these first two alternative methods address not only the special problem caused by recycled PM but also the problem of the difficulty (and imprecision) associated with limiting metals emission rates by the material balance approach given the variability of waste and raw material matrices and variability of the concentrations of metals in feedstreams, a problem that also exists for these furnaces and will exist for other devices as well.⁶⁰

a. Monitoring Metals in Collected PM. This approach will control metals emission rates by establishing limits on all of the parameters discussed above for implementing the Tier II and Tier III controls, except for limits on the feed rate of each metal in total feedstreams. In lieu of that parameter, the final rule limits the concentration of each metal in collected PM. See "Alternative Methodology for Implementing Metals Controls" in Method Manual for Compliance with the BIF Regulations (incorporated in today's rule as appendix IX of part 266). The concentration limit is calculated by determining the maximum allowable concentration of each metal in the emitted PM and by empirically relating the concentration of the metal in the emitted PM to the concentration of the metal in collected PM (i.e., the enrichment factor). The maximum allowable concentration of each metal in the emitted PM is determined by dividing the allowable emission rate for the metal in pounds per hour by the applicable PM standard⁶¹ in pounds per hour. The enrichment factor (i.e., concentration of a metal in emitted PM divided by the concentration in collected PM) is determined initially by a series of 10 emissions tests over a two-week period. Quarterly testing is required thereafter to determine if the enrichment factor changes substantially. If so, the series of 10 emissions tests must be conducted again to establish the revised enrichment factor.

EPA acknowledges certain potential limitations to this approach: (1) The Agency has limited data to support the main assumption of this approach—that the enrichment factor will remain constant over the range of normal

⁶⁰ We also note that these methods may be preferable to the material balance approach in some situations for implementing the metals controls for hazardous waste incinerators.

⁶¹ The applicable PM standard is 0.08 gr/dscf or any more stringent standard that may apply under the NSPS or SIP.

operating conditions that occur between the initial series of 10 tests to establish the enrichment factor and the quarterly confirmation tests; and (2) that a problem with emissions is detected after the fact. However, we have built into the approach conservative features that should address concern about whether the enrichment factor may change over time. First, the approach assumes that the facility is always operating at its maximum allowable PM emission limit. Although allowable metal concentrations in collected PM would be higher when the facility operates at lower PM emission levels, the limits do not change. Thus, for example, for every 10% the facility operates under its PM standard, the limit on metals concentrations in collected PM are conservative (lower than necessary) by 10%. Second, the enrichment factor is statistically determined based on test data as the lower of: (1) Twice the enrichment factor at the 95% confidence level; or (2) the enrichment factor at the 99% confidence level. Where there is significant scatter in the data, twice the enrichment factor at the 95% confidence level is likely to govern. Thus, when the enrichment factor varies significantly during the 10 tests, not only is the enrichment factor based on the 95% confidence level, but an additional margin of safety is provided by doubling the factor at the 95% confidence level for purposes of determining the metal limit in collected PM.⁶²

As for detection after the fact, sampling of collected dust is required every eight hours to form a daily composite sample. The operator is allowed up to 48 hours to analyze the daily composite⁶³ given that the analytical procedures can take 24 to 48 hours even for on-site laboratories. In addition, if the sample fails the concentration limit for a metal, the operator may analyze two duplicate samples that he may have elected to obtain to determine if the failed sample is an outlier. Analyses of these back-up samples will also take up to 48 hours. Thus, it could take up to four days to confirm that a dust sample has failed the

⁶² In addition, the methodology requires that a "safe enrichment factor" of 100 be used when a metal is at nondetect levels in the collected PM. Mercury, for example, may be at nondetect levels because it is likely to be in the vapor form (and not collected as PM) in an ESP or baghouse.

⁶³ Except for "noncritical" metals where 30 continuous days of analyses demonstrate that the dust concentration for the metal does not exceed 10% of the concentration limit. For these metals, weekly composite samples must be analyzed. If a weekly composite exceeds 10% of the dust concentration limit, however, daily analyses would be again required.

concentration limit and that a violation of the metals emissions controls may have occurred.⁶⁴

Notwithstanding this provision of the method, EPA expects that owners and operators that want to comply with the spirit of the controls and to operate in a manner that is protective of human health and the environment will conduct triplicate analyses of samples for those metals that may exceed the "conservative" metal limit to avoid the time delay of subsequently analyzing back-up samples if the initial sample fails the concentration limit. Owners/operators should use historical data to determine whether a metal may be close to exceeding a concentration limit and, thus, routinely analyze "back-up" samples concurrently with the "required" sample for such metals. Further, EPA expects that enforcement officials will consider whether the owner/operator has taken such precautions to minimize the time during which they may be operating under violation conditions (if the dust concentration actually exceeds the "violation" limit) in determining appropriate enforcement action.

Notwithstanding these potential limitations, EPA believes that this methodology is preferable to the material balance approach. Rather than attempt to limit emissions by limiting metal feed rates and extrapolating through a number of not well-understood processes for furnaces that recycle dust, the methodology in the final rule goes to the material that is closest to what is being emitted, collected PM, to extrapolate to emissions.

Limits on the operating parameters discussed above will be established under this methodology during a minimum of three "compliance tests" of the first five of the ten emissions tests required to establish the enrichment factor for each metal. Consequently,

⁶⁴ The methodology requires that two dust concentration limits be established for each metal: a "conservative" limit and a "violation" limit. For example, the conservative limit is based on the safe enrichment factor of twice the enrichment factor at the upper 95% confidence level, while the violation limit is based on the enrichment factor at the upper 95% confidence level. If the conservative limit is failed more than 3 times out of 60 times, the owner/operator must notify the Director and he may burn hazardous waste for a total of 720 hours during which: (1) The series of 10 emissions tests must be conducted to revise the enrichment factor and the dust concentration limits; and (2) the maximum feed rate of each metal in the hazardous waste is reduced by 50% (except during the three compliance tests). If the violation limit is exceeded, however, the operator is in violation of the metals controls (and he must also notify the Director, reduce the feed rate of metals in hazardous waste, and conduct the series of 10 tests to calculate the revised concentration limits.)

during three of the ten runs, feed rates of metals in total hazardous waste and pumpable hazardous waste will be at the maximum level that the facility may operate during the remainder of interim status. Although the feed rate of metals in the hazardous waste during the other tests need not be at the maximum level established during the three "compliance tests", the feed rate must be at least 25%⁶⁵ of the compliance test level, and the facility must operate at the compliance test capacity (i.e., the maximum capacity at which the facility may operate during the remainder of interim status). The owner and operator must demonstrate compliance with the applicable PM standard and the metals emissions standards of § 266.106(c) or (d) during all ten tests required to establish enrichment factors. The rule requires that the ten emissions tests to determine enrichment factors be conducted in a two week period with not more than two tests per day, and that the three compliance tests (when metals feed rates from the hazardous waste will be maximized to establish limits for the remainder of interim status) be among the first five tests. EPA is providing these restrictions to ensure that the enrichment factors are representative of operations over several days when operating conditions can vary, and to ensure that any effect on enrichment factors from the high metals loading from spiked hazardous waste during the three compliance tests will be detected during the subsequent tests.

The testing and operating requirements for this methodology are prescribed in detail in "Alternative Methodology for Implementing Metals Controls" in the Methods Manual.

b. Daily Emissions Testing. Under this option, the owner or operator must conduct daily emissions testing to confirm that the metals emission limits are not exceeded. Sampling must be conducted for a minimum of 6 hours each day when hazardous waste is burned. To ensure that sampled emissions are representative of normal emissions that day, the testing must be conducted when burning normal hazardous waste for that day (i.e., considering metals content, point of

⁶⁵ We are not requiring the facility operate at the maximum (i.e., compliance test) metals feed rate from hazardous waste (or other feedstreams) during all ten emissions tests because the purpose of the remaining tests is to obtain data to statistically determine the enrichment factor. Thus, it is important to determine how the enrichment factor may change as the feed rate of metals from various feedstreams varies. Nonetheless, the metal feed rate in the hazardous waste must be a minimum of 25% of compliance test limits during the remaining 7 enrichment factor determinations tests.

induction into the system, and physical form of the waste) at normal feed rates for that day and when the air pollution control system is operated under normal conditions. See § 266.103(c)(3)(ii)(B).

Given that actual emissions sampling is used under this option to determine compliance with emission standards, those operating conditions that apply to other BIFs after certification of compliance that are designed to control metals emissions are not necessary. See § 266.103(c)(1). The operating parameters that need not be limited at certification of compliance under this method are:

- Maximum feed rate of each metal in total feedstreams, total hazardous waste feedstreams, or pumpable hazardous waste feedstreams;
- Maximum feed rate of pumpable hazardous waste;
- Maximum feed rate of chlorine in total feedstreams;
- Maximum combustion chamber temperature and temperature at the inlet to the air pollution control system (APCS); and
- Key parameters to ensure proper operation of the APCS.

This approach has one drawback—there is a time delay before a violation of the emissions limits is determined given that it normally takes a week or more to obtain the results of the stack sampling. To minimize the impact of this problem, the operator is required to know the metals concentration and feed rate of hazardous waste at all times and must determine if a change in metal feed rate from the hazardous waste is likely to result in exceedance of a metal emission limit.

c. Conditioning Prior to Compliance Testing. Under this approach (see § 266.103(c)(3)(ii)(C)), the operator must condition the furnace to ensure that metals emissions are in equilibrium with metals fed into the system from all feedstreams. The owner or operator must determine using engineering judgment when the system has reached equilibrium (i.e., how long the system must be conditioned). During conditioning, hazardous waste and raw materials having the same metals content as will be fed during the compliance test must be fed at feed rates that will be fed during the compliance test.

Under this method, limits for all operating parameters under § 266.103(c)(1) must be established during the compliance test.

5. Trial Burns

A trial burn, or data in lieu of the trial burn (e.g., emissions data from interim

status compliance testing) is required to demonstrate the performance capabilities of a system and to establish the operating limits of a facility for the duration of the operating permit. Compliance limits will be based on the operating conditions and emission rates observed during the trial burn.

Therefore, to obtain the most flexible compliance limits, an owner/operator should conduct test burns and the trial burn under worst-case conditions (those that maximize emissions without exceeding the established limits). These conditions include feeding the waste used in the trial burn at a feed rate and metals concentration that reflect the highest levels expected in present or future operations.

Spiking with Metals. To achieve the maximum allowable concentration of metals, the owner/operator may wish to spike the waste to artificially high concentrations of the metals during the pre-trial burn period and during the trial burn. However, the owner/operator may not feed metals at levels higher than those documented in the part B permit application as those not likely to result in emissions exceeding allowable levels. Permit officials will consider this documentation in establishing pre-trial burn permit conditions for new permits.

6. Monitoring and Analysis Requirements

a. Emissions Testing. Emissions testing and analysis for metals must be conducted using "Methodology for the Determination of Metal Emissions in Exhaust Gases from Hazardous Waste Incineration and Similar Combustion Processes" provided in Methods Manual for Compliance with the BIF Regulations⁶⁶, incorporated in today's rule as appendix IX of part 266. The methodology describes the use of a multiple metals sampling train. The methodology also describes and provides references to the appropriate analytical techniques in Test Methods for Evaluation Solid Wastes (SW-846), incorporated by reference in § 260.11, that must be used to analyze samples.

b. Analysis of Feedstreams. Feedstreams must be analyzed for each of the 10 regulated metals that could reasonably be expected to be in the hazardous waste. If a particular metal is excluded from the analysis, the basis for exclusion must be documented and included in the operating record. Methods for sampling and analysis of feedstreams for metals are prescribed in SW-846.

⁶⁶ U.S. EPA, *Methods Manual for Compliance with the BIF Regulations*, December 1990, EPA/530-SW-91-010. NTIS publication number PB91-120-006.

D. Interim Status Compliance Requirements

As prescribed in §266.103, and discussed in section VII of part three of this preamble, boilers and industrial furnaces operating under interim status must comply with the metals emissions standards during interim status.

V. Controls for Emissions of Hydrogen Chloride and Chlorine Gas

Today's final rule uses a three-tiered regulatory approach to limit HCl and Cl₂ emissions (see § 266.107), an approach identical to that used to control noncarcinogenic toxic metals emissions.

A. Background Information

In the 1987 proposed rule, EPA stated its intention to develop risk-based HCl emission standards in the same format and for the same reasons as the proposed metals emission limits. The HCl emission limits for a particular device would have been based on the device type and capacity, and on the type of surrounding terrain. In the 1989 supplemental notice, EPA discussed an alternative approach to make the standards a function of stack height, terrain, and land use rather than a function of device type and capacity. The reasons for the change were the same as those described above in the discussion of the metals standards.

Controls on Cl₂ were proposed on April 27, 1990 (55 FR 17866) because Cl₂ can be emitted from devices burning chlorinated wastes if insufficient hydrogen is available (i.e., from other hydrocarbon compounds or water vapor) to react with all of the chlorine present in the waste. In recent tests⁶⁷ of a cement kiln, EPA found that approximately 50% of gaseous chlorine emissions were in the form of Cl₂ (and the other 50% was in the form of HCl). In the April 1990 proposal, the Agency proposed a Cl₂ RAC of 0.4 µg/m³.

In the 1989 supplemental notice, EPA also discussed the possibility of using continuous HCl monitors in lieu of the waste feed analysis approach for monitoring HCl emissions are likely to be close to allowable emissions. The Agency continues to believe that this is a reasonable approach and believes that it can be effectively implemented during the permit process as necessary using the omnibus authority.⁶⁸

⁶⁷ U.S. EPA, *Emission Testing of a Precalciner Cement Kiln at Louisville, Nebraska*, November 1990. Document No. EPA/530-SW-91-016.

⁶⁸ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the

B. Response to Comments

The Agency received a number of comments on the proposed HCl and Cl₂ controls as discussed below.

1. Short Term HCl RAC

A number of commenters stated that the Agency's support for the proposed 3-minute RAC for HCl was inadequate. The Agency is currently developing a new methodology for evaluating health effects data to develop a no-adverse-effect short-term exposure level.⁶⁹ Given that the new methodology has not been approved by the Agency, today's final rule does not establish a short-term RAC for HCl.

We note that the Tier I chlorine feed rate limits proposed in the 1989 supplemental notice were based on the short-term HCl RAC because the short-term exposure RAC provided more restrictive feed rate limits than the long-term RAC. Consequently, the 1989 proposed chlorine feed rate limits are not included in today's final rule. In establishing the Tier I feed rate limits for chlorine in today's final rule, the Agency considered both the long-term HCl RAC (i.e., 7 µg/m³) and the Cl₂ RAC (i.e., 0.4 µg/m³), and the partitioning between the two pollutants in stack gases. Given that the Agency has tested for Cl₂ emissions at only two facilities, and at one of the facilities more than 50% of the chlorine partitioned to Cl₂, the Agency conservatively assumed in calculating feed rate limits that 100% of the chlorine would be partitioned to Cl₂. Because the Cl₂ RAC is more than an order of magnitude lower than the HCl RAC, the Tier I chlorine limits were based on 100% conversion of chlorine to Cl₂. If applicants believe that this assumption is too conservative, they may conduct emissions testing to document Cl₂ and HCl emission rates.

2. Need for Cl₂ Controls

Many commenters stated that Cl₂ controls are unnecessary. One commenter believed that very little hydrogen is needed to react with Cl₂ to form HCl. Another commenter believed that operating conditions for boilers and industrial furnaces are not conducive to the formation of Cl₂. Another commenter stated that the proposed limits to control

conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

⁶⁹ Memorandum dated September 18 from Susan Griffin, EPA, to Bob Holloway, EPA, entitled "Derivation of Short-Term RAC for HCl"

HCl emissions will provide adequate control of Cl₂ emissions as well.

The Agency does not agree with these commenters. As discussed above, emissions testing indicates that a substantial fraction of gaseous chlorine can be emitted in the form of Cl₂. In addition, the HCl controls may not be adequate to control Cl₂ emissions. Because Cl₂ has a much lower solubility in water than does HCl, the use of wet scrubbers as the principle emissions control device for HCl is not likely to significantly reduce emissions of Cl₂. Cl₂ emissions can be controlled, however, by increasing the hydrogen content of feedstreams (e.g., by adding steam) or by decreasing the feed rate of chlorine. Moreover, EPA does not believe that high Cl₂ emissions relative to HCl emissions is a widespread occurrence.

3. HCl Emission Test Procedures

A number of commenters who own or operate cement kilns expressed concern that EPA's HCl stack sampling and analysis procedure (see section 3.3 in Methods Manual for Compliance with the BIF Regulations) was inappropriate because it counted as HCl chlorine in inorganic chloride salts and chloride ions that are emitted as ammonium chloride. The Agency has determined⁷⁰ that the filter in the sample probe, in fact, effectively removes fine particulate chloride salts so that they do not interfere with the HCl determination. The Agency agrees, however, with commenters that the procedure may consider as HCl chloride ions that are emitted as ammonium chloride.⁷¹ Although the Agency has not developed a sampling and analysis procedure that would correct this problem, we do not believe that any such over-reporting of HCl will cause a cement kiln to exceed the HCl standard. This is because the highly alkaline particulate matter resulting from the limestone raw materials effectively neutralizes much of the chlorine generated from hazardous waste fed into the kiln.

4. Technology-Based HCl controls

Several commenters stated that technology-based HCl emission controls applicable to hazardous waste incinerators (i.e., 99% reduction of emissions in the stack gas) should also apply to BIFs. As discussed in the proposed rule, the Agency continues to believe that a 99% reduction standard

for BIFs to control HCl emissions may be neither technically feasible nor necessary to protect human health and the environment. The Agency believes that the process chemistry of some industrial furnaces (e.g., cement kilns) generally results in low HCl emissions and concerns about tube corrosion generally limit HCl concentrations in boiler emissions. Given the low uncontrolled HCl concentrations in many BIFs, a 99% reduction standard in addition to the health-based standard required by today's final rule, may not be cost-effective. Commenters did not provide data or information that would support the need for, and the cost-effectiveness of a technology-based standard in addition to the health-based standard provided by the final rule.

We note that the Agency is currently developing health effects data for two other acid gases: hydrogen fluoride and hydrogen bromide.

C. Implementation

Procedures for implementing the HCl and Cl₂ controls are virtually identical to those for the metals controls discussed above.

1. Emissions Testing

Collection and analysis of HCl and Cl₂ in stack gas emission samples must be conducted according to the procedures prescribed in section 3.3 of the Methods Manual for Compliance with the BIF Regulations, (Methods Manual) incorporated in today's rule as appendix IX of part 266. The Methods Manual describes two procedures for sampling emissions for HCl and Cl₂: Methods 0050 and 0051. Method 0050 collects a sample isokinetically and is, therefore, particularly suited for sampling at sources emitting acid particulate matter (e.g., HCl dissolved in water droplets), such as those controlled by wet scrubbers. Method 0051 uses a midget impinger train sampling method designed for sampling sources of HCl and Cl₂ emissions not in particulate form. Samples collected using either method must be analyzed using Method 9057 which is also described in the Methods Manual.

2. Wastes Analysis

Methods for sampling and analysis of feedstreams for total chlorine and chloride are described in detail in SW-846.

3. Interim Status Compliance Requirements.

As discussed in section VII of part three of this preamble, boilers and industrial furnaces operating under interim status must comply with the HCl

and Cl₂ emissions standards during interim status.

VI. Nontechnical Requirements

As proposed, the final rule requires BIFs to comply with the nontechnical standards applicable to other hazardous waste treatment, storage, and disposal facilities. These nontechnical standards address the potential hazards from spills, fires, explosions, and unintended egress; require compliance with the manifest system to complete the cradle to grave tracking system; ensure that hazardous wastes (and hazardous residues) are removed from the site upon closure; and ensure that the owners and operators are financially capable of complying with the standards. BIFs burning hazardous waste fuels that operate storage facilities must already comply with these standards under existing § 266.35(c).

We also note, in particular, that owners and operators of BIFs are subject to the waste analysis requirements of §§ 264.13 and 265.13 by reference. See §§ 266.102(a)(2)(ii) for permitted facilities and 266.103(a)(4)(ii) for interim status facilities. Before a waste is stored or burned, the owner or operator must obtain a detailed chemical and physical analysis of a representative sample of the waste sufficient to enable the owner or operator to comply with today's rule.

The nontechnical standards provided in today's rule are identical to those that currently apply to hazardous waste incinerators. In today's rule, § 266.102(a)(2) applies these standards to permitted BIFs and § 266.103(a)(4) applies these standards to BIFs operating in interim status.

Finally, we note that, as proposed, today's rule applies the same controls on fugitive emissions that currently apply to hazardous waste incinerators. The controls apply to facilities operating under a permit (see § 266.102(e)(7)(i) and, on the effective date of the rule, to facilities operating under interim status (see § 266.103(h)). The controls provide for alternative control strategies including: (1) Keeping the combustion zone where hazardous waste is burned (or where emissions from such burning may migrate) totally sealed; and (2) maintaining the combustion zone pressure lower than atmospheric pressure.

VII. Interim Status Standards

In addition to the nontechnical standards discussed above, today's final rule requires facilities with interim status to comply with substantive

⁷⁰ U.S. EPA, Emission Testing of a Precalciner Cement Kiln at Louisville, Nebraska, November 1990. Document No. EPA/530-SW-91-016.

⁷¹ U.S. EPA, Emissions Testing of a Wet Cement Kiln at Hannibal, MO, December 1990. Document No. EPA/530-SW-91-017.

emission controls for metals, HCl, Cl₂ particulates, and CO (and, where applicable, HC and dioxins and furans). Owners and operators must certify compliance with the emissions controls under a prescribed schedule, establish limits on prescribed operating parameters, and operate within those limits throughout interim status.

Given that interim status requirements are self-implementing, the Agency has developed comprehensive interim status requirements to ensure that the standards are implemented effectively. To assist the regulated community in complying with the requirements, EPA is developing a guidance document entitled Interim Status Guidance Document for BIFs (ISGD). The guidance document will be available shortly after publication of the final rule in the *Federal Register*. The ISGD will summarize the provisions of the rule, provide example forms that may be used to submit data and information required by the certifications of precompliance and compliance (see discussions below), and provide guidance on developing a compliance test protocol. To provide further assistance to the regulated community, EPA plans to conduct a series of workshops open to the public to explain how the interim status standards work. The workshops are scheduled to begin shortly after publication of the final rule in the *Federal Register*. To obtain a copy of the ISGD or information on the dates and locations of the workshop, contact the sources identified at the beginning of this preamble under "FOR FURTHER INFORMATION CONTACT".

The following sections summarize how the interim status standards work.

A. Certification Schedule

1. Certification of Precompliance

The BIF rule is effective 6 months after the date of promulgation. By the effective date, an owner/operator must submit a certification of precompliance providing prescribed information supporting a determination that emissions of individual metals, HCl, Cl₂, and particulates are not likely to exceed allowable levels. See § 266.103(b)(2). For certification of precompliance, the owner/operator must use engineering judgment to evaluate available information and data (or must use EPA-prescribed default data provided in sections 8.0 and 9.0 of Methods Manual for Compliance with the BIF Regulations, incorporated in today's rule as Appendix IX of part 266) to determine that, under the operating limits (for EPA-prescribed parameters) that the owner/operator establishes, emissions are not

likely to exceed the allowable emissions provided by §§ 266.105, 266.106, and 266.107. The owner and operator must then comply with these operating conditions (see discussion in section VII.B below) submitted in the precompliance certification during the interim status period of operation until a revised precompliance certification is submitted or until a certification of compliance is submitted as discussed below.

In addition, by the effective date of the rule, the owner or operator must submit a notice for publication in a major local newspaper of general circulation providing the general facility information prescribed by § 266.103(b)(6). The information that must be provided in the notice includes: The name and address of the owner and operator of the facility; the type of facility, the type and quantity of hazardous waste burned; the location where the operation record of the facility can be viewed; a notification that a facility mailing list is being established so that interested parties may notify the Agency that they wish to be placed on the mailing list to receive future information and notices about the facility; a brief summary of the RCRA regulatory system for BIFs; and the address of the EPA Regional Office where additional information on the RCRA regulatory system may be obtained. EPA is requiring this public notice to ensure that the local citizenry is aware that the BIF is burning hazardous waste and that, to the extent desired, the local citizenry may become better informed about the facility operations through site inspections and review of data in the operating record. In turn, this opportunity for local involvement in facility operations should provide an added incentive for the owner and operator to comply with the spirit and letter of the interim status standards.

EPA notes that facilities that meet the definition of "in existence" of § 266.103(a)(1)(ii) but that are not burning hazardous waste on the effective date of the rule must nonetheless submit a certification of precompliance based on planned operations. The certification may be revised at any time in the future if necessary. See § 266.103(b)(8).

2. Certification of Compliance

Within 18 months of promulgation, the owner/operator must conduct compliance testing⁷² and submit a

⁷² We note that compliance testing may be conducted only under operating conditions for which the facility has submitted a certification of

certification of compliance with the standards for individual metals (§ 266.106), HCl and Cl₂ (§ 266.107), particulates (§ 266.105), and CO, and, where applicable, HC and dioxins/furans (§ 266.104 (b) through (e)). The certification of compliance is based on emissions testing and establishes operating limits for EPA-prescribed parameters based on the compliance test. See § 266.103(c)(1).

If the owner/operator cannot submit the certification of compliance within 18 months of promulgation however, he must either: (1) Notify the Director that he is taking an automatic 12-month extension under which hazardous waste burning is limited to a total of 720 hours; (2) obtain a case-by-case extension of time for reasons beyond his control; or (3) stop burning hazardous waste and begin closure of the hazardous waste portion of the facility. See § 266.103(c)(7).

The case-by-case time extension will be provided by the Director if he determines that the owner or operator has made a good faith effort to comply with the requirements in a timely manner but, for reasons beyond his/her control, are not able to meet the certification of compliance deadline. Reasons could include inability to complete modifications to an air pollution control system in time to conduct the compliance test to support the certification, or a major, unplanned outage of the facility (e.g., need to replace refractory in a kiln) just prior to scheduled compliance testing, or as discussed earlier, HC levels attributable to organics in raw materials. The Director may use his discretion to determine the length of the extension.⁷³ The Director also may impose conditions that ensure that the boiler or industrial furnace will be operated in a manner that protects human health and the environment, provided that the Director documents the basis for adding such a condition and provides the applicant opportunity to comment on it.

precompliance. This is because the facility may only operate after the effective date of the rule and prior to submittal of a certification of compliance under conditions for which it has certified precompliance. If any applicable emission standard is exceeded during the compliance test (or during pretesting), the facility must immediately submit a revised certification of precompliance establishing revised (i.e., more stringent) operating limits.

⁷³ We would not expect for the Director normally to limit the hours that hazardous waste may be burned under a case-by-case extension given that the owner/operator must support the need for the extension and, if granted, the extension must be for a legitimate need. In contrast, the hours of burning are limited for the automatic 12-month extension because there is no judgement by the Director that, in fact, the extension is warranted.

In addition, we note that a case-by-case extension may be requested and granted for any interim status certification deadline under § 266.103 (c) or (d). A case-by-case extension may be granted after an owner/operator has elected to take the 12-month automatic extension, an extension may be granted if the owner/operator cannot comply with the recertification schedule (see discussion below), and an existing extension may be extended.

3. Recertification

Owners and operators must periodically conduct compliance testing and recertify compliance with the standards for individual metals, HCl and Cl₂ particulates, and CO, and, where applicable, HC and dioxins/furans within three years of the previous certification while they remain in interim status (i.e., until an operating permit is issued under § 270.66). See § 266.103(d). EPA is requiring recertifications primarily to ensure that air pollution control systems do not deteriorate over time.

4. Failure to Comply with the Certification Schedule

If the owner or operator does not comply with the certification schedule, all hazardous waste burning must cease as of the date of the missed deadline, and closure must commence. See § 266.103(e). Any burning of hazardous waste by such a device after failure to comply with the certification schedule must be under a RCRA operating permit. See § 270.66.

To comply with the certification schedule, complete and accurate certifications of precompliance and compliance must be submitted by the applicable deadlines. (Although the deadline for certification of compliance may be extended (see § 266.103(c)(7)), the deadline for certification of precompliance may not be extended.) In addition to terminating interim status if the owner and operator do not comply with the certification schedule, EPA will also take appropriate enforcement action.

When closing a BIF, all hazardous waste and hazardous waste residues, including, but not limited to, ash, scrubber water, and scrubber sludges, must be removed from the affected BIF. In addition, the owner/operator must comply with the general interim status closure requirements of §§ 265.111–265.115, as amended. These requirements, which are incorporated by reference into today's rule, specify closure performance standards; submission of and compliance with a written closure plan; disposal or

decontamination of equipment, structures, and soils; and certification procedures for closure.

We note that under amended § 265.112(d)(2), for an owner or operator who fails to submit a complete certification of compliance by the applicable compliance deadline (including the automatic 12-month extension or the case-by-case extension under § 266.103(c)(7)(i), the date that he "expects to begin closure" is within 30 days after the applicable deadline. Therefore, for example, for an owner who takes the automatic 12-month extension, the closure notification requirements of § 265.112(d)(1) or the closure activity requirements of § 265.113 would not be triggered unless and until the owner fails to submit a complete certification of compliance by the 12-month extended deadline and a case-by-case extension beyond the 12-month extension was not obtained.

For any other BIF owner or operator closing during interim status operation (i.e., one who closes between the effective date of the rule but before the interim status compliance deadline of 18 months after promulgation of the rule, or one who submits a complete certification of compliance by the applicable 18-month compliance deadline, the 12-month automatic extension, or case-by-case extension, and closes during interim status), the date when he "expects to begin closure" under § 265.112(d)(2) will remain either within 30 days after the date on which any hazardous waste management unit receives the known final volume of hazardous waste, or if there is a reasonable possibility that the unit will receive additional hazardous waste, no later than one year after the date on which the unit received the most recent volume of hazardous waste.

5. Development of the Certification Schedule

In the 1989 supplemental notice, the Agency requested comment on alternative schedules for requiring compliance with the emissions standards during interim status. The Agency selected a certification deadline of 18 months (with provision for extensions) because we believe that most facilities will be able to install the necessary monitoring equipment, conduct any precompliance testing that may be necessary, and conduct compliance testing within that time period. Although 18 months from the date of promulgation is a fairly short period of time, we note that Agency staff have made numerous public presentations and have had numerous

discussions⁷⁴ with the regulated community, including, in particular, the development of interim status compliance procedures. Thus, facility owners/operators have had some advance indication of the general regulatory approach taken in the final rule.

The Agency received a comment that the air emission standards for cement kilns should be instituted more quickly than the schedule proposed. The commenter believed that accelerating the schedule will not place an excessive burden on these facilities because the regulations were proposed far enough in advance for cement kilns to come into compliance. The Agency has considered this comment and: (1) Sees no compelling reason to single out cement kilns from other BIFs for an accelerated schedule; and (2) continues to believe that an 18-month compliance period is representative of the time required to implement necessary plant design or process modifications, install monitoring and compliance equipment, conduct facility compliance testing, and submit a certification of compliance testing that documents key operating limits during the remainder of the interim status period. In fact, the Agency is concerned that in some situations, where, for example, the air pollution control system may need to be modified, an 18-month deadline may not provide enough time to complete modifications, "shake-down" the system, conduct pre-testing⁷⁵, conduct compliance testing, and analyze test data and submit a certification of compliance. Thus, the final rule includes provisions for time extensions to all certification deadlines except for certification of precompliance under § 266.103(b).

B. Limits on Operating Parameters

Limits on operating parameters during interim status are established at certification of precompliance and at certification of compliance following emissions testing 18 months (unless extended) after promulgation of the rule. The operating conditions can be revised prior to certification of compliance by submitting a revised certification of precompliance. The operating conditions can be revised after certification of

⁷⁴ See the public docket for this rulemaking for summaries of meetings held with groups including: Cement Kiln Recycling Coalition, Chemical Manufacturers Association, National Solid Waste Management Association, Council of Industrial Boiler Operators, and Hazardous Waste treatment Council.

⁷⁵ Although pretesting is not required, EPA believes that most facilities will conduct pretesting before conducting the formal compliance testing with all its attendant QA/QC requirements.

compliance by conducting emissions testing and submitting a revised certification of compliance.

After the effective date of the rule and prior to certification of compliance with the emissions standards based on emissions testing, a facility may operate only under those conditions for which the facility has submitted a "precompliance" certification demonstrating that emissions of individual metals, HCl, Cl₂, and particulates are not likely to exceed allowable levels. The operating conditions for which limits are established by precompliance are (see 266.103(b)(3)):

- Feed rate of each of the 10 metals
- Total feed streams, except for furnaces that recycle collected particulate matter (see discussion in section VIII below)
- Total hazardous waste feed streams
- Total pumpable hazardous waste feed streams;
 - Total feed rate of chlorine and fluoride in all feed streams;
 - Total feed rate of ash in all feed streams, except for cement and lightweight aggregate facilities for which ash content of feed streams is not an operating parameter;
 - Total feed rate of hazardous waste and feed rate of pumpable hazardous waste; and
 - Maximum capacity in appropriate units such as heat input, steam production, or raw material feed rate.

In addition, the following parameters must be considered in demonstrating precompliance and must be continuously monitored (and records maintained in the operating log) when monitoring systems are installed (see § 266.103(b)(6)):

- Maximum combustion zone temperature;
- Maximum flue gas temperature entering the PM APCS; and
- Limits for APCS-specific operating parameters.

Once a facility has conducted compliance testing and certified compliance with the emissions standards, limits for all of the above parameters, as well as for CO (and, where applicable, HC) are established based on the compliance test and remain in force until recertification under new conditions. See § 266.103(c)(1).

C. Automatic Waste Feed Cutoff

Upon certification of compliance, an automatic hazardous waste feed cutoff system must engage when the limits (established in the certification) for the

following operating parameters are exceeded (see § 266.103(g)):

- Total feed rate of hazardous waste and feed rate of pumpable hazardous waste;
- Limits on CO and, where applicable, HC;
- Maximum production rate in appropriate units such as heat input, steam production, or raw material feed rate;
- Maximum combustion zone temperature;
- Maximum flue gas temperature entering the PM APCS; and
- Limits for APCS-specific operating parameters.

Facilities operating during interim status after certification of compliance must test the automatic waste feed shutoff system once every 7 days to ensure that it is operating properly, unless an owner/operator can document that weekly testing will result in unsafe conditions. See § 266.103(j)(3). In all cases, testing at least every 30 days is required. Owners/operators are required to document the results of these tests and all automatic waste feed shutoffs that occur during normal operations.

D. Sham Recycling Policy

The BIF rules supersede the Agency's sham recycling policy (see 48 FR 11157 (March 16, 1983)) after the owner or operator certifies during interim status compliance with the emissions standards for metals, HCl, Cl₂, particulates, and CO (and, where applicable, HC and dioxins and furans). Thus, after certification of compliance, a BIF may burn hazardous waste (other than waste fed solely as an ingredient or solely for material recovery) with a heating value lower than the 5,000 Btu/lb limit generally considered heretofore to be the minimum for a legitimate hazardous waste fuel. Although the Agency considers such burning to be treatment, we believe that conformance with the emissions standards upon certification of compliance under § 266.103(c) will ensure protection of human health and the environment. (Prior to today's rule, BIFs burning a hazardous waste that was not considered to be a legitimate fuel were subject to the subpart O incinerator standards of parts 264 and 265, assuming burning was not for some other legitimate recycling purpose, such as material recovery.)

Although we indicated above that a BIF may burn hazardous waste for the purpose of treatment upon certification of compliance, today's rule allows BIFs to burn such hazardous waste for a total period of time not to exceed 720 hours

prior to certification of compliance. See § 266.103(a)(6). The rule allows such burning only for purposes of compliance testing (and pretesting to prepare for compliance testing) to determine that the device can comply with the emissions standards while burning waste for treatment. The rule limits such burning to a total of 720 hours because we believe that period of time is adequate to complete any pretesting and compliance testing, and it is the same period of time that new BIFs may burn hazardous waste during the pretrial burn period under § 270.66(b)(1).

The Agency discussed three options in the 1989 supplemental notice for superseding the sham recycling policy: rescinding the sham recycling policy on the effective date of the final rule; rescinding the sham recycling policy when a facility comes into compliance with the interim status emission standards; or leaving the sham recycling policy in effect until a RCRA operating permit is issued.

The Agency received comments supporting all three of the options. Eight commenters supported the first option, rescinding the sham recycling policy on the effective date of the final rule, because the policy is considered guidance. Eight commenters supported the second option, rescinding the sham policy when facilities come into compliance with the interim status emission standards, because the standards are protective of human health and the environment. Five commenters supported the third option, leaving the sham recycling policy in effect until a facility is issued a RCRA operating permit, because the permit writer oversight during the permit process is necessary to ensure that a facility complies with the appropriate regulations.

The Agency believes that the procedures required for certification of the interim status emissions standards are adequate to ensure effective implementation and enforcement of the standards. The only emissions standard applicable to permitted facilities that is not required during interim status is the destruction and removal efficiency (DRE) standard requiring a trial burn to demonstrate 99.99% DRE. The Agency does not believe that this is necessary because emissions testing of boilers and industrial furnaces indicates that facilities with CO and HC levels within the limits established by today's rule also are likely to achieve 99.99% DRE.

It should be noted that in rescinding the sham recycling policy for these types of regulated boilers and industrial furnaces, the Agency is not altering in

any way what secondary materials are defined as solid and hazardous wastes when burned for legitimate energy recovery. Thus, all spent materials, sludges, and by-products are solid wastes when burned for recovery, as are off-specification commercial chemical products which are burned as fuels (or used as a component of fuels) in lieu of their original intended use. See §§ 261.2(c)(2) and 261.33. (Non-listed hazardous commercial chemical products (i.e., those that exhibit a characteristic but are not listed in § 261.33) are likewise solid wastes when they are recycled in ways that differ from their normal use. 50 FR at 14219 (April 11, 1985).) With respect to the issue of what constitutes a normal manner of use for an off-specification commercial chemical product that has some Btu value, or the issue of when such a material is used "in lieu of [its] original intended use" (§ 261.33) and so is a solid and hazardous waste, the Agency notes that not every type of burning ostensibly for energy recovery is considered to qualify. Inappropriate modes of burning thus do not render such materials non-wastes. For example, if ignitable off-specification natural gas condensate is burned as a motor fuel, or reactive jet fuel (U 133, hydrazine) is burned as conventional fuel oil, such materials are solid and hazardous wastes and subject to subtitle C controls. This is because the mode of burning is not at all like these materials' original intended use.

E. Submittal of Part B Applications

Permit writers will require owners and operators to submit part B applications for operating permits on a schedule considering the relative hazard to human health and environment the facility poses compared to other storage, treatment, and disposal facilities within the Director's purview.

F. DRE Testing

As proposed, testing to demonstrate 99.99% destruction and removal efficiency (DRE) of organic compounds in the waste is not required under interim status. The complexity and costs of DRE testing, as well as the substantial interaction needed between owners/operators and regulatory officials, make such testing impracticable during interim status. EPA expects that the control requirements for CO and HC will result in low levels of emissions of organic compounds.

G. Chlorinated Dioxins and Furans

As proposed, hazardous waste containing or derived from any of the following dioxin-listed wastes cannot be

burned in a boiler or industrial furnace operating under interim status: EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027. Burning these dioxin-containing wastes during interim status is prohibited because boilers and industrial furnaces cannot be assumed to achieve the 99.9999 percent DRE required for these wastes.

Even though these wastes may not be burned during interim status, chlorinated dioxins and furans may be emitted as PICs under certain conditions (i.e., when the PM control device is operated within the temperature range of 450–750°F, or when HC concentrations exceed 20 ppmv) as discussed in section I.E of part three of the preamble. EPA believes that the emissions testing and risk assessment requirements of § 266.104(e) can be effectively implemented during interim status without significant EPA interaction. Thus, the rule requires the owner or operator to certify compliance with those requirements, as applicable.

H. Special Requirements for Furnaces

Today's rule provides special interim status requirements for industrial furnaces that feed hazardous waste, except hazardous waste fed solely as an ingredient,⁷⁶ at locations other than the "hot" end where the product is discharged and fuels are normally fired to ensure adequate combustion of hazardous waste prior to conducting a trial burn during the part B permit process (see § 266.103(a)(5)) as follows: (1) The combustion gases must have a minimum temperature of 1800 °F at the point where the waste is introduced;⁷⁷

⁷⁶ Hazardous waste is burned solely as an ingredient if it is burned for neither energy recovery (i.e., it has a heating value less than 5,000 Btu/lb) nor treatment or destruction (i.e., it contains a total of less than 500 ppm toxic nonmetal constituents listed in appendix VIII, part 261).

⁷⁷ EPA is aware that cement companies have experimented with feeding containerized waste into the upper, raw material feed end of the kiln using feed chutes that propel the containers down into the kiln before they rupture and expose the waste to the combustion gas (and begin to release hydrocarbons). In such a situation, the temperature limit applies at the point that the waste may begin to release hydrocarbons—the point where the container impacts the charge bed. The temperature limit does not apply to the point where the container is actually charged into the kiln. (If, however, a noncontainerized waste is fired into the kiln at the upper end, the 1800 °F temperature limit applies at the location where the waste exits the firing system.) Although this discussion pertains to cement kilns, EPA notes that the subject requirements apply to any industrial furnace that feeds hazardous waste at a location other than the "hot" end as described in the text.

(2) the owner or operator must determine (and include such determination in the operating record) that there is sufficient oxygen present to combust the waste; (3) the continuous hydrocarbon monitoring controls provided by § 266.104(d) apply; and (4) for cement kilns, hazardous waste must be fed into the kiln itself;

EPA established a minimum temperature of 1800 °F for the location of hazardous waste firing and is requiring that the owner/operator demonstrate that adequate oxygen is present to sustain combustion given that it is generally accepted that organic compounds are readily destroyed at temperatures above 1800 °F in the presence of adequate oxygen. The demonstration of adequate oxygen is particularly important for cement kilns because they are operated close to stoichiometric oxygen levels (i.e., with little excess oxygen in the kiln) to efficiently maintain the high temperatures necessary to calcine and sinter the raw materials. Although higher excess oxygen levels would better ensure more complete combustion of fuels, operating at higher oxygen levels is less thermally efficient and reduces the kiln production capacity.

In addition, continuous hydrocarbon (HC) monitoring is required to demonstrate that HC levels do not exceed the regulatory limit of 20 ppmv on a hourly rolling average basis (or alternative level established under § 266.104(f)) irrespective of whether the CO level is less than 100 ppmv where HC monitoring is not normally required. See § 266.103(a)(5). EPA is requiring HC monitoring because of the concern that CO monitoring alone may not be an adequate indicator of good combustion conditions when hazardous waste is fed at locations other than where (nonhazardous) fuels are normally fired. See discussion in part three, section II.B.4.a of this preamble. Continuous monitoring of HC and compliance with the applicable operating limit is required upon certification of compliance (or, for furnaces that feed raw materials containing organic matter and that receive a time extension to certify compliance, upon receipt of the time extension.⁷⁸)

The Agency considered whether the hydrocarbon controls were redundant to the operating requirements specified above and concluded that HC monitoring is needed to effectively

⁷⁸ We note, as discussed elsewhere in the text, the time extension will be conditional on, among other things, HC (and CO) levels not exceeding an interim limit established in the extension.

implement and enforce the controls on organic emissions. Although the operating requirements alone should be adequate to limit organic emissions, absent HC monitoring there would be no continuous verification that the operating requirements were, in fact, adequate and that the owner/operator maintained compliance with the operating requirements.

Finally, the rule requires that hazardous waste be fired into a cement kiln itself to ensure that the waste is not introduced at a location that may not be conducive to complete combustion of the waste. For example, cement companies have considered burning hazardous waste in the precalciner of a cement kiln. Although such practices may prove during the permit process to be acceptable, EPA has not tested emissions from a kiln burning waste at locations other than in the kiln itself. EPA is concerned that complete combustion of organic constituents may not be ensured. Thus, burning hazardous waste in a cement kiln precalciner is not allowed during interim status. (This restriction is limited to cement kilns because this is the only type of kiln of which the Agency is aware where hazardous waste may be fired at a location that is clearly not designed for optimum combustion conditions. A cement kiln precalciner is designed primarily to achieve calcining of raw materials and may not provide adequate combustion of hazardous waste.) The special requirements do not apply to hazardous waste that is burned or processed solely as an ingredient⁷⁹ because such waste does not contain significant levels of hazardous nonmetal constituents (i.e., compounds listed in appendix VIII, part 261) and, thus, nonmetal emissions will not pose a significant risk to human health and the environment. (Metal emissions will be adequately controlled by today's rule irrespective of where the waste is fed to the system because metals are controlled by a PM control device.) Thus, emissions of nonmetal compounds are not of concern when a waste is burned (or processed) solely as an ingredient. EPA considers a waste to be burned solely as an ingredient in a kiln if it is not burned partially as a fuel or

for conventional treatment (i.e., destruction). The Agency considers a waste that is fed to boilers and industrial furnaces to be burned at least partially for energy recovery and not as an ingredient if it has a heating value of 5,000 Btu/lb or greater, as-generated, and at least partially for treatment (i.e., destruction) if it contains more than a total of 500 ppm (by weight) of appendix VIII, part 261, nonmetal hazardous constituents. See 54 FR at 43731-32 where EPA discussed use of a 500 ppm standard for distinguishing between recycling activities tantamount to production and those constituting conventional treatment.

The Agency notes in addition that it ordinarily does not consider metal-bearing wastes hazardous wastes to be used as ingredients when they are placed in industrial furnaces purportedly to contribute to producing a product. (The use of metal-bearing wastes for material recovery is discussed earlier in the preamble, and this discussion does not deal with the issue of when such wastes are burned for legitimate material recovery in industrial furnaces.) To be considered legitimate use as an ingredient, it would normally need to be demonstrated to EPA (or an authorized State) pursuant to § 261.2(f) that the hazardous metal constituents in the waste are necessary for the product (i.e., are contributing to product quality) and are not present in amounts in excess of those necessary to contribute to product quality. See 50 FR at 638 (Jan. 4, 1985). This would normally require some demonstration that these hazardous metal constituents do not render the product unsafe for its intended use. (The other sham recycling criteria discussed frequently by EPA would also have to be satisfied. See, e.g., 53 FR at 522 (Jan. 8, 1988).) The types of uses of hazardous wastes in industrial furnaces to produce waste-derived products of which the Agency is aware, such as using hazardous wastes to produce aggregate or cement (the Agency is not actually aware of cement kilns using hazardous wastes ostensibly as ingredients, although some facilities have contemplated engaging in the practice) do not appear to satisfy these criteria. In addition, the Agency notes the discussion earlier in this preamble (in the context of hazardous waste used as slurry water) to the effect that the more common and less valuable the raw material the hazardous waste is replacing, the more likely the activity is to be some form of surrogate treatment.

I. Special Metals Controls for Furnaces that Recycle Collected Particulate Matter

For reasons discussed in section IV.C.4 of this preamble, the final rule requires owners and operators of furnaces (e.g., cement kilns, light-weight aggregate kilns with dry particulate matter (PM) control systems) that recycle collected PM back into the furnace to implement the metals emissions controls of § 266.106 (c) or (d) under one of the three alternative methods. The discussion in section IV.C.4 of the preamble summarizes procedures for certification of compliance under the methods. For certification of precompliance, the standard procedures will be used for both the "daily emissions testing" option, and the "conditioning prior to compliance testing" option. Precompliance procedures are different, however, for the "monitoring metals in collected PM" method, as discussed below.

Under the "monitoring metals in collected PM" method, operating limits will be established for all of the parameters listed in section VII.B. above except for the feed rate limit on each metal in total feedstreams. In lieu of that parameter, the special procedures limit the concentration of each metal in collected PM. See "Alternative Methodology for Implementing Metals Controls" in Methods Manual for Compliance with the BIF Regulations (incorporated in today's rule as appendix IX of part 266).

For certification of precompliance, the owner/operator must estimate the enrichment factor for each metal using engineering judgment or EPA prescribed default values. EPA default values are 100 for mercury and 10 for all other metals. The enrichment factors are then used to calculate precompliance dust metal concentration limits using the allowable emission rate for each metal and the applicable PM standard using the same procedures applicable for certification of compliance. Daily (or weekly for noncritical metals) analysis of dust samples is required. If more than 3 of the previous 60 samples fail, the owner/operator must notify the Director. The owner/operator is then allowed to burn hazardous waste for up to 720 hours before a revised certification of precompliance must be submitted that revises the estimated enrichment factors and establishes revised precompliance dust metals concentration limits. The revised enrichment factors must be based on testing or engineering judgment using

⁷⁹ Under the RCRA hazardous waste regulatory program, EPA considers a hazardous waste to be burned or processed as an ingredient if it is used to produce a product. EPA considers a hazardous waste to be burned or processed for material recovery if one or more constituents of the waste is recovered as a product. Nonetheless, the criteria are the same for determining when a waste is burned or processed as an ingredient or for materials recovery versus when it is burned for the partial purpose of energy recovery or conventional treatment.

data or information not considered in the original estimate.

J. Recordkeeping

Over the period of interim status, facilities will be required to generate and maintain data and records designed to demonstrate routine compliance with established limits on operating parameters. These records must be sufficient to allow a RCRA inspector to review and evaluate recent and past operation of the facility for compliance purposes. Records must be maintained for a period of three years or until an operating permit is issued under § 270.66, whichever is later.

VIII. Implementation of Today's Rule

There are three types of treatment, storage, and disposal facilities (TSDF's) which may be affected by today's rule: (1) Facilities which are subject to RCRA permit requirements for the first time as a result of today's rule; (2) facilities which are already operating under interim status; and (3) facilities that have been issued a RCRA permit. The following sections describe the compliance obligations for facilities that have units subject to permitting due to today's rule.

A. Newly Regulated Facilities

Prior to receiving a permit, newly regulated facilities (i.e., facilities which only contain the types of units newly regulated by today's final rule) must qualify for interim status by the effective date of the rule in order to continue managing hazardous wastes in units newly regulated by today's rule. To obtain interim status, the eligible facility must meet three criteria: (1) On the effective date of the BIF rule, the facility must be "in existence" with respect to hazardous waste burning or processing activities; (2) within 90 days of the date of publication, the owner or operator must notify EPA or an authorized State (if not previously required to do so) of the facility's hazardous waste burning or processing activities; and (3) within 180 days of the date of publication, the owner or operator must submit part A of the permit application.

1. Definition of "In Existence".

To meet the definition of an existing facility, the boiler or industrial furnace must either be in operation burning or processing hazardous waste on or before the effective date of the rule, or construction of the facility (including the hazardous waste burning or processing equipment) must have commenced on or before the effective date of the rule. See § 266.103(a)(1)(ii). A facility has commenced construction if the owner or

operator has obtained the Federal, State, and local approvals or permits necessary to begin physical construction; and either:

- (a) A continuous on-site, physical construction program has begun; or
- (b) The owner or operator has entered into contractual obligations—which cannot be cancelled or modified without substantial loss—for physical construction of the facility to be completed within a reasonable time. See § 270.2.

2. Section 3010 Notification

BIF owners and operators burning hazardous waste fuels have already been required to notify of their hazardous waste fuel activities under existing § 266.35 and need not renotify. (See section 3010(a) which allows EPA to waive notification if the information is considered unnecessary.) Although today's rule requires small quantity burners and owners and operators of smelting, melting, and refining furnaces to notify, this notification is not a section 3010 notice and so is not a prerequisite to obtaining interim status.

Facilities which have not submitted a section 3010 notification form to EPA must do so by May 22, 1991. This is done by completing a section 3010 notification form and sending it to the appropriate EPA Regional Office. (See EPA form 8700-12, dated 7/90. See 55 FR 31389, August 2, 1990 for a copy of the form. Notification instructions are set forth in 45 FR 12746.)

3. Part A Permit Application

Newly regulated facilities must also submit a part A permit application to the appropriate EPA Regional Office by August 21, 1991, which is the effective date of today's rule. (See 270.70(a) and EPA Form 8700-23, dated 1/90.)

B. Interim Status Facilities

Interim status facilities that contain units newly regulated by today's rule must file an amended part A permit application under 40 CFR 270.10(g) if they are to continue managing hazardous waste in these newly regulated units. The facilities must file the necessary amendments to EPA by August 21, 1991, the effective date of the rule, or they will have to cease management of hazardous waste in these units. In authorized states, the facility should also send a copy of the submission to the State program.

Today's rule amends § 270.72 to allow interim status facilities to add newly regulated units as a change in interim status without prior Agency approval. The current procedures for the addition of new units in § 270.72(a)(3) require

Agency approval prior to making the change. Section 270.72(a)(1) allows the addition of newly listed or identified wastes, and any newly regulated units associated with them, to be added to the part A application without prior Agency approval. Today's addition of § 270.72(a)(6) extends this ability to any newly regulated unit. Today's rule also eliminates the reconstruction limit for the addition of newly regulated types of units. (As noted earlier, the Agency proposed this specific change for boilers and industry furnaces, but realized in the course of implementing the proposal that the problem was more endemic and called for a general solution.) This provision is located in § 270.72(b)(7).

In order to add a unit as a change in interim status under the new § 270.72(a)(6), the owner or operator must file the amended part A permit application by the effective date of the rule that subjects the unit to regulation.

Technical Correction to § 270.73 (f), (g). In the course of developing today's rule, the Agency discovered that particular regulatory provisions dealing with loss of interim status are miscodified. See §§ 270.73 (f), (g). We are amending these provisions in today's notice to match the implementing statutory language. The result will be that neither boilers nor industrial furnaces, nor other units which achieve interim status after Nov. 7, 1984, are subject to the automatic statutory loss of interim status provisions.

The 1984 HSWA amendments provided that each facility which achieved interim status prior to the effective date of the amendments would automatically lose its interim status on a specified date, unless by an earlier specified date the facility applied for a final determination regarding the issuance of a permit (i.e., submitted part B of its permit application. See RCRA sections 3005 (c)(2), (e)(2). The dates for part B submission and loss of interim status vary according to whether the facility is a land disposal facility, incinerator, or other facility. *Id.* Of relevance to today's technical correction, HSWA provided that interim status for incinerators would terminate five years after the enactment of HSWA (i.e., on November 8, 1989), unless the part B application was submitted within two years after the enactment (i.e., by November 8, 1986); interim status for other non-land disposal facilities would terminate eight years after the HSWA amendments (i.e., November 8, 1992) unless the part B application was submitted within four years (i.e.,

November 8, 1988). See RCRA section 3005(c)(2).

EPA amended its regulations on July 15, 1985 to incorporate these and other HSWA changes. See 50 FR at 28703. EPA's intention in promulgating these amendments was simply to reflect the new statutory provisions; for the most part, the Agency simply codified into the regulations the new HSWA language. *Id.* at 28703. In light of the largely ministerial nature of the regulations, and in view of the need to move quickly to incorporate HSWA, EPA published these 1985 regulations without opportunity for public comment. *Id.* (The D.C. Circuit eventually sustained the legality of these procedures in *United Technologies Corp. v. EPA*, 821 F.2d at 714 (D.C. Cir. 1987).)

Section 270.73 (f), (g) sets forth the dates on which interim status for incinerators and other non-land disposal facilities terminates if the facilities fail to submit their part B applications. However, in contrast to the HSWA amendments, the sections by their terms apply to all incinerator and other non-land disposal facilities, instead of being limited only to those facilities which had obtained interim status on November 8, 1984, the date of the HSWA amendments. In fact, it is impossible for units newly subject to regulation after the specified dates for submission of part B permit applications (such as the boilers and furnaces regulated by today's rule, or certain facilities newly subject to regulation under the recent Toxicity Characteristic rule) to comply with the rules as codified. EPA did not intend for these rules to deviate from statutory language. As the preamble to the 1985 codification regulations stated, the Agency simply intended for section 270.73 (f), (g) to reflect the HSWA termination-of-interim status provisions. *Id.* at 28723.

The Agency is today making a technical correction to these sections to correct this mistake, and to avoid the unintended (and possibly illegal) result that large classes of newly regulated units are ineligible for interim status because they failed to submit part B applications at a time they were unregulated. EPA is proceeding without proposing the correction for public comment, and believes that public comment is unnecessary, for the following reasons: (1) This correction simply conforms the language of the regulations to the Agency's original expressed intent in promulgating the 1985 regulations, which themselves were validly promulgated without the opportunity for comment; (2) this correction simply conforms the

regulations to HSWA's plain language; (3) the amendment conforms the regulations to the Agency's actual practice in implementing the regulations and RCRA 3005(c)(2); (4) the amendment is necessary to avoid rendering units newly regulated after specified part B permit application submittal dates from being ineligible for interim status even though they meet all of the statutory interim status eligibility criteria; and (5) the amendment can be viewed as an interpretative rule, which does not require prior notice and public comment.

C. Permitted Facilities

Some permitted facilities contain boiler and furnace units that are newly subject to subtitle C regulation as a result of today's rule. These permitted facilities must therefore submit permit modifications to EPA Regional offices, and comply with federal permit modification procedures in order to continue to manage hazardous waste in these units. The modification will be processed under Federal permit modification procedures rather than authorized state procedures because this rule is promulgated under HSWA authority.⁶⁰ However, because the permit undergoing modification is most likely a jointly issued EPA-state RCRA permit, a copy of the modification request should also be submitted to the state if it is an authorized state.

1. Amendment to § 270.42(g)

Today's rule contains a new permit modification procedure in § 270.42 for the addition of any newly regulated waste management units used to manage hazardous wastes (see § 270.42(g)). This two-step procedure essentially allows the permittee to notify the Agency of its newly regulated boilers and furnaces using the Class 1 permit modification procedures, and to continue to handle hazardous wastes. Subsequently, the permittee must submit a Class 2 or 3 permit modification request to initiate a permanent change to the permit. The self-implementing interim status standards of § 266.103 would apply until the permit was modified using the Class 2 or 3 modification procedures. This new permit modification provision only applies to newly regulated units that were not previously subject to the permitting requirements of subtitle C of RCRA.

Today's new permit modification provision for newly regulated units is

⁶⁰ Except, however, the provisions for sludge dryers, carbon regeneration units, infrared incinerators, and plasma arc incinerators are not promulgated under HSWA authority.

essentially identical to the special procedure in § 270.42(g) for newly regulated wastes. The purpose of today's amendment is to extend the same opportunities and procedures that are available for newly regulated waste streams (and any units used to manage them) to those situations where the unit becomes newly regulated in absence of a new waste identification. (See 53 FR 37922, September 28, 1988.) EPA believes that the same rationale applies to newly regulated types of units, and is therefore clarifying this provision in today's rule.

Without the procedure in § 270.42(g), the facility would need to obtain an approved permit modification if the facility were to continue managing hazardous wastes past the effective date of today's rule, which establishes management standards for boilers and industrial furnaces. If the modifications were not approved within six months, these facilities would be barred from handling hazardous wastes, disrupting the ongoing operations of many of these facilities as well as other RCRA facilities that would then need to manage the wastes. As discussed below, EPA believes that the addition of a boiler or industrial furnace to a facility's permit is a Class 3 modification. Because of the time allowed for preparation of the modification request by the facility and public participation in the permit modification procedures, the Agency would be unable to review and make a final determination on the modification request in the six month period.

Today's technical correction rectifies a potential inequity between permitted facilities and newly regulated facilities. Newly regulated facilities are required only to submit part A of the permit application, and submit the RCRA section 3010 Notification form, if necessary, to obtain interim status. Both activities can be easily completed by the effective date of today's rule, allowing them to continue operations, while permitted facilities, who have undergone the scrutiny of the permitting process, would likely be barred from doing so.

2. Procedures to Modify Permits

Under today's new procedures in § 270.42(g), a unit that is "in existence" as a unit by managing hazardous waste on or before the effective date of today's rule must submit a Class 1 modification by that date. Essentially, this modification is a notification to the Agency that the facility is managing hazardous wastes in these newly regulated units. It could consist of a revised part A application form clearly indicating all activities that are newly

regulated as a result of today's rule. As part of the Class 1 procedure, the permittee must also notify the public regarding the modification within 90 days of submittal to the Agency.

Next, within 180 days of the effective date, the permittee must submit a Class 2 or 3 modification request to the Agency. It is at this time that the detailed part B information must be submitted. The Agency believes that the Class 3 permit modification procedures are mostly likely applicable to the addition of boilers or industrial furnace units. The Class 3 modification requires an initial public notice by the facility owner of the modification request, a 60 day public comment period, and an informal meeting between the owner and the public within the 60 day period. After the end of the 60 day public comment period, the Agency will develop a draft permit modification, open a second public comment period of 45 days and hold a public hearing. After the public comment period, the Agency will make a final decision on the modification request.

Today's rule also amends appendix I to § 270.42 to classify the permit modifications for boilers and industrial furnaces. Section L is revised to include boilers and industrial furnaces with incinerators, and to specify additional permit conditions to conform with today's rule (and the conditions added to incinerator permits under the omnibus authority of § 270.32(b)(2). For more information on these permit modification procedures, see 53 FR 37912, September 28, 1988.

D. Addition of Storage Units as Direct Transfer Facilities That Obtain Interim Status

As discussed in section XII.C of part Three of this preamble, the requirements for boilers and industrial furnaces are being promulgated under section 3004(q) of RCRA, which is a HSWA provision. As a result, under section 3006(g), EPA will implement these requirements in both authorized and unauthorized States until the State is authorized to implement these requirements in lieu of EPA. Based on comments received during the rulemaking, EPA is aware that many interim status facilities newly-regulated under this rule may wish to add storage units to their facilities in the future rather than continue direct transfer operations (direct firing of the burner from the transport vehicle). Furthermore, EPA recommends that facilities install tanks and reduce or eliminate direct transfer practices because of the additional hazards associated with the practice. As discussed in more detail below, EPA

believes that such units can be added to the facility without awaiting complete permitting.

1. Unauthorized States

Facilities that wish to shift to storage from direct transfer operations and that are located in unauthorized states, will generally be able to add such units to the facility as a change in interim status under 40 CFR 270.72(a)(3). In order to qualify for addition of units under this provision, the facility must: (1) Obtain interim status for the boiler or industrial furnace; and (2) submit a revised part A application to the EPA Regional Office prior to adding the storage units with a justification for the change. Because EPA strongly encourages the discontinuation of direct transfer operations at boilers and industrial furnaces, EPA believes that the addition of storage units at such facilities constitutes a change necessary to meet federal requirements under 40 CFR 270.72(a)(3)(ii). The Regional Office must approve the interim status change, unless it is covered by amended § 270.72(a)(6) just discussed. Although 40 CFR 270.72(b) limits the extent of an addition that can be made during interim status, the addition of associated storage units under today's rule would be exempt from this limitation pursuant to § 270.72(b)(2).

2. Authorized States

Interim status facilities located in authorized states that wish to discontinue direct transfer operations will also generally be able to add such units to the facility pursuant to 40 CFR 270.72(a)(3). In states which are not authorized to implement the HSWA storage requirements for boilers and industrial furnaces, the procedure for adding storage units at new interim status boilers or industrial furnaces is the same as described above for facilities located in unauthorized states. Because EPA is implementing both the rule promulgated today and the associated storage requirements in such states, the federal rules governing changes in interim status apply to both the boilers and industrial furnaces and the addition of associated storage facilities.

In states which have been authorized to implement the HSWA storage requirements for boilers and industrial furnaces, facilities newly regulated under today's rule must comply with the authorized state requirements concerning the addition of associated storage units. In some cases, the authorized state may require the facility to obtain a permit prior to constructing or operating such storage units.

E. Compliance with BIF Versus Incinerator Rules

Existing rules (see § 266.31(c)) require that cement kilns burning hazardous waste that are located in urban areas must comply with the hazardous waste incinerator standards. In addition, existing rules allow owners/Operators of any boiler or industrial furnace to obtain an incinerator permit. These provisions exist because the Agency had not yet established regulatory controls for BIFs. In fact, the statutory provision (section 3004(q)(2)(c)) requiring that cement kilns in urban areas be regulated as incinerators states that the " * * * regulations remain in effect until the Agency develops substantive standards for cement kilns burning hazardous waste." Therefore, on the effective date of the BIF rule, both of these regulatory provisions will be rescinded except as discussed below.

Commenters questioned what regulations should more appropriately apply under three scenarios: (1) If a BIF is operating in interim status under the subpart O, part 265, incinerator standards; (2) if a BIF has already been issued an incinerator operating permit under subpart O, Part 264; and (3) if a BIF has previously submitted a part B application for an incinerator permit and the permit review process has progressed substantially by the effective date of the BIF rule. A BIF currently operating under the interim status incinerator regulations must comply with the BIF regulations on their effective date in lieu of the incinerator regulations so that it is subject to the more stringent BIF rule. A BIF currently operating under an incinerator permit will continue under that permit until it is reviewed or the permit term otherwise expires. At that time, the BIF rule will apply. Although the Agency's general policy is that BIFs are to be regulated only under the BIF rules, we believe permit officials should use their discretion to determine whether to grant exceptions for the third situation given the protectiveness of the standards, and the desirability of avoiding further delay and expense by having to duplicate the permit process under these BIF rules. For example, if a BIF is operating under the incinerator interim status standards but has submitted part B of the incinerator permit and the permit proceedings have progressed substantially, the Director may continue processing the permit (and issue it) under the incinerator standards and use

omnibus authority⁶¹ to add conditions to the permit as necessary to conform with the BIF rule.

IX. Permit Procedures

A. Part B Information

As proposed on May 6, 1987 (52 FR 17015), § 270.22 provides specific information requirements for part B of the permit application. Paragraph (a) requires a trial burn to demonstrate conformance with the performance standards of §§ 266.104 through 266.107, except where the trial burn is waived. Although the regulatory language is substantively the same as proposed, it has been restructured for clarity, by specifying the documentation required to support a waiver from each type of trial burn: DRE trial burn, particulate matter trial burn, metals trial burn, and HCl/Cl₂ trial burn.

In addition, the rule specifics under § 270.22(a)(6) that owners and operators may submit data from previous compliance testing of the device, or from testing of similar boilers or industrial furnaces burning similar wastes, in lieu of a trial burn provided that the data is determined adequate and sufficient documentation of similarity is provided.

Paragraphs (b) through (e) were added to § 270.22 to provide information requirements related to other regulatory provisions being promulgated today for boilers and industrial furnaces.

Paragraph (d) requires information describing the automatic waste feed cutoff system. Paragraph (e) requires owners and operators using direct transfer operations to feed hazardous waste from transport vehicles directly to the boiler or industrial furnace to submit information supporting conformance with the direct transfer standards at § 266.111. Under paragraph (e), owners and operators that claim their residues are excluded from regulation under § 266.112 must submit information adequate to demonstrate conformance with those provisions.

B. Special Forms of Permits

As proposed, the final rule adds § 270.66 to subpart F of part 270. This section establishes special forms of permits (see discussion below) for new boilers and new industrial furnaces, and

⁶¹ EPA notes that permit writers choosing to invoke the omnibus permit authority of § 270.32(b)(2) to add conditions to a RCRA permit must show that such conditions are necessary to ensure protection of human health and the environment and must provide support for the conditions to interested parties and accept and respond to comment. In addition, permit writers must justify in the administrative record supporting the permit any decisions based on omnibus authority.

sets forth requirements for the various periods of operation under which a boiler or industrial furnace operates, depending on applicable trial burn requirements. This section also establishes trial burn procedures.

Finally, this section discusses special procedures for permitting existing facilities. Although these provisions were described in the preamble to the proposal, at 52 FR 17016, they are described briefly below, in order to highlight minor changes from the proposed requirements.

1. Permits for New Boilers and Industrial Furnaces.

Paragraph (b) specifies four operating periods of a permit for a new facility. The provisions have been restructured from those proposed in recognition of the fact that all boilers and industrial furnaces subject to a permit must undergo some type of trial burn. Although a facility could conceivably meet the requirements for a waiver of the DRE trial burn, particulate matter trial burn, metals trial burn, and HCl/Cl₂ trial burn, all regulated facilities must demonstrate conformance with the carbon monoxide, and where applicable, hydrocarbon limits or § 266.104.

In addition, minor revisions to this section have been made to make the permit process for new boilers and industrial furnaces consistent with the way the hazardous waste incinerator permitting process is implemented, i.e., one permit with four periods of operations rather than an individual permit for each period of operation.

Thus, the final rule provides for permits addressing four periods of operation for all boilers and furnaces: The pre-trial burn period, the trial burn period, the post-trial burn period, and the final permit period.

Conditions addressing compliance with each performance standard (or corresponding waiver requirement) will be set in the permit for each period of operation. Applicants must submit a statement with part B of the permit application that suggests the conditions necessary to operate in conformance with the performance standards of §§ 266.104 through 266.107. For those performance standards for which a trial burn is required, the Director will use his engineering judgment, and consideration of the applicant's proposal, in setting operating conditions in the permit sufficient to meet the performance standards. Once the trial burn data are available, they will be used to modify, if necessary, the final operating conditions in the permit. For those performance standards for which a trial burn demonstration is not

required (for example, when the applicant has chosen to comply with Tier I of the metals limitations under § 266.106(b)), appropriate conditions (in the above example, metals feed rate limits specified under § 266.102(e)(4)) will be set for all periods of operation.

The pre-trial burn period begins with initial introduction of hazardous waste into the boiler or industrial furnace and extends for the minimum time required, not to exceed 720 hours of hazardous waste burning, to bring the device to a point of operational readiness to conduct a trial burn. This period may be extended once by the Director if good cause is shown. The trial burn period covers the period when the trial burn is conducted. This period is followed by the post-trial burn period, which extends for the minimum time necessary to allow analysis, data computation, and submission of the trial burn results and modification of the permit by the Director if necessary to reflect the trial burn results. Such modifications will proceed under the permit modification provisions at § 270.42.

Paragraph (c) specifies information that must be included in the trial burn plan. Paragraph (d) establishes trial burn procedures, including criteria for approval of trial burn plans and requirements for submission of trial burn data. Paragraph (e) establishes procedures for selection of POHCs when a DRE trial burn is required. Finally, paragraph (f) establishes the determinations that the applicant must make based on the trial burn results—the data, analyses, and computations that must be submitted to support conformance with the applicable emissions standards.

2. Permit Procedures for Interim Status Facilities.

Applicants owning or operating existing boilers or industrial furnaces will be permitted under § 270.66(g). This paragraph addresses submission of trial burn plans and trial burn data for existing boilers and furnaces. These provisions differ from the proposal in that they specifically require that the applicable trial burn data be submitted and considered prior to permit issuance. This language conforms with the January 30, 1989 change to the hazardous waste incinerator regulations, promulgated at 54 FR 4286 providing clarification of this point.

X. Exemption of Small Quantity Burners

Section 3004(q)(2)(B) of RCRA provides EPA with explicit authority to exempt from regulation facilities that burn small quantities of hazardous

wastes if the wastes are burned at the same facility at which they are generated. The Administrator is to ensure that such waste fuels are burned in devices designed and operated in a manner sufficient to ensure adequate destruction and removal to protect human health and the environment.

The Agency has carefully evaluated the risks posed by small quantity burning and concluded that a conditional exemption for small quantity burners should be allowed where hazardous waste combustion poses insignificant risk. A discussion of the original May 1987 proposal and the subsequent October 1989 proposed revisions is presented below.

On May 6, 1987 (52 FR 17034), the Agency proposed to exempt facilities that burn small quantities of hazardous waste that they generate on site because even in the absence of regulatory control, the health risk posed by such burning would not be significant. Eligibility for the exemption would have been based on the quantity of waste burned per month, established as a function of device type and thermal capacity. In order to be exempt, in addition to restricting the quantity of waste burned, a facility was required to notify the Regional Administrator that it is a small quantity burner, limit the maximum instantaneous waste firing rate to 1% of total fuel burned, and refrain from burning acutely toxic waste containing dioxin.

On October 26, 1989 (54 FR 43730), the Agency proposed several revisions to the exemption in the 1987 notice. Rather than establish hazardous waste quantity limits as a function of device type and capacity, EPA proposed quantity limits that vary as a function of effective stack height. The exempt quantities proposed in October 1989, and promulgated today, include several changes to the risk assessment methodology. In particular, the quantities are based on evaluation of risks from hydrocarbon (HC) emissions instead of a PIC/POHC ratio as originally proposed. This change was made to better account for organic emissions from combustion. In addition, the procedures for evaluation of facilities with multiple stacks were revised to reduce over-regulation in these situations.

A. Response to Comments

Numerous commenters to the 1987 and 1989 proposals objected to conservatism of the calculated quantity limits and/or the 1% limit on hazardous waste firing. The commenters stated that the assumptions used in calculating the exempt limits are overly conservative, and that the 1% limit on firing of

hazardous waste is based on unrealistic and unjustifiable conclusions. The commenters, however, did not provide data or analysis to support their arguments that assumptions used in the small quantity burner exemption (SQBE) calculations and conditions (including limits on the waste to be burned) for exemption eligibility were too restrictive. Absent technical support for alternate approaches, the Agency continues to believe that the approach proposed in October 1989 is reasonable and appropriate. In addition, using less conservative assumptions to derive the exempt quantities could allow relatively large amounts of hazardous waste to be burned, a result somewhat at odds with the statutory language referring to small "quantities" of hazardous waste. See § 266.108(a)(2) which limits the maximum hazardous waste firing rate at any time to 1% of the total fuel requirements of the device on a volume basis. See also § 266.108(a)(3) which requires the hazardous waste to have a minimum heating value of 5,000 Btu/lb, as-generated, to ensure that the exemption is limited to fuels as intended by section 3004(q)(2)(B) and to ensure adequate destruction of toxic organic constituents.

One commenter requested credit for the presence of air pollution control devices (APCDs). The Agency believes that it is not appropriate to allow credit for APCDs because, without requirements for an oversight of the operation and maintenance of the devices, there is no assurance that collection efficiencies are being met.

Four commenters to the 1987 proposal urged EPA to delete the small quantity burner exemption. These commenters were concerned that the large number of boilers and industrial furnaces burning hazardous waste that do not have to meet any design requirements would have a detrimental effect on human health and the environment. The Agency continues to believe that the exemption is protective of human health and the environment because it is health-based, incorporating quantity limits and conservative assumptions designed to be protective regardless of size and location of the device, or conditions of operation.

Two commenters stated that the exemption should apply to facilities that generate hazardous waste at off-site facilities under the same ownership and operational control. The Agency is concerned, however, that contrary to Congress's intent, this approach could allow a large quantity generator to distribute their hazardous wastes in small quantities to TSDFs (including entities that are parent corporations,

joint ventures, subsidiaries of the generator, etc.) that would then burn the wastes without regulation. Consequently, the final rule limits the exemption to facilities that burn only hazardous waste generated on-site.

One commenter to the 1987 proposal urged the Agency to clarify that the 1% limit on the hazardous waste firing is to be applied only to unmixed hazardous waste fuel, not to a mixture of hazardous and non-hazardous fuel. The Agency acknowledges the ambiguity in the proposed rule language and intended the proposal to require that the quantity determination take into account only the hazardous waste fuel prior to mixing with a nonhazardous waste fuel. Today's final rule contains language to that effect and requires the exempt facility to keep records to document that the quantity of hazardous waste prior to mixing with a nonhazardous fuel complies with the quantity limitations.

Six commenters to the 1989 proposal suggested that quantity limits be based on 1% of the total fuel burned and not the stack height, which relies upon dispersion only. The Agency, however, continues to believe that terrain-adjusted stack height is the important criterion, because it is possible that even a 1% limit, with large dispersion and low stack height, could pose a threat to human health and the environment.

B. Basis for Today's Final Rule

In order to calculate allowable exempt quantities under today's rule, worst-case dispersion coefficients (based on incinerator modeling), and an HC unit risk factor of $2 \times 10^{-5} \text{ m}^3/\mu\text{g}$ (based on a 10^{-5} risk limit) were assumed, as proposed in the October 1989 supplemental notice. Allowable emission rates of hydrocarbons (HCs) were then back-calculated as a function of effective stack height, terrain type, and land use. The assumption used in this back-calculation was an HC concentration in the stack gas of 150 ppmv at 99.99% DRE. Finally, the exempt quantities were calculated using the HC emission rates and an empirically-derived ratio of combustion gas volume to mass of waste. The most conservative allowable emission rates calculated for each stack height were then used as the established quantity limits.

A detailed description of the methodology used to derive quantity limits for the exemption is available in the docket for the supplemental notice.

As mentioned above, the use of effective stack height to determine eligible quantity limits reflects one of the revisions proposed in the October

26, 1989 supplemental notice. The Agency notes that we have not established separate exempt quantity limits for the different terrain types and land use classifications. Rather, the revised quantities are based on assumptions of terrain and land use that result in the lowest (i.e., most conservative) exempt quantities. We believe that this conservative approach is appropriate given that there would be no EPA or State agency oversight of an operator's determination of a facility's terrain and land use classification. Some key assumptions used to arrive at the quantity limits are described below.

EPA evaluated the risks posed by emissions of organic compounds, metals, and hydrogen chloride, the parameters controlled in the substantive regulations promulgated in today's rule.⁸² The analysis demonstrates that the risks posed by organic emissions from waste-as-fuel activities are overwhelmingly dominated by the risks posed by carcinogenic (as opposed to noncarcinogenic) waste constituents. Accordingly, the initial evaluation performed in support of the small quantity burner exemption focused exclusively on carcinogenic risks, on the assumption that controls ensuring insignificant risks from organic carcinogenic emissions will ensure protection against non-carcinogenic releases. This assumption was confirmed by evaluating the potential risks from metals and hydrogen chloride that would result when those quantities of waste indicated by the risk analysis for organic carcinogens were burned.

The risks from burning small quantities of hazardous waste are determined primarily by the following factors:

- Composition of the waste stream being burned;
- Toxicities and concentrations of hazardous constituents in the waste stream;
- Destruction and removal efficiency achieved by the device;
- Local meteorology, which influences the amount of dispersion of stack emissions;
- Clustering and size of sources; and
- The effective stack height of the device.

The values of these parameters can and do vary widely. Reasonable, worst-case assumptions were made for these parameters in the Agency's calculations of exempt quantities and evaluation of risks. In the risk analysis, EPA assumed an acceptable cancer risk level of $1.0 \times$

10^{-5} to an individual residing for 70 years at the ground level point of maximum exposure to reasonable, worst-case stack emissions. Reasonable, worst-case dispersion coefficients based on effective stack heights were used. The dispersion coefficients were those developed in the risk analysis for the proposed amendments to the hazardous waste incinerator regulations (See 54 FR 43752 and 55 FR 17871). The dispersion coefficients differ by terrain type, land use, and effective stack height. Separate calculations were made for noncomplex and complex terrain and urban and rural land use, resulting in three different sets of quantity eligibility limits for each effective stack height. The rationale for the assumptions used in the risk analysis is discussed below.

1. Composition of Hazardous Waste Stream

Composition data on hazardous waste-derived fuels is scarce. Information gathered by the mail questionnaire survey and other industry contacts indicate that most of the materials burned are organic solvents that are usually classified as hazardous based on ignitability and/or toxicity. The actual concentrations of carcinogens in wastes burned by 21 facilities during EPA's field testing program for boilers and industrial furnaces ranged from 0 to 17% with an average of approximately 4%.

The quantity of PICs measured in EPA test burns was found to be independent of specific POHC species and was a function of hydrocarbon (HC) content of the fuel only. This is supported by comparisons made by MRI of PICs from hazardous waste and fossil fuel combustion. Since it is impossible to differentiate between the PICs from fuel and those from hazardous waste during most tests, it was assumed that the boilers in the EPA test burns were using fuels of 100% HC and all PICs are the result of hazardous waste burning. Additionally, HC emissions are presumed to be an acceptable measurement of PICs; historic data indicate that HC measures from 75 to 95% of all PICs emitted.

The hazardous waste was assumed to contain concentrations of cadmium, chromium, nickel, and lead that were obtained from the state sampling reports of the Keystone Cement Company. Arsenic, barium, and mercury concentrations were based on 90th percentile levels from the Engineering Science Background Document.

2. Toxicity of Hazardous Constituents

The average unit risk of those PICs that were identified during EPA trial burns was 1.0×10^{-5} $m^3/\mu g$. However, it

is likely that the PICs resulting from incineration under the 99% DRE assumption for the small quantity burner analysis would have a higher toxicity than those measured under the 99.99% DRE in the EPA boiler tests. EPA therefore estimates the unit risk for total HCs to be 2.0×10^{-5} $m^3/\mu g$. This corresponds to a carcinogenic potency of $Q_1^* = 0.07$ for hydrocarbons (HC). As explained in the October 1989 notice, this potency factor was used rather than a Q_1^* value of 1.0 for products of incomplete combustion as originally proposed in the May 6, 1987 proposed rule because the Agency was concerned about possible nonconservative features of PIC estimation. (See 54 FR 43730.)

3. Destruction Efficiency

The burner destruction efficiency determines the quantity of unburned hazardous wastes that will be emitted from the stack. Assumed values for boiler and furnace performance were selected based upon review of test data generated in support of this rule and based on the professional judgment of Agency staff members familiar with the destruction and removal efficiencies (DRE) typically achieved by boilers. It was assumed that, in the worst case, boilers and furnaces would only achieve 99% DRE⁸³ of organic constituents. This represents a very poorly performing combustion device. In fact, as explained previously, most boilers and furnaces can be expected to achieve 99.99% DRE of organic waste constituents even when operated under less than optimal conditions.

4. Assumptions Regarding Metals and Chlorine in Waste Fuels

A similar reasonable, worst-case analysis was performed to evaluate the potential risks posed by emissions of toxic metals (including carcinogens) and hydrogen chloride from small quantity burners. As a result, it was determined that, at the volume cut-offs specified by the exemption and the assumed waste concentrations as discussed above, metals emissions caused by cofiring of hazardous wastes would not pose a significant risk. The analysis also considered hydrogen chloride emissions assuming a chlorine content of 50% in the hazardous waste fuel. The chlorine

⁸³ We note that we assumed 99% DRE to derive the small quantity burner exempt quantities rather than the 99.9% that the owner/operator must assume under the low risk waste exemption of § 268.109 because monitoring of CO is not required for the small quantity burner exemption to ensure that good combustion conditions are maintained. CO monitoring is required under the low risk waiver of the DRE trial burn.

⁸² U.S. EPA, "Analysis for Calculating a *de Minimis* Exemption for Burning Small Quantities of Waste in Combustion Devices", August 1989.

content in actual hazardous wastes seldom exceeds 3%; however, the highest chlorine content measured in a hazardous waste fuel fired in a boiler of which EPA is aware was 43%. Predicted ground level concentrations of HCl also did not exceed the reference aid concentrations.

The assumptions used to determine the effect of local meteorology/dispersion and the clustering of sources (stacks at the facility) are discussed in the following section.

C. How the Exemption Is Implemented

1. Use of Terrain-Adjusted Effective Stack Height

In the 1987 proposal, the Agency used a set of assumptions about local meteorology, dispersion modeling, terrain conditions, etc., to determine eligible quantity limitations. As mentioned above, today's rule uses terrain-adjusted effective stack height along with the most conservative assumptions of terrain and land use to determine quantity limits for exemption eligibility. See § 266.108.

2. Multiple Stacks

As explained in the October 1989 notice, in today's final rule the exempt quantities for a facility with multiple stacks from boilers or industrial furnaces burning hazardous waste are limited according to the following equation:

$$\sum_{i=1}^n \frac{\text{Actual Quantity Burned}_i}{\text{Allowable Quantity Burned}_i} < 1.0$$

Where:

- n means the number of stacks
- Actual Quantity Burned, means the waste quantity per month burned in stack "i"
- Allowable Quantity Burned, means the maximum allowable exempt quantity for stack "i"

For example, if a site had two stacks with effective stack heights (ESH) of 30 and 10 meters, the following equation would hold:

$$\frac{X}{140} + \frac{Y}{40} \leq 1.0$$

Where:

- 140 and 40 are the exempt quantities from § 266.108 for stack heights of 30 and 10 meters, respectively
- X is the waste quantity burned in the device with the 30 meter stack

- Y is the waste quantity burned in the device with the 10 meter stack

In this example, if Y is burning 15 gallons/month, then X could burn no more than 87.5 gallons/month.

D. Wastes Ineligible for Exemption

Boilers and furnaces burning hazardous waste fuels containing or derived from any of the following dioxin-containing hazardous wastes are not eligible for the exemption: EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027. See § 266.108(a)(4). Given the toxicity of these wastes, EPA does not believe it is appropriate to exempt facilities burning them from regulation. Hazardous waste fuels containing or derived from these dioxin-containing wastes must be burned at a 99.9999% destruction and removal efficiency (DRE). We cannot expect boilers and furnaces to achieve that level of DRE when operating outside of the Agency's regulatory system.

E. Exemption of Associated Storage

Hazardous fuel storage practices prior to burning vary from site to site. Many facilities burning relatively large quantities of hazardous waste fuels hold the fuels in a storage system and then pump the waste fuels through a dedicated line into the combustion zone of the boiler. Other facilities mix hazardous waste fuels with other fuels (typically virgin fuel oil) in a storage/mixing tank prior to burning the blended material. These tanks are not feasibly emptied of hazardous waste every 90 days and so are in most cases ineligible for the generator accumulation provisions in § 262.34.

Under today's rule, facilities storing unmixed hazardous waste fuels are responsible for complying with all applicable standards for the storage of the hazardous waste fuel. Owners and operators that are eligible for the small quantity burner exemption and who mix toxic hazardous waste fuels would, however, be exempt from the storage standards after such mixing, as proposed. See § 266.101(c)(2). The basis for this exemption is discussed below.

The Agency is promulgating an exemption for storage of such storage/mixing tanks (for small quantity burners) in order for the small quantity burner exemption in section 3004(q)(2)(B) to have a practical application. Congress evidently envisioned a class of facilities capable of burning small amounts of hazardous wastes safely absent regulation and viewed such burning as a superior means of managing these small amounts of waste. Furthermore, assuming that

small quantity waste storage is conducted safely, the Agency assumes that Congress also envisioned exemption of the storage since permitting storage would discourage safe on-site burning just as much as regulating the burning itself.

We believe that storage of small amounts of hazardous wastes mixed with virgin fuels would pose no significant incremental risks over storage of the virgin fuels. The monthly volumes of hazardous waste fuel covered by the small quantity burner exemption, for example, represent less than 1% of the fuel flow rate through these tanks. Under these circumstances, we think the statutory exemption can reasonably be read to encompass this limited class of storage practices as well.

We note further that the Agency is studying other situations where hazardous waste-containing mixtures may not be appropriately subject to regulation and will consider whether to issue rules addressing the issue generically. It appears to us justifiable to address the question for the limited class of burning facilities in advance of other types of situations because Congress has singled out small quantity burning facilities for exemption where appropriate. We note further that to the extent these small quantity waste-virgin fuel tanks are underground storage tanks (as defined in RCRA section 9001(1)), they would be subject to regulation under Subtitle I if they contain petroleum.

F. Notification and Recordkeeping Requirements

As proposed in the October 26, 1989 supplemental notice, the final rule requires (conditionally) exempt small quantity burners to provide a one-time written notification to EPA (see § 266.108(d)) of their status as a small quantity burner and a certification that they are in compliance with the requirements of § 266.108. To assist enforcement efforts, the owner or operator must also indicate in the notification the maximum allowable quantity that may be burned per month as provided by § 266.108(a)(1). In addition, the final rule requires small quantity burners to keep records to document that they comply with the conditions of the exemption including: quantities of hazardous waste burned per month; quantities of hazardous waste and other fuels burned at any time to demonstrate conformance with the 1% hazardous waste firing rate limit; and heating value of the hazardous waste.

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XI. Exemption of Low-Risk Waste from DRE Standard and Particulate Matter Emission Standard

The final rule defines two types of "low-risk" wastes: (1) waste that is low risk with respect to feed rate of hazardous (i.e., appendix VIII, part 261) nonmetal constituents and, thus, is exempt from the requirement to demonstrate 99.99% DRE; and (2) waste that is low risk with respect to both nonmetal constituents and metals (i.e., the waste meets the Tier I feed rate limits for metals provided by § 286.106(b)) and, thus, is exempt from both the DRE standard and the 0.08 gr/dscf particulate standard. See § 286.109.

The following sections explain these exemptions and how they operate.

A. Exemption from Compliance with the DRE Standard

In the May 6, 1987 proposed rule, the Agency proposed a risk-based, site-specific waiver of the DRE trial burn and the flue gas CO limits for facilities burning waste that poses insignificant health risks absent those controls (52 FR 17002). Today's final rule retains the exemption from the DRE standard, but requires the facility to monitor CO continuously and to comply with the Tier I PIC controls of § 286.104(b) (i.e., CO cannot exceed the 100 ppmv limit on an hourly rolling average basis).

In the 1987 proposal, EPA explained the basis for the DRE exemption for boilers or industrial furnaces that burn low-risk waste (52 FR 17002). After further consideration, however, the Agency believes that controls on emissions of PICs are needed. This is because a waste with low levels of toxic organic constituents can nonetheless pose significant health risk if it is burned under poor combustion conditions conducive to formation of PICs. Toxic PICs can form from poor combustion of nontoxic organic compounds.

The final rule does not allow a burner to operate under the alternative CO limit provided by § 286.104(c), which allows higher CO levels provided that HC levels do not exceed 20 ppmv, because the Agency believes that only those devices operating under best demonstrated technology combustion conditions should be granted an exemption from the DRE requirement. (We note that this is consistent with the CO restriction for the automatic waiver of the DRE trial burn for boilers operating under the special operating conditions provided by § 286.110.) Devices operating at CO levels above 100 ppmv on an hourly rolling average are not operating under best demonstrated technology combustion

conditions even if they can show that hydrocarbon levels do not exceed 20 ppmv (or the HC limit established under § 286.104(f)). As discussed at proposal (see 54 FR 43723 c.3), the 20 ppmv HC level represents a demarcation between good and poor combustion conditions. HC levels under best demonstrated technology combustion conditions would generally be less than 5 ppmv on an hourly rolling average basis.

B. Exemption from Compliance with the Particulate Standard

Today's final rule provides a waiver of the particulate standard for facilities that both obtain the DRE standard waiver and meet the Tier I requirements for all metals. (Because the PM standard guards against risks from both adsorbed organic compounds and metals, only facilities with waste that is low risk for both organic constituents and metals are eligible for the PM waiver.)

The basis for imposing a particulate standard on boilers and industrial furnaces firing hazardous waste, as explained in the October 28, 1989 supplemental notice (54 FR 43719), is primarily the concern over adsorption of toxic organics and metals onto the emitted particulates. Consequently, the Agency believes that an exemption from the particulate standard for boilers and industrial furnaces is appropriate provided that the facility can demonstrate that emissions of toxic organics and metals do not pose unacceptable human health risks.

C. Eligibility Requirements

Three eligibility requirements for the low-risk waste exemption were detailed in the 1987 proposed rule. Many commenters objected to the first of these requirements, that 50 percent of the fuel fired in the boiler or industrial furnace must consist of oil, natural gas, coal, or other fossil fuels derived from these fuels. These commenters requested that EPA allow the cofiring of various other fuels, including tall oil, off-specification fuel oils, and wood chips.

Although some of these fuels may provide a hot, stable flame that will support good combustion, the Agency is concerned that others may not. In today's rule, the Agency is requiring for this exemption the same conditions on the primary fuel as required for the special operating requirements for boilers seeking the automatic waiver from a DRE trial burn (see section II.A.3 of part three of this preamble): a minimum of 50% of the fuel fired to the boiler must be high quality "primary" fuel consisting of fossil fuels or fuels derived from fossil fuels, tall oil, or, if approved by the Director on a case-by-

case basis, other nonhazardous fuel comparable to fossil fuel, and all such primary fuels must have a minimum as-fired heating value of 8,000 Btu/lb.

The two remaining eligibility requirements, that the hazardous waste must have an as-fired heating value of at least 8,000 Btu/lb, and that the waste must be fired into the flame zone of the combustion chamber, are being promulgated as proposed in 1987. The reasons for these requirements are the same as discussed in section II.A.3 of part three of this preamble in the context of the automatic waiver of the DRE trial burn for boilers.

D. How the Low-Risk Waste Exemption Works

1. Constituents of Concern

The low-risk waste exemption is intended to exempt a waste from either or both the DRE standard and the particulate standard if the owner/operator demonstrates that, absent regulatory controls (i.e., under a reasonable, worst-case emissions scenario), emissions from the facility will not result in ambient levels of toxic organic compounds and/or metals that exceed acceptable levels. The organic constituents of concern are the hazardous organic compounds listed in appendix VIII of 40 CFR part 261 and the metals of concern are the 10 regulated metals.

2. Estimation of Worst-Case Emissions

The requirements for estimating worst-case emissions were discussed in the May 1987 proposed rule and are being promulgated in today's rule with slight modifications.

To estimate reasonable, worst-case emissions of toxic organic constituents in hazardous waste fuel, an owner or operator must: (1) Identify every nonmetal appendix VIII constituent that could reasonably be expected to be found in the waste; and (2) assume a reasonable, worst-case destruction and removal efficiency (DRE) for each constituent of 99.9 percent in calculating the worst-case emissions (by considering waste concentration and feed rate) from the stack for each constituent. This assumed DRE of 99.9 percent is less conservative than the proposed 99 percent assumption in the 1987 notice. The Agency is making this change in response to the many commenters who objected to the 99 percent DRE assumption. Specifically, the commenters' objection was that 99.9 percent was the worst DRE measured by the Agency in its nonsteady-state testing of boilers operated under intentionally

upset (i.e., high CO and smoke) conditions. The Agency believes that changing the assumed DRE from 99 percent to 99.9 percent is justified because today's rule, unlike the 1987 proposal, does not provide a waiver of the continuous CO emission monitoring (CEM) requirements. Compliance with continuous CO monitoring requirements will ensure that these devices do not operate under upset conditions and will achieve a DRE of at least 99.9 percent.

The Agency has eliminated the proposed requirement that emissions of products of incomplete combustion (PICs) be estimated using a ratio of PICs to principal organic hazardous constituents (POHCs). As explained in the April 1989 notice (54 FR 43730), use of the PIC:POHC ratio may not be a conservative method for estimating PIC emissions.

An estimate of worst-case emissions is not necessary for metals. To be eligible for the exemption from the particulate standard, the waste must be low-risk with respect to organic compounds and must meet the Tier I metals feed rate limits. See § 266.106(b). Those metals feed rate limits assume that all metals fed into the device are emitted.

3. Dispersion Modeling

Dispersion modeling must be used to predict the maximum annual average ground level concentration of each toxic nonmetal compound in the waste using procedures identical to those required to implement the Tier III metals controls. See 266.109(a)(2)(iii)(A).

4. Acceptable Ambient Levels

Predicted maximum annual average ground level concentrations of each toxic nonmetal compound may not exceed levels the Agency proposed as acceptable for purposes of this rule. The acceptable ambient concentrations were developed for carcinogenic and noncarcinogenic compounds using the same procedures used to develop the RACs and 10^{-5} RSDs for the 10 toxic metals.

To demonstrate that the noncarcinogenic nonmetal compounds listed in appendix IV of the rule do not pose an unacceptable health risk, the predicted ground level concentrations cannot exceed the levels established in that appendix.

To demonstrate that the carcinogenic nonmetal compounds listed in appendix V of the rule do not pose an unacceptable health risk, the sum of the ratios of the predicted ground level concentrations to the levels established in the appendix cannot exceed 1.0. This is because the acceptable ambient levels

established in appendix V are based on a 10^{-5} risk level. To ensure that the summed risk from all carcinogenic compounds does not exceed 10^{-5} (i.e., 1 in 100,000), the sum of the ratios described above must be used.

To demonstrate that other compounds for which the Agency does not have adequate health effects data to establish an acceptable ambient level are not likely to pose a health risk, the predicted ambient level cannot exceed $0.1 \mu\text{g}/\text{m}^3$. This is the 5th percentile lowest reference air concentration for the compounds listed in appendix IV of the rule.

5. Constituents with Inadequate Health Effects Data

At the time of the 1987 proposal, the Agency had data adequate for establishing RACs and RSDs for only about 150 of the over 400 compounds listed in appendix VIII, part 261. In the preamble to the May 1987 proposal, EPA stated that, to be eligible for the exemption, health effects data (i.e., RACs and RSDs) must be available for each constituent in the waste. In response to comments concerning the inadequacy of current health effects data to establish a RAC or RSD for a large number of compounds, we have established in today's rule a conservative RAC value for such constituents determined as the 5th percentile lowest RAC for all of the nonmetal appendix VIII, part 261, constituents— $0.1 \mu\text{g}/\text{m}^3$ (see note to appendix IV of the final rule). EPA believes that this approach will be protective of human health and the environment and will not unreasonably restrict owners/operators from eligibility for the exemption.

XII. Storage Standards

A. Permit Standards for Storage

Under the administrative controls for hazardous waste marketers, burners, and blenders of hazardous waste burned in boilers and industrial furnaces promulgated on November 29, 1985, and codified in subpart D of part 266, EPA subjected existing burner storage facilities (effective May 29, 1986) to only the interim status standards of part 265. The permit standards of part 264 were not applied to existing storage facilities in order to avoid two-stage permitting, given that today's rule for permitting boiler and industrial furnace facilities was under development at that time. The Agency wanted to avoid requiring a boiler or industrial furnace owner or operator to obtain a permit for their hazardous waste fuel storage facility and to soon thereafter obtain another

permit for operation of the boiler or industrial furnace under today's rule.

Today's rule does, therefore, subject such existing burner storage facilities to the permit standards of part 264. See § 266.101(c).

Numerous comments on the May 6, 1987 proposed rule to subject burner storage units to the permit standards of part 264 agreed that the interim status standards currently in force are not adequate and permit standards are needed. Several commenters were concerned about the potential mishandling of waste fuels stored on-site in and around residential areas. One commenter requested that preburn transport and storage regulations for hazardous waste apply to all hazardous waste blends, mixtures, or diluted hazardous materials.

With the promulgation of today's rule, all hazardous waste storage units will be subject to applicable part 264 and 265 standards. Since hazardous waste storage units standards are designed to be protective of human health and the environment regardless of the location of the facility, on-site storage associated with boilers and industrial furnaces burning hazardous waste is not restricted to areas in or around residential areas. These standards apply to the storage of any hazardous waste blends, mixtures, or dilutions that will be burned at these facilities, due to the "mixture rule" of 40 CFR 261.3. Whereas nonindustrial boilers were previously prohibited from burning hazardous wastes unless they were operated in conformance with the incinerator standards of subpart O of parts 264 or 265, today's rule eliminates the distinction between industrial and nonindustrial boilers. Consequently, today's rule establishes standards that are protective when hazardous waste is burned in any boiler.

One commenter recommended that the final rule allow the 90-day "on-site" accumulation provision to include wastes received at the BIF from off-site, company-owned locations. The 90-day accumulation provision referred to by the commenter is contained in 40 CFR 262.34(a) and only applies to generators of hazardous wastes. The Agency does not intend to apply this provision to hazardous waste treatment, storage, or disposal facilities.

B. Consideration of Requirement for Liquid Waste Fuel Blending Tanks

In the October 26, 1989 supplemental notice, the Agency requested comment on a requirement that all boiler and industrial furnaces use blending and surge storage tanks (i.e., other than other

modes of waste fuel transfer) to avoid flow interruptions and waste stratification which could affect the ability of a combustion device to meet performance standards. The majority of commenters opposed requiring blending and surge storage tanks for BIFs and suggested that such a requirement would not be necessary to ensure compliance with performance standards. Several commenters believed that a uniform requirement for tanks, containers, and/or surge tanks may not be universally appropriate. These commenters noted that some secondary materials such as lead acid batteries, flue dust, and various scraps and slags cannot be transferred to furnaces from a tank or container system. Another commenter suggested that in some instances, such as feeding incompatible wastes, direct transfer may be preferable due to health and safety concerns. A few commenters concurred with this view, but felt that storage and blending tanks should be required in all other instances. One commenter suggested that storage tanks should be required only if transport vehicles do not meet Department of Transportation requirements, secondary containment is not used in transfer operations, and if operations are not covered by site-specific contingency or SPCC plans. One commenter agreed that hazardous wastes should generally be fed from storage tanks and supported a final rule that would allow a "window of opportunity" to install storage tanks, thus providing an incentive for a company to reduce their reliance on direct burning from transport vehicles.

In today's rule, the Agency is not requiring storage and blending tanks for boilers and industrial furnaces burning hazardous waste because we continue to believe that such tanks are not requisite to demonstrating conformance with the emission standards of §§ 266.104 through 266.107. However, as indicated in the supplement to the proposed rule, EPA believes that facilities that install blending and storage tanks may be better able to control flow interruptions and waste stratification. Consequently, boilers and industrial furnaces with blending and/or storage tanks may operate with greater efficiency and thereby may more readily meet performance standards for emissions.

We also note that, once an owner/operator is in interim status, the part A application may be revised to convert from direct transfer operations to the use of storage units. See discussion in section VIII.D of Part Three of the preamble.

C. Standards for Direct Transfer Operations

In the October 26, 1989, supplement to the proposed rule, EPA identified permitting authorities' concerns about the practice of feeding hazardous waste fuels directly from transport vehicles to boilers and industrial furnaces. These concerns included: (1) The potential for fires, explosions, and spills during transfer operations; and (2) the stratification of waste in the transport container and the potential for waste fuel flow interruptions which, in turn, could affect the ability of the burner to consistently provide efficient combustion of the waste. EPA requested comment on two approaches to regulate direct transfer operations. One approach was for permit writers to use the RCRA omnibus authority to establish additional permit conditions as necessary to ensure adequate protection of human health and the environment from such operations. The other approach was to require that facilities burning hazardous waste use blending and surge storage tanks to avoid the flow interruptions and waste stratification, which would address permit writers' concerns.

In the April 27, 1990 Federal Register notice, EPA noted that commenters on the October 1989 notice stated that controls on transfer operations were needed during interim status. As a result, the Agency requested comment on the need and appropriateness of regulating direct transfer operations under interim status standards for containers and tank systems of subparts I and J of part 265. EPA received numerous comments in response to these solicitations. The majority of commenters recommended that EPA allow direct transfer with proper controls and restrictions, such as: (1) Allow direct transfer approval for facilities granted interim status or a RCRA operating permit; (2) establish direct transfer standards similar to subparts I and J of 40 CFR part 265 for facilities with a contingency or SPCC plan; and (3) allow direct transfer during test burns alone. Some respondents suggested that instead of allowing direct transfer, EPA should require storage and blending tanks for all facilities burning hazardous waste.

The Agency is today promulgating standards regulating direct transfer operations. See § 266.111. The Agency believes that these standards will adequately address potential risks to human health and the environment.

EPA considers direct transfer operations to be a part of the hazardous waste firing system, not a storage

activity. Hence, facilities that are not subject to the burner standards of §§ 266.102 (permit standards) or 266.103 (interim status standards) are not subject to the direct transfer standards. Examples of facilities not subject to the direct transfer standards are small quantity burners exempt from regulation under § 266.108, metals reclamation furnaces deferred under § 266.100(c), and coke ovens exempt under § 266.100(b)(4).

These direct transfer standards reference extensively the subpart I container standards and the subpart J tank standards of parts 264 and 265 and will apply equally to facilities operating under a permit as well as those operating under interim status. The regulations address the area in which transport vehicles are located and piping and other ancillary equipment (termed "direct transfer equipment" in today's rule) used to transfer waste from the vehicle to the burner. The standards provide general operating requirements and controls on equipment integrity, containment and detection of releases, response to leaks or spills, design and installation of new direct transfer equipment, and closure.

1. General Operating Requirements

Facilities that directly transfer hazardous waste to boilers and industrial furnaces from transport vehicles must comply with general operating requirements that specify safe management practices for handling incompatible wastes, spill prevention controls, and automatic waste feed cutoffs. These general operating requirements apply to both containerized and bulk hazardous waste. General performance standards for safe operation in today's rule include measures for conducting direct transfer operations such that fire, explosion, violent reactions, and other conditions that could threaten human health or the environment do not occur. Direct transfer from open-top containers is prohibited. Direct transfer equipment, which is any device that distributes, meters, or controls hazardous waste flow between a transport vehicle and a BIF, must also be closed except when necessary to add or remove the waste. Safe management practices for handling incompatible wastes are also required. Transport vehicles or direct transfer equipment holding ignitable or reactive hazardous waste must be located at least 50 feet from the receiving facility's property line.

2. Inspections and Recordkeeping

All equipment and areas where direct transfer occurs must be inspected hourly for leaks during direct transfer operations. Control equipment, direct transfer equipment monitoring data, and other equipment ensuring compliance with direct transfer standards must also be inspected hourly. Finally, the rule provides recordkeeping requirements to document results of inspections.

We note that only daily inspection is required under subpart J of parts 264 and 265 for tank systems (i.e., piping, valves and other direct transfer equipment). EPA is requiring hourly inspections of direct transfer operations because, unlike tank systems that use hard piping, direct transfer operations use flexible hoses and quick change coupling devices that have a greater potential for leaks or spills.

3. Equipment Integrity

Equipment integrity requirements address direct transfer equipment (e.g., piping or conveyors from the transport vehicle to the burner). The standards promulgated today require the transfer of waste to other equipment if equipment holding hazardous waste leaks or is in poor condition, and specify safe management practices for transferring wastes to other containers or transport vehicles. An assessment is required of existing direct transfer equipment that does not meet the secondary containment requirements discussed below to determine if the direct transfer equipment is leaking or unfit for use and must be certified by a qualified, registered professional engineer. If equipment is found to be leaking or unfit for use, the owner/operator must comply with the requirements addressing responses to leaks or spills.

4. Containment and Detection of Releases

The rule requires secondary containment for underground direct transfer equipment. See § 266.111(e)(1). Inspections and leak tests of direct transfer equipment and recordkeeping requirements are also required. Existing direct transfer equipment subject to the secondary containment requirements of § 265.193 (by reference in § 266.111(e)(1) of today's rule) must comply with those secondary containment requirements within two years after the effective date of the rule. EPA believes that two years (30 months from promulgation) is a reasonable amount of time to enable owners and operators to retrofit existing equipment with secondary containment as necessary given that direct transfer

operations generally do not involve the use of extensive equipment subject to secondary containment.

5. Response to Leaks or Spills

Action required to be followed in the event of a leak or spill are based on those required in subpart J, part 265. See § 266.111(e)(5). Should a leak or spill occur, equipment use must cease (to prevent the flow or addition of wastes into the direct transfer equipment or secondary containment system) and the system must be inspected to determine the cause of the release. The waste must be removed from the direct transfer equipment or secondary containment system and visible releases to the environment must be contained. In the event of a leak or spill, the Director must be notified of the incident in writing. Secondary containment, repair, or closure of the leaking equipment, and certification of major repairs must be provided.

6. Design and Installation of New Equipment

New direct transfer equipment must meet the design and installation standards specified in today's rule as defined in § 265.192 for tank systems. See § 266.111(e)(4) in today's rule referencing that section. The standards include: Specifications for assessing the design of new direct transfer equipment; backfill requirements for new underground direct transfer equipment; tightness tests; equipment support and protection requirements; corrosion protection; and written certification that these requirements have been met.

7. Closure

Today's rule applies by reference the closure requirements for direct transfer equipment provided by § 265.197 (except paragraphs (c)(2) through (c)(4)). See § 266.111(e)(6). That section requires the removal or decontamination of waste residues, system components, and contaminated soils, structures, and equipment.

XIII. Applicability of the Bevill Exclusion to Combustion Residues When Burning Hazardous Waste

Under the Agency's existing regulations, wastes that are derived from the treatment of listed hazardous wastes are also considered to be hazardous unless and until they are delisted (see 40 CFR 261.3(c)(2) and (d)(2)). The combustion or processing of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the hazardous waste, is a type of

treatment no matter what type of device is used in the process, or for what purpose the waste is burned or processed. Accordingly, under the Agency's existing rules, residues from thermal combustion (or processing) of listed hazardous wastes remain the listed hazardous wastes until they are delisted.

When the device burning hazardous waste is (1) a boiler burning primarily coal or other fossil fuels, (2) an industrial furnace processing primarily ores or minerals, or (3) a cement kiln processing primarily raw materials, the applicability of the Bevill exclusion must be considered (see RCRA section 3001(b)(3)(A)(i-iii)). The Bevill exclusion refers to residues resulting from burning or processing certain materials whereby the residues are not considered to be hazardous waste at this time because they require special study to determine whether they should be regulated under subtitle C.

To determine whether the Bevill exclusion continues to apply when the devices described above burn or process hazardous waste, today's final rule promulgates the case-by-case determination involving a two-part test as discussed in the October 1989 supplement to the proposed rule. See § 266.112. Under this test, owners and operators must determine on a site-specific basis whether the co-combustion of hazardous waste has significantly affected the character of the residue. The residue is considered to be significantly affected if both: (1) Concentrations of toxic (appendix VIII, part 261) compounds in the waste-derived residue are significantly higher than in normal (i.e., without burning/processing hazardous waste) residue; and (2) toxic compounds are present in the waste-derived at levels that could pose significant risk to human health. If the case-by-case determination demonstrates that the residue has been significantly affected (or if the owner or operator does not obtain data and information adequate to support a demonstration that the residue has not been significantly affected), such derived-from residues are subject to regulation as hazardous waste because the residues are no longer the type of material Congress commanded the Agency to study before regulation. Such residues are no longer deemed to be from processing ores or minerals, burning fossil fuels, or making cement. Rather, they are from treating hazardous waste.

The following sections discuss the basis for applying the Bevill exclusion to derived-from residues, the evolution of

the Agency's interpretations on the applicability of the Bevill exclusion to waste-derived residues, and how today's case-by-case determination works.

A. Basis for Applying the Bevill Exclusion to Derived-From Residues

A number of comments questioned whether the Agency has the legal authority to determine that some residues from coprocessing hazardous waste with Bevill raw materials could remain excluded under the Bevill amendment pending completion of the section 8002 studies. Because the Agency's previous determination of this question (50 FR 49190 (Nov. 29, 1985)) could have been more fully explained, the Agency has decided to reopen the question in this rule and to respond to the public comments.

The Agency's consistent position on this issue is that so long as the processing of hazardous waste does not significantly affect the character of the waste residues as high volume/low hazard, then those wastes can remain excluded under the Bevill amendment. Put another way, the wastes can potentially remain the type of material that Congress told the Agency to study before imposing subtitle C regulation.

Instead of focusing on the question of whether coprocessing hazardous waste affects the composition of the residues from a Bevill device, some commenters would have it that the mixture and derived-from rules apply to the residues, so that the residues are subject to subtitle C (assuming listed wastes are coprocessed) regardless of the actual effect of burning hazardous waste. At the least, the statute does not compel this result. In the case of utility boilers burning fossil fuels, the statute states explicitly that wastes "generated primarily from the combustion of coal or other fossil fuels" is to be excluded. See section 3001(b)(3)(A)(i). Thus, some type of co-combustion is expressly authorized. With respect to the two remaining categories of Bevill waste (wastes from processing ores and minerals and cement kiln dust), the Bevill amendment (section 3001(b)(3)(A)) does not use the term "primarily", but does not expressly address the question of whether the exemption applies when the residues are produced in part from burning hazardous waste. Thus, read literally, dust from a cement kiln that burns hazardous waste along with normal raw materials could be termed "cement kiln dust."⁸⁴

⁸⁴ EPA does not accept the argument that the omission of the word "primarily" in regard to ore/

If there were doubt on this point, the Agency is convinced that it is dispelled by the 1984 amendments. Sections 3004(q)(1) and 3010(a) both state explicitly that "(n)othing in this subsection shall be construed to affect or impair the provisions of section 3001(b)(3)" (the Bevill amendment). This language would be meaningless unless it allowed some residues from Bevill devices burning hazardous wastes (specifically hazardous waste fuels) to remain within the scope of the Bevill amendment. Although commenters argued, based on passages from the legislative history, that the provision should not be given this natural meaning, the Agency does not find the argument persuasive. Rather, the legislative history appears to state that Bevill devices burning hazardous waste fuels will be subject to the emission standards developed pursuant to section 3004(q). See H. Rep. No. 198, 98th Cong. 1st Sess. 41; S. Rep. No. 284, 98th Cong. 1st Sess. 37. Today's rules accomplish that result.

At the same time, the Agency is concerned about reading the Bevill amendment in a manner that gives it undue scope, such as by allowing Bevill devices to serve as a dumping ground for other hazardous wastes. We do not view the interpretation adopted today as allowing the exemption to have undue scope. In the first place, emissions from the Bevill device itself are regulated. Second, the facility becomes subject to the facility-wide corrective action provisions of sections 3008(h) and 3004(u) by virtue of regulation of the combustion activity. Thus, potential problems relating to mismanagement of waste residues must be evaluated and addressed no later than during the permitting process.

Most importantly, the Agency believes that the reading adopted strikes a reasonable balance between the terms of the Bevill amendment and other provisions and regulations relating to hazardous waste management. A reading that would disqualify residues from the Bevill amendment if any hazardous waste is burned in the device would exalt form over substance by barring from Bevill eligibility a residue that was not discernably affected by

mineral processing wastes and cement kiln dust means that the residues must come exclusively from processing raw materials exclusively. This type of negative inference is not a compelled reading of the statute, and the legislative history to the provision in fact indicates that Congress used the term "primarily" with respect to utility wastes to overrule a 1978 EPA proposed regulation on the scope of utility wastes, rather than to affect the scope of the remaining two Bevill categories. 128 Cong. Rec. 3363 (1980).

burning hazardous waste. Given that such material could be exactly the high volume/low hazard residue that Congress told the Agency to study before regulating, EPA does not agree with an interpretation that automatically forecloses it from Bevill status.⁸⁵ In addition, use of Bevill devices for combusting hazardous wastes provides needed treatment capacity for a number of hazardous wastes, and the Agency would be reluctant to adopt an interpretation that discouraged safe processing of hazardous waste by necessarily imposing hazardous waste disposal costs on residues that might not be affected by the hazardous waste combustion.

For all of these reasons, therefore, the Agency is reading the statute in a way that does not automatically disqualify residues from coprocessing hazardous wastes in Bevill devices from eligibility for Bevill exempt status.

B. Evolution of Interpretations

To determine whether the Bevill exclusion continues to apply when the devices described above⁸⁶ burn hazardous waste fuel, the Agency stated in 1985 (see 50 FR 49190 (Nov. 29, 1985)) that the exclusion continues to apply as long as the hazardous waste is burned for energy recovery (i.e., not for destruction). The underlying principle for this determination was that when hazardous waste is used as fuel, the character of the residue would continue to be determined by the Bevill material (e.g., coal, ores or minerals, or cement raw materials) being burned or processed. Thus, the residue should remain within the Bevill exclusion pending special study before it could be regulated under subtitle C.

In the May 6, 1987 proposed rule (52 FR 17012-013), the Agency suggested refining these determinations to address residues from industrial furnaces processing ores or minerals and that also process hazardous waste for materials recovery, and residues from cement kilns that may process hazardous waste as an ingredient.

⁸⁵ EPA notes that in assessing whether residues have been affected by hazardous waste burning it is using a somewhat more rigorous test for assessing inorganic contamination—use of the TCLP rather than the synthetic acid rain leaching procedure—than it used in making the high volume/low hazard determination for mineral processing wastes. 54 FR at 36630 (Sept. 1, 1989). The Agency views this as an additional safeguard to assess the possible effect coprocessing of hazardous waste may have had on the residues.

⁸⁶ This is, a boiler burning primarily coal, an industrial furnace processing primarily ores or minerals, or a cement kiln processing primarily raw materials.

Under that proposal, such residues would remain within the Bevill exclusion provided that at least 50 percent of the raw material fed to the device consisted of a virgin ore, mineral, or normal raw material. However, residues from devices burning hazardous waste for the purpose of destruction (i.e., for neither energy nor materials recovery) would not qualify for the Bevill exclusion.

The Agency has evaluated these interpretations of the applicability of the Bevill exclusion to waste-derived residues in light of its stated principle that residue that results from coburning hazardous waste and Bevill raw materials should remain within the Bevill exclusion provided that the character of the residue is determined by the Bevill material (i.e., the residue is not significantly affected by the hazardous waste). As discussed in the October 1989 supplement to the proposed rule (54 FR 43733-36), the Agency does not believe that its data base for making these interpretations is sufficient to ensure that, in every case, the residue would not be significantly affected by the hazardous waste. Further, the Agency has reconsidered whether the interpretation that residues generated by the subject devices when burning waste for destruction are not within the Bevill amendment is consistent with the stated principle. Consequently, the Agency proposed in the supplemental notice to require case-by-case determinations of the effect of burning hazardous waste on residuals. That case-by-case approach is promulgated in today's rule.

C. Case-By-Case Determinations

We discuss below which devices are eligible for the Bevill exclusion of residues and how the two-part test works for determining whether combustion of the waste has significantly affected the residue.

1. Eligible Devices

Until further studies were completed, Congress intended to exclude from subtitle C regulation residues from: (1) Devices that burn primarily fossil fuel; (2) industrial furnaces that process ores or minerals; and (3) cement kilns. As the Agency reads these provisions, to be eligible for exclusion from subtitle C regulation under the Bevill amendment, the waste-derived residue must be generated from: (1) A boiler burning primarily coal⁸⁷ (2) an industrial

furnace processing primarily ores or minerals (otherwise, residues could not be said to come from processing ores and minerals, but rather from processing other materials), or (3) a cement kiln processing primarily raw materials. To implement the provision that, to be eligible for the Bevill exclusion the device must burn primarily Bevill material, EPA is requiring that a boiler must burn at least 50 percent coal, an industrial furnace must process at least 50 percent ores or minerals, and at least 50 percent of the feed stock to a cement kiln must consist of normal raw materials. This requirement also confirms the Agency's long-standing interpretation that the Bevill exclusion applies only to primary facilities and not to secondary facilities such as secondary smelters.⁸⁸ See § 266.112(a).

2. Two-Part Test

Today's rule requires a case-by-case determination as to whether the hazardous waste being burned or processed significantly affects the character of the residue with respect to inorganic and organic toxic (i.e., appendix VIII, part 261) constituents. The residue is considered to be significantly affected if both: (1) Concentrations of toxic (Appendix VIII) compounds in the waste-derived residue are significantly higher than in normal (i.e., without burning/processing hazardous waste) residue; and (2) toxic compounds are present in the waste-derived residue at levels that could pose significant risk to human health. Part One of the test need not be conducted if the waste-derived residue passes Part Two of the test (i.e., if the health-based concentration limits are not exceeded). Such a waste would still meet the high volume/low hazard Bevill threshold.

a. Part One—Comparison with Normal Residues. Part One of the test requires a comparison of hazardous waste-derived residues with normal residues to determine if toxic compounds are present at statistically significant higher levels. See § 266.112(b)(1). The toxic compounds of concern are any compound listed on appendix VIII, part 261, that may reasonably be expected to be a constituent in the hazardous waste plus the list (see appendix VIII to the rule) of

hazardous waste. This is because oil and gas generally produce little residue when burned and, thus, toxic constituents from the hazardous waste can significantly affect any residue generated. See 50 FR 49190 (Nov. 29, 1985). The Agency is not reopening this determination in today's rule.

⁸⁸ In support of this reading, one court has held that residues from a secondary lead smelter are not covered by the Bevill amendment. *Ilico Co. versus EPA* (W.D. Ala. 1986).

organic compounds that are common products of incomplete combustion (PICs) from burning hazardous waste. The total concentration of each compound of concern in the residues must be determined.⁸⁹ Analytical procedures are provided in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) incorporated by reference in § 260.11(a).

The rule requires the use of a statistical test to compare the concentrations of toxic constituents in samples of normal (without burning/processing hazardous waste) residues with samples of waste-derived residues. In the statistical test, the 95th percent confidence interval about the mean of the normal residue concentrations (using a "t" distribution) is used to determine the upper 95th percent confidence interval about the mean. Procedures that must be used to determine the upper 95th percent confidence interval about the mean are prescribed in "Statistical Methodology for Bevill Residue Determinations" in Methods Manual for Compliance with the BIF Regulation, incorporated in today's rule as appendix IX of part 266. A minimum of ten composite samples must be obtained and analyzed to represent the normal residue in order to effectively calculate the upper 95th percent confidence interval about the mean. This is the concentration that the waste-derived residue may not exceed to pass Part One of the test. The waste-derived residue must be characterized by composite samples with a composite period not to exceed 24 hours to ensure that residues are managed properly and promptly (i.e., as exempt residues or hazardous waste) and to provide for effective enforcement. The sampling approach must be based on (and be consistent with) representative sampling protocols described in SW-846 and must be documented by recordkeeping.

If operating conditions change so that concentrations of toxic compounds in normal residue may (would have) decrease(d), the owner and operator must re-establish the "baseline" concentrations in normal residue and use the lower baseline levels for the test. This is necessary to ensure that owners/operators do not use the most contaminated raw materials in order to burn more hazardous waste, and then switch back to their normal raw materials.

⁸⁹ We note that Part One of the test considers the total concentration of each compound, while Part Two of the test considers, for metals, the concentration in an extract generated from the Toxicity Characteristic Leachate Procedure (TCLP).

⁸⁷ The Agency has determined that residues from cofiring hazardous waste with oil or gas are not excluded under the Bevill amendment because the character of the residue would be determined by the

b. Part Two.—Comparison With Health-Based Limits. Part Two of the test requires a comparison of the concentration of toxic constituents in the waste-derived residues with health-based limits the Agency has established in appendix VII to the rule. The comparison is made to determine if toxic compounds in the waste-derived residue are present at levels higher than the health-based limits. The toxic compounds of concern are the same as for Part One of the test—any compound listed on appendix VIII, part 261, that may reasonably be expected to be a constituent in the hazardous waste plus the list (see appendix VIII to the rule) of organic compounds that are common products of incomplete combustion (PICs) from burning hazardous waste. The total concentration of each nonmetal compound of concern in the waste-derived residue must be compared with the health-based limit. In addition, the concentration of each metal of concern in an extract from the Toxicity Characteristic Leaching Procedure (TCLP) must not exceed the health-based limits.

The Agency does not have adequate health effects data (e.g., MCLs, RfDs, unit risk values) to establish health-based limits for many compounds listed in appendix VIII, part 261. Consequently, we have conservatively established a health-based limit for such compounds based on the 5th lowest percentile value of the health-based values for nonmetal compounds established in appendix VII to the rule. That value is 0.002 ug/kg. This is the same approach EPA used to establish a RAC for compounds where insufficient health effects data were available to establish a RAC or RsD for the compound.

The rule requires the use of total concentrations of nonmetal compounds rather than extract concentrations for the test of health significance because of burning toxic nonmetal compounds in these devices should be to destroy the compounds. (Use of total nonmetal concentrations thus serves as a partial check that combustion is being conducted properly.) The health-based limits for the metals in appendix VII of the rule are the Toxicity Characteristic (TC) limits (see § 261.24) for those metals for which TC limits have been established. To establish health-based limits for the other metals, the Agency applied the same 100 fold dilution factor to leachate concentrations used to establish the TC limits. The Agency has also used this same dilution factor in assessing whether mineral processing wastes satisfy the low hazard prong of

the Bevill test. See 54 FR 36630 (Sept. 1, 1989).

To determine if the concentrations of toxic compounds in the waste-derived residues are higher than the health-based limits, owners and operators must obtain and analyze composite samples of waste-derived residues with a composite period not to exceed 24 hours. The sampling approach must be based on (and be consistent with) representative sampling protocols described in SW-846 and must be documented by recordkeeping.

D. Recordkeeping

Owners and operators must maintain for a period of three years records of sampling and analyses of residues to support claims that the waste-derived residue retains the Bevill exclusion.

E. Other Considerations

1. Generic Determinations

In the October 26, 1989 supplement to the proposed rule, the Agency requested data and information that it could use to support: (1) Generic determinations of levels of toxic constituents in normal (i.e., generated without burning/processing hazardous waste) residues; and (2) generic determinations that certain waste-derived residues are not significantly affected by burning/processing hazardous waste, and, thus, remain excluded without the need to make the case-by-case demonstration.

a. Normal Residues. After review of comments on the 1989 supplemental notice, the Agency concluded that it is not practicable to establish generic concentrations of toxic constituents in normal residues. Commenters noted that there were so many site-specific variables that affect the concentration of toxic constituents in normal residues that this approach was not workable. Variables include the type of industrial furnace, type of fuels burned, and type and source of raw materials used by industrial furnaces. The Agency initially considered establishing generic concentration levels in normal residues to avoid giving an advantage to facilities that use fuels or raw materials with high (i.e., higher than normal for the industry) levels of toxic constituents. Normal residues from such facilities would have high levels of toxic constituents. Thus, waste-derived residues from such facilities could also have high levels of toxic constituents. Consequently, such facilities could burn/process hazardous waste with high levels of toxic constituents without losing the Bevill exclusion of residues. We note that enforcement officials will give priority consideration to those facilities whose

residues fail part 2 (health-based limits) of the test to determine Bevill applicability and rely on part 1 (comparison with normal residues) to retain the exclusion. Owners and operators must be able to support, at any time, that the nonhazardous waste feedstreams being fed into the device when hazardous waste is fired are the same (or would not decrease the concentrations of toxic constituents in residues) as those fired when the concentrations of toxic constituents in normal residues were determined. If the concentrations of toxic constituents in nonhazardous feedstreams decrease significantly from those concentrations when the normal residue was generated for purposes of establishing normal concentrations of toxic constituents (or if design or operating conditions change such that levels of toxic constituents in normal residue could decrease significantly), then the owner/operator must establish new, lower, concentrations for normal residue.

b. Excluded Residues. The Agency also concluded that it is not practicable to make generic determinations that certain waste-derived residues are not significantly affected by burning or processing of hazardous waste and, so, remain excluded. This approach is not workable given that the exclusion would have to be conditioned on a number of factors including: (1) The composition, feed rate, and method of feeding the hazardous waste; (2) the type of device; (3) the composition, feed rate, and method of feeding any other fuels; and (3) the composition, feed rate, and method of feeding any raw materials. The data base to support such determination is not available. Moreover, any such generic exclusion that is necessarily conditioned on so many factors would be of little practical use to the regulated community given the variability of normal operations.

2. Burning for Destruction

The case-by-case approach to determine the effect of coburning on residues from Bevill devices focuses on the residues that are actually generated rather than on the purpose for which the hazardous waste is burned. Thus, residues generated from burning hazardous waste in boilers and industrial furnances for the purpose of destruction⁹⁰ are eligible to retain the

⁹⁰ For example, wastes with low heating value that are not burned for materials recovery or as an ingredient are burned for destruction. We note that such wastes may be burned only by new facilities as incinerators under an operating permit or by those existing facilities operating under interim status that also have certified compliance with the applicable emissions standards.

Bevill exclusion. The Agency's historic approach to the issue of cogenerated residues has been to focus on the character of the residues to ascertain what determines their character—the Bevill material or the hazardous waste being burned/processed (see 50 FR 49190 (November 29, 1987)). The statute itself does not directly specify that the purpose of the burning is a relevant criterion, but instead states that certain types of waste are excluded from subtitle C regulation pending completion of required special studies. Since the Bevill devices would still be engaged in the Bevill activity, and composition of the residues would potentially be unaffected, the Agency sees no absolute bar to allowing Bevill status for such residues.

Part Four: Miscellaneous Provisions

I. Regulation of Carbon Regeneration Units

A. Basis for Regulating Carbon Regenerating Units as Thermal Treatment Units

In today's rule, EPA is clarifying the regulatory status of carbon regeneration⁹¹ units. Since 1980, controlled flame (direct flame) carbon regeneration units which destroy organic contaminants adsorbed onto activated carbon have met the definition of incinerator and were subject to regulation as such, while carbon regeneration nonflame thermal units were treated as exempt reclamation units. Today's rule defines carbon regeneration unit and incinerator (see § 260.10) to ensure that both direct flame and nonflame thermal carbon regeneration units are regulated as thermal treatment units under the interim status standards of part 265, subpart P, and the permit standards of part 264, subpart X.

One commenter expressed concern that the thermal treatment standards of subpart X were vague. EPA disagrees and points out that subpart X, part 264 covers miscellaneous hazardous waste management units that do not or may not fit the description of any of the units covered by other part 264 regulations. Without subpart X, these unregulated units could only operate as interim status facilities and could not be fully permitted, thereby preventing the construction of new units or some expansions of existing units. EPA recognized that some types of new units that were not previously allowed to be constructed could reduce risks to human health and the environment from the

management of hazardous waste. Promulgation of subpart X generic permitting standards was intended to allow such construction and flexibility for technical development and innovation and to cover diverse technologies and units. The subpart X standards specify that health and environmental safety must be a primary concern during the management of hazardous wastes in miscellaneous units. If the need arises, the Agency may develop specific technology standards in the future (see 52 FR 46964, December 10, 1987). Although several commenters supported the application of part 264, subpart O incinerator standards to direct flame and nonflame devices, EPA has decided against this since demonstration of conformance with the DRE standards (and the proposed CO/THC standards) may not be achievable or warranted for carbon regeneration units considering the relatively low levels of toxic organic compounds adsorbed onto the activated carbon.

B. Definition of Carbon Regeneration Unit and Revised Definition of Incinerator

Several commenters requested that EPA consider revising the definition of a carbon regeneration unit so that certain units used for air emissions control, wet oxidation, and general recycling, would not be regulated. Activated carbon units used as air emission control devices of gaseous industrial process emissions will not necessarily be regulated because trapped organics in such columns are not hazardous wastes because the gas originally being treated is not a solid waste (it is an uncontained gas⁹²), and therefore any condensed organics do not derive from treatment of a hazardous waste. (The nongas residues from these devices could be hazardous wastes if they are listed or if they exhibit a characteristic, however.) However, regeneration or reactivation of carbon used to control air emissions from hazardous waste treatment, storage, or disposal facilities (e.g., under 40 CFR parts 264 and 265, subpart AA, June 21, 1990, 55 FR 25454) is subject to regulations as a RCRA thermal treatment unit.

We considered whether other units truly are engaged in reclamation, or whether the regeneration of the carbon is just the concluding aspect of the waste treatment process that commenced with the use of activated carbon to adsorb waste contaminants, which are now destroyed in the "regeneration" process (just as rinsing

out a container of hazardous waste is a stage in the storage process and does not constitute recycling of the container). Irrespective of whether these units are better classified as waste treatment or recycling units (or whether the units are flame or nonflame devices), we are concerned, as indicated above, that emissions from the regeneration process can pose a serious hazard to public health if not properly controlled, and therefore are clarifying today that they are regulated as thermal treatment units.

We note that this revision also applies to those carbon regeneration units that, while in active service treating wastewater, meet the definition of wastewater treatment units in § 260.10. Such units are exempt from RCRA permitting standards while treating wastewater. However, these units are not exempt from RCRA regulation when they are being regenerated because they are not treating wastewater during the regeneration process. Rather, the activated carbon columns themselves are being treated thermally. The thermal regeneration unit is subject to part 265, subpart P (existing units) or part 264, subpart X (new units).

C. Units in Existence on the Effective Date of the Rule are Eligible for Interim Status

Although certain carbon regeneration units may technically have met either the 1980 or 1985 definitions of incinerator, the Agency believes that there has been legitimate doubt as to these units' regulatory status (which is why the Agency undertook this rulemaking to clarify the status). The units might potentially have been classified as incinerators, thermal treatment units, or perhaps exempt recycling units. It would also have been confusing to interpret the rules in a manner that carbon regeneration units were not all regulated in the same way, given that their functions and activities are roughly identical whether or not the units are direct-fired. In fact, the most natural classification of these units, and the one the Agency intended, is as thermal treatment units. (EPA does not believe that these are recycling units, but rather that regeneration is a continuation of the waste treatment process, that process consisting of removal of pollutants by adsorption followed by their destruction. Nor does the Agency believe that incinerator standards make technical sense for these devices, as noted above). In addition, few if any of these units have actually been regulated as incinerators in practice.

⁹¹ The term "regeneration" includes reactivation of used carbon for reuse.

⁹² See 47 FR at 27530 (June 30, 1982) and 54 FR at 50973 (Dec. 11, 1989).

For these reasons, EPA is finding pursuant to § 270.10(e)(2) that there was substantial confusion as to which owners or operators of carbon regeneration units were required to submit a part A application and that this confusion is attributable to ambiguities in the subtitle C rules. Accordingly, such owners and operators may submit part A applications by the effective date of today's regulations and be eligible for interim status under part 265, subpart P (assuming they meet remaining requirements for interim status eligibility, and the facility is not already subject to interim status for other units).

II. Sludge Dryers

In today's rule, the Agency is clarifying the regulatory status of sludge dryers. In particular, the rule adds a definition of "sludge dryer" to § 260.10 and amends the definition of "incinerator" in § 260.10 to specifically exclude sludge dryers.

On November 17, 1980 (45 FR 76074), EPA suspended the applicability of the RCRA permitting requirements (40 CFR part 122, which is now codified as part 270) and hazardous waste management facility standards (40 CFR parts 264 and 265) to owners and operators of devices meeting the definition of "wastewater treatment unit" in 40 CFR 260.10 and 270.2.

Since promulgation of this wastewater treatment unit exclusion from RCRA permitting requirements, the Agency has received numerous requests to determine if certain types of units satisfy the definition of "wastewater treatment unit" and, therefore, would not require a RCRA permit. Many of these requests have concerned the regulatory status of thermal treatment units, particularly sludge dryers. Commenters have also requested clarification of the regulatory status of sludges from thermal treatment units. Most of the requests have been from owners and manufacturers of sludge dryers. The Agency believes that approximately 40 sludge dryers are currently being used in the metal finishing industry to dehydrate metal hydroxide sludges (EPA Hazardous Waste F006) generated in the treatment of wastewater.

In response to these inquiries, EPA distributed policy memoranda to the Regional offices explaining that a sludge dryer is included within the scope of the wastewater treatment tank exclusion, provided that it meets the definition of "wastewater treatment unit." (See OSWER Policy Directives 9503.52-1A and 9503.51-1A, available upon request from the RCRA Hotline.) In addition, with respect to the status of the sludges

themselves, they are hazardous waste if identified or listed (including by application of the mixture and derived-from rules) and are subject to regulation when removed from the tanks.

Despite the original November 17, 1980 preamble discussion and the policy clarification, the regulatory status of sludge dryers has continued to be unclear. One reason for the confusion is because it is not clear whether a sludge dryer satisfies the third component of the definition of wastewater treatment unit (i.e., whether it meets the definition of a "tank" or "tank system"). The Agency has determined that sludge dryers that are integrally equipped with feed or discharge hoppers that provide for an accumulation of waste satisfy the definition of "tank system."³³ Based on information available to EPA at this time, it appears that most sludge dryers are so equipped. (Those sludge dryers that are not so designed may still be considered tanks, but a case-by-case decision must be made.) The Agency has also determined that other types of equipment not obviously meeting the "tank" definition, such as presses, filters, sumps, and other types of processing equipment, are covered within the meaning of the term "tank" or "tank system" when used in the context of this exclusion (see OSWER Policy Directive 9503.52-1A).

Another reason that the regulatory status of sludge dryers has been the subject of many questions may be because some sludge dryers technically meet the current definition of an "incinerator," although EPA never intended to regulate direct-flame (or nonflame) sludge dryers as incinerators. When EPA amended the definition of "incinerator" to use physical design criteria rather than a primary purpose test (i.e., purpose of burning) to define an incinerator, it did not intend to bring sludge dryers under regulatory control as incinerators. (See 50 FR 625, January 4, 1985, indicating that the revised definition would not bring large numbers of devices other than incinerators under incinerator standards.) Under the former primary purpose definition, sludge dryers were not incinerators. Although under the 1985 revised definition of incinerator sludge dryers could be classified as incinerators, this was not EPA's intention. The Agency is clarifying this ambiguity by clearly regulating all

³³ We note that sludge dryers that are a part of a wastewater treatment facility that is subject to regulation under either section 402 or 307(b) of the Clean Water Act and that do not meet the definition of a tank system are subject to RCRA regulation as thermal treatment units, just like sludge dryers that are not a part of a wastewater treatment system.

nonexempt sludge dryers (i.e., those not meeting the definition of "wastewater treatment unit" under today's rule, as discussed below) under the interim status standards of part 265, subpart P ("Thermal Treatment"), and the permit standards of part 264, subpart X ("Miscellaneous Units"). See 55 FR 17866 (April 27, 1990) for details. Given that such units managing hazardous waste always were subject to some type of regulation, they are not newly eligible for interim status as a result of today's clarification.

Even though as a result of this amendment sludge dryers are potentially subject to regulation under subpart P of part 265 and subpart X of part 264 as other thermal treatment units, sludge dryers that meet the § 260.10 definitions of "wastewater treatment unit" and "tank" or "tank system" continue to be exempt wastewater treatment units under §§ 264.1(g)(8) and 265.1(c)(10). The Agency believes that virtually all sludge dryers meet the tank/tank system definition and, therefore, would be exempt when used as part of a wastewater treatment system.

A. July 1990 Proposal

To better clarify the regulatory status of sludge dryers, the Agency proposed on July 18, 1990 (55 FR 29280) a definition for "sludge dryer" to clearly distinguish them from other thermal treatment units: Sludge dryer means any enclosed thermal treatment device that is used to dehydrate sludge and that has a maximum total thermal input of 1,500 Btu/lb of sludge treated on a wet-weight basis.

In the same notice, the Agency also proposed to amend the definition of a wastewater treatment unit to say that sludge dryers were the only thermal treatment devices (heretofore) meeting the definition of a wastewater treatment unit that were exempt from regulation.

Today's rule clarifies that sludge dryers meeting the definition of a wastewater treatment unit are exempt from regulation (by promulgating a definition of sludge dryer and revising the definition of incinerator to exclude sludge dryers). EPA also proposed a further clarification that other devices that use heat to treat wastewaters were not to be considered eligible for the wastewater treatment tank exemption. The Agency indicated, without discussion, that it had not intended for such units to be eligible for the exemption and that the proposal was a simple clarification which reflected common understanding within the Agency and the regulated community.

Commenters disagreed with this assessment of the regulations, and the Agency has since studied the issue in more depth. It appears that the Agency was mistaken in its assessment both of the current intended scope of the rule and of common understanding of what the rule covers. With respect to such devices as evaporators and steam strippers used in wastewater treatment, the Agency has in fact traditionally regarded such units as eligible for the wastewater treatment exemption. See 55 FR at 25467 (June 21, 1990). Commenters likewise indicated their understanding that current rules exempt such devices.

Given the narrow scope of the proposal, the clear indication that any change would not be a clarification of existing rules (as indicated) but rather a potentially far-reaching alteration, and the absence of any discussion (or study) of whether a substantive change in regulatory status of these devices is warranted, EPA cannot go forward. Consequently, we are not adopting any other part of the definition of wastewater treatment unit discussed in the 1990 notice.

B. Summary of Public Comments

EPA received comments regarding the status of sludge dryers in response to the April 27, 1990 BIF notice and the July 18, 1990 notice discussed above.

Many of the commenters to these notices supported the inclusion of sludge dryers in the wastewater treatment unit (WWTU) definition. The commenters, however, requested clarification on whether units similar to sludge dryers (e.g., evaporators) would also be eligible for the WWTU exclusion. As discussed above, other devices using heat that meet the definition of wastewater treatment unit would continue to be exempt from RCRA regulation (except, of course, an incinerator, boiler, or industrial furnace burning hazardous waste).

Eleven commenters to these proposals stated that the maximum 1,500 Btu/lb thermal input requirement in the sludge dryer definition is too low. Citing low thermal efficiencies (especially for indirect-fired dryers), these commenters recommended thermal input requirements ranging from 1,700 to 3,300 Btu/lb.

After consideration of the commenters' concerns and further review of the technical background information on the thermal input limit, the Agency is today revising the thermal input limit to 2,500 Btu/lb wet sludge. The Agency believes that depending on the nature of the treatment system, the thermal input to a *bona fide* sludge dryer (i.e., a device that is not an

incinerator) can be as high as 2,500 Btu/lb.

Several commenters also requested that EPA clarify that the total thermal input limit was not to include the heating value of the sludge itself given that a number of sludges that are dried have as-fired heating values of 1,000 to 2,700 Btu/lb. The Agency agrees. The final rule explicitly excludes the heating value of the sludge from the 2,500 Btu/lb limit on thermal input. With this clarification, however, we note that the primary purpose test—dehydration—is the primary distinction between a sludge dryer and an incinerator. This is because a sludge incinerator can readily meet the thermal heat input limit of 2,500 Btu/lb when the heating value of the sludge itself is not included. However, the primary purpose of a sludge dryer is dehydration while the primary purpose of an incinerator is volume reduction to produce an ash residue. Thus, we believe that the definition in today's rule adequately distinguishes between sludge dryers and incinerators. Nevertheless, it should be noted that any person claiming the wastewater treatment unit exemption for a sludge dryer must have documentation to support that the primary purpose of the device is to dehydrate sludge, not to destroy sludge to produce an ash residue.

The Agency received many responses to its request for comments on whether it is necessary to specify a minimum percent volume reduction in the definition of a sludge dryer. Although one commenter stated that a percent volume reduction should be specified in the sludge dryer definition, twelve of the commenters stated that such a requirement would be arbitrary, confusing, unworkable, and costly to enforce. Two of the commenters stated that a minimum percent weight reduction would be more appropriate. In today's rule, the Agency has decided not to specify a minimum percent volume (or weight) reduction in the definition of a sludge dryer. The Agency believes that such a specification would be difficult to support and would not be needed to distinguish sludge dryers from incinerators.

Several commenters stated that the Agency should address emissions of volatile organics from units such as sludge dryers. In addition, two commenters recommend a 1,000 Btu/lb thermal input limit for the device to control volatile emissions from sludge dryers. EPA recognizes the need to address volatile emissions from sludge dryers and intends to evaluate alternatives for regulating these units at a later date. However, because this rule

simply clarifies that EPA intended for sludge dryers that meet the definition of a wastewater treatment unit to be exempt from the RCRA rules, it would be inappropriate to address volatile organic emissions at this time. Nonetheless, sludge dryers that do not meet the definition of a wastewater treatment unit (e.g., sludge dryers that are not a part of a wastewater treatment facility that is subject to regulation under either section 402 or 307(b) of the Clean Water Act) are subject to regulation as thermal treatment units under subpart X of part 264. Under those standards, the Agency may apply controls on volatile organic (and other) emissions as necessary to protect human health and the environment.

After considering comments on the proposed sludge dryer definition, EPA is today promulgating the following definitions:

Sludge dryer means any enclosed thermal treatment device that is used to dehydrate sludge and that has a maximum total thermal input, excluding the heating value of the sludge itself, of 2,500 Btu/lb of sludge treated on a wet-weight basis.

Incinerator means any enclosed device that: (1) uses controlled flame combustion and neither meets the criteria for classification as a boiler, carbon regeneration unit, or a sludge dryer, nor is listed as an industrial furnace; or (2) meets the definition of infrared incinerator or plasma arc incinerator.

III. Classification of Coke and By-Product Coal Tar

A. AISI Petition

The American Iron and Steel Institute (AISI) petitioned EPA with respect to the practice of recycling tar decanter sludge by the following means:

1. Applying the sludge to coal prior to or just after charging the coal into the coke oven; and
2. Combining the sludge with coal tar prior to its being sold.

The coke and the coal tar are often used as fuel and so have been classified as solid wastes and hazardous wastes since they are fuels produced or otherwise containing a hazardous waste—EPA Hazardous Waste No. K087, tar decanter sludge. See § 261.2(c)(2)(i)(B). These hazardous waste fuels have been exempt from regulation under § 261.6(a)(3)(vii) and 50 FR 49170-171 (November 29, 1985). The AISI has requested that EPA not classify such coke or coal tar as solid wastes. AISI submits that recycling the decanter sludge in this manner does not

significantly affect the concentration of toxic metal and organic constituents of the coke or coal tar. EPA has indicated that waste-derived fuels could be classified as products under such circumstances, "since the more waste-derived fuels from a process are like products from the same process produced by virgin materials, the less likely EPA is to classify the waste-derived fuel as a waste." 50 FR 49169 (Nov. 29, 1985). To support its request, the AISI submitted data on the metals and organic constituents in coke, coal tar, and tar decanter sludge both with and without sludge recycling, the data and the Agency's response are discussed below.

B. Process Description

Coke used for making iron is manufactured through the destructive distillation of coal in ovens. A typical oven holds approximately 13 tons of coal which is heated to a temperature of about 2000°F. Generally 20 to 100 ovens are located adjacent to each other in a "coke oven battery." The destructive distillation or "coking" process takes about 15-18 hours. During that time period, about 20-35 percent of the coal is converted to coke oven gas (COG) consisting of water vapor, tar, light oils, heavy hydrocarbons, and other chemical compounds. The COG is collected from the top of the coke oven and, in most cases, sent to the by-product plant via the coke battery main. The COG is then cleaned by removing wastes and by-products prior to being burned, generally in the coke oven under-firing system. As a first step in the COG cleaning process, the coal tars, consisting of heavy hydrocarbons, are condensed from the gas. In addition, most of the particulate that escapes from the ovens is collected in the tar. This particulate is believed to consist principally of coal fines. The particulate or solids are then removed from the tar in the tar decanter. The coal tar is then burned as fuel or sold for use in various products such as roofing cement. The sludge has been listed as EPA Hazardous Waste No. K087 and is disposed of or recycled either by mixing with coal prior to being charged to the coke oven or mixing with coal tar after physical processing (grinding) prior to sale.

Approximately 8-12 gallons of tar are produced per ton of coke. In addition, approximately one pound of tar decanter sludge is produced for every 40 pounds of tar produced.

C. Basis for Approval of the AISI Petition

The AISI submitted data from metal and organic chemical analyses for the

coke, coal tar, and tar decanter sludge from four plants. The Agency reviewed these results and determined the following:

1. The recycling of tar decanter sludge by application to the coal charge does not appear to have a significant effect on the chemical composition of coke;

2. The organic chemical composition of the tar decanter sludge does not appear to be significantly different from the coal tar; and,

3. The concentration of one metal, lead, in the sludge appears to be slightly higher than in the coal tar. However, the increase does not appear to be statistically significant due to the high variability of the concentration values.

Based on the above and the fact that there is such a small quantity of sludge relative to the quantity of coke and coal tar produced by the coking process, EPA believes that sludge recycling, as described here, does not significantly affect the concentration of toxic metals and organic constituents in coal tar or coke. Furthermore, coke, coal tar, and the decanter tank tar sludge are similar materials formed in a single process and contain the same contaminants. In this circumstance, when the coke and the decanter tank tar sludge are very nearly the identical substance and, moreover, come from a single process, the Agency is warranted in exercising its discretion to determine that this management of the sludge is "not part of the waste disposal problem", and hence that the coke product is no longer a RCRA solid waste. *American Mining Congress v. EPA*, 907 F. 2d 1179, 1186 (D.C. Cir. 1990). Therefore, in today's rule, EPA is classifying such coke and coal tar as products, not wastes. As a result, the coke and coal tar will be excluded under 40 CFR 261.4 from the definition of solid waste and not subject to RCRA hazardous waste management regulations, when used as a fuel. A necessary corollary to this action is also to exclude the coking process from regulation when K087 is used as an ingredient to produce coke. Given that K087 is for practical purposes just like other materials used to produce coke and comes the same process as these other materials, it would be anomalous to assert RCRA control over the coking process. Again, this form of sludge management—which is the same as raw material management—does not appear to EPA to be part of the waste disposal problem.⁹⁴ (In addition, coke

⁹⁴ The Agency is not aware of any other hazardous wastes that are burned in coke ovens as an ingredient that are just like other materials used to produce coke. If such materials are used, the Agency would encourage the industry to provide the

ovens are subject to a special regulatory regime under amended section 112(i)(8) of the Clean Air Act, and RCRA regulation of this particular practice could disrupt the Clean Air Act regulatory scheme. Thus, the Agency views RCRA regulation of this practice as inappropriate in any case.)

This exemption applies only to the waste-derived fuels and only when derived from tar decanter sludge, K087. Thus the tar decanter sludge, K087, is subject to full RCRA regulation prior to recycling. In addition, the exemption does not extend to coke or coal tar produced from hazardous waste (e.g., spent solvents) other than tar decanter sludge, EPA Hazardous Waste K087.

IV. Regulation of Landfill Gas

In the November 29, 1985 final rules regulating hazardous waste burned for energy recovery, the Agency indicated that gas recovered from hazardous waste landfills that is burned for energy recovery in boilers or industrial furnaces is not regulated under the waste-as-fuel rules. 50 FR 49171. EPA took this action in order to study further the extent to which there might be jurisdictional limits on the Agency's authority under section 3004(n) of RCRA to regulate gaseous emissions from hazardous waste. *Id.* In today's rule, we are amending this language slightly by indicating that the exemption also applies to gas recovered from solid waste landfills. Therefore, gas recovered from a solid waste landfill that exhibits a hazardous characteristic would also be exempt from today's rule when burned for energy recovery in a boiler and industrial furnace.

In addition, the Agency solicited comment, in the May 6, 1987 proposed rule, on whether the hydrocarbon phase of the condensate removed from recovered gas should also be exempt from regulation when burned as fuel (52 FR 17021). Two commenters responded that the condensate contains chemical constituents similar to fossil fuels such as kerosene or gasoline and that the handling and burning of the gas condensate poses no significant hazard to human health. The commenters encouraged the Agency not to regulate the hydrocarbon phase of the landfill gas condensate unless the hydrocarbons exhibit a subtitle C characteristic of a hazardous waste. However, data on condensate composition provided by one respondent was vague and represented only one source of condensate. Absent adequate data EPA

necessary information in order to determine whether the exclusion should be modified.

is not promulgating an exemption from regulation of the hydrocarbon phase of the landfill gas condensate at this time. Facilities that wish to burn a landfill gas condensate may consider whether they are eligible for the small quantity burner exemption promulgated in this rule.

V. Definitions of Infrared and Plasma Arc Incinerators

Today's rule establishes definitions for infrared and plasma arc incinerators and revises the definition of incinerator to explicitly include these devices. As discussed in the April 27, 1990 proposed amendments to the incinerator standards (55 FR at 17869-70), EPA is clarifying that these devices are incinerators rather than (other) thermal treatment units subject to regulation under subpart X of part 264 (or subpart P of part 265 for interim status units) because: (1) although these devices use nonflame sources of thermal energy to treat waste in the primary chamber, they invariably employ controlled flame afterburners to combust hydrocarbons driven off by the primary process (and, thus, they meet the definition of an "incinerator" under § 260.10); and (2) the incinerator standards are workable and protective for these units.

We note that today's action merely clarifies the regulatory status of these devices. It does not subject them to regulation for the first time; they have been regulated since 1980. Thus, interim status is not reopened for these devices.

Part Five: Administrative, Economic, and Environmental Impacts, and List of Subjects

I. State Authority

A. Applicability of Rules in Authorized States

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA program within the State. (See 40 CFR part 271 for the standards and requirements for authorization.) Following authorization, EPA retains enforcement authority under sections 3008, 7003 and 3013 of RCRA, although authorized States have primary enforcement responsibility.

Prior to the Hazardous and Solid Waste Amendments of 1984 (HSWA), a State with final authorization administered its hazardous waste program entirely in lieu of EPA administering the Federal program in that State. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities in the State which the State was authorized to permit. When new, more stringent Federal requirements

were promulgated or enacted, the State was obliged to enact equivalent authority within specified time frames. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

In contrast, under section 3006(g) of RCRA, 42 U.S.C. 6926(g), new requirements and prohibitions imposed by HSWA take effect in authorized States at the same time that they take effect in nonauthorized States. EPA is directed to carry out those requirements and prohibitions in authorized States, including the issuance of permits, until the State is granted authorization to do so. While States must still adopt HSWA-related provisions as State law to achieve or retain final authorization, the HSWA applies in authorized States in the interim.

The majority of today's rule is promulgated pursuant to section 3004(q) of RCRA, a provision added by HSWA. (The provisions that are not promulgated pursuant to HSWA are the provisions for sludge dryers, carbon regeneration units, infrared incinerators, and plasma arc incinerators.) Therefore, the Agency is adding the requirements (except the non-HSWA provisions) to Table 1 in § 271.1(j) which identifies the Federal program requirements that are promulgated pursuant to HSWA and that take effect in all States, regardless of their authorization status. States may apply for either interim or final authorization for the HSWA provisions identified in Table 1, as discussed in the following section of this preamble.

B. Effect on State Authorizations

As noted above, EPA will implement the majority of the provisions of today's rule in authorized States until they modify their programs to adopt these rules and the modification is approved by EPA. Because these provisions of the rules are promulgated pursuant to HSWA, a State submitting a program modification may apply to receive either interim or final authorization under section 3006(g)(2) or 3006(b), respectively, for these provisions on the basis of requirements that are substantially equivalent or equivalent to EPA's. The procedures and schedule for State program modifications for either interim or final authorization are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations will expire January 1, 1993. (See § 271.24(c).)

The provisions of today's rule that are not promulgated pursuant to HSWA—provisions for sludge dryers, carbon regeneration units, infrared incinerators, and plasma arc incinerators—are not

effective in authorized States. Thus, these requirements will be applicable only in those States that do not have final authorization. In authorized States, the requirements will not be applicable until the State revises its program to adopt equivalent requirements under State law.

40 CFR 271.21(e)(2) requires that States that have final authorization must modify their programs to reflect Federal program changes, and must subsequently submit the modifications to EPA for approval. The deadline by which the State must modify its program to adopt the HSWA portion of today's rule is July 1, 1993 if a statutory change is not needed, or July 1, 1994 if a statutory change is needed. The deadline by which the State must modify its program to adopt the non-HSWA portion of today's rule is July 1, 1992 if a statutory change is not needed, or July 1, 1993 if a statutory change is needed. These deadlines can be extended in certain cases (40 CFR 271.21(e)(3)). Once EPA approves the modification, the State requirements become Subtitle C RCRA requirements.

States with authorized RCRA programs may already have requirements similar to those in today's rule. These State regulations have not been assessed against the Federal regulations being promulgated today to determine whether they meet the tests for authorization. Thus, a State is not authorized to implement these requirements in lieu of EPA until the State program modification is approved. Of course, States with existing standards may continue to administer and enforce their standards as a matter of State law.

In implementing the Federal program for the HSWA portion of today's rule, EPA will work with States under cooperative agreements to minimize duplication of efforts. In many cases, EPA will be able to defer to the States in their efforts to implement their programs, rather than take separate actions under Federal authority.

States that submit their official applications for final authorization less than 12 months after the effective date of these standards are not required to include standards equivalent to these standards in their application. However, the State must modify its program by the deadlines set forth in § 271.21(e). States that submit official applications for final authorization 12 months after the effective date of these standards must include standards equivalent to these standards in their application. 40 CFR 271.3 sets forth the requirements a State

must meet when submitting its final authorization application.

II. Regulatory Impacts

A. Cost Analysis

1. Background

Prior to publication of the proposed regulations in May 1987, the Agency examined the projected compliance costs, economic impacts, and risk reductions associated with the proposed rules. This effort consisted of a detailed examination of the pre-proposal draft as it was drafted in mid-1986 and a supplement prepared in late 1986⁹⁵ that examined several changes in tax policy and regulatory approach that occurred after the first analysis was completed.⁹⁶

The analyses estimated that of the approximately 1,000 BIFs identified as firing hazardous wastes, approximately 20 percent were likely to discontinue burning hazardous wastes because of the rules, 60 percent would burn small amounts of waste and would qualify for the small quantity burner exemption (SQBE), and the remaining 15 percent would obtain full permits. Because the final 15 percent of devices represent large facilities, however, the impact on the total quantity of waste burned would be small. For example, under the "base case" scenario, although 20 percent of the devices would discontinue burning hazardous wastes and a number of other devices would reduce the quantity of hazardous waste they combust in order to qualify for the SQBE, only 3 percent of the quantity of waste combusted in the absence of regulations would be diverted to other devices. The mid-1986 analysis estimated that under this scenario, the aggregate after-tax cost of compliance to individual firms would be \$5.2 million per year and that the before-tax social cost would be \$8.2 million per year. Under other sets of assumptions (i.e., other scenarios), these costs were likely to be higher, but in all cases were estimated to be less than \$100 million per year.

Based on these analyses, the Agency concluded that the total social costs, impact on market competition, and the impact on small businesses were such that the proposed regulations did not constitute a major rule, and that a formal Regulatory Impact Analysis as described in Executive Order 12291 was not required.

⁹⁵ U.S. EPA, "Regulatory Analysis for Waste-As-Fuel Technical Standards", Draft Report, October 1986.

⁹⁶ U.S. EPA, "Effects of Recent Changes on the Estimated Costs and Benefits of the Proposed Waste As Fuel Technical Standards", January 1987.

A number of comments on the economic analysis were received from affected businesses and other groups. Most of these commenters contended that the cost of compliance had been underestimated by the Agency. Based on these comments, as well as changes made in the final regulation compared to the proposed requirements, the Agency has reexamined and updated the earlier analyses.

2. Revised Cost Analysis

As indicated earlier, there have been a number of changes made in the regulations that are expected to increase the cost of compliance. In addition, the Federal tax code was changed in late 1986, the cost of goods and services to the economy as a whole has increased due to inflation, and the estimated cost of specific requirements associated with the BIF regulations have been reexamined. The new analysis focused on assessing the impact of changes in compliance costs on typical facilities, and did not reexamine the impact of these changes on the selection of regulatory options by individual facilities. In addition, no effort was made to explicitly examine the impact of the final rules on the economic competitiveness of individual firms or industries, nor on the reduction in public health risks.

The primary changes that have occurred in the regulations subsequent to proposal have been revised requirements for continuous emission monitoring of CO and HC; addition of the PM standard, interim status compliance procedures, and limits on emissions of several additional metals and Cl₂; and increases in recordkeeping, sampling, and analysis requirements. The impact of these changes plus the impact of tax code changes and inflation on the before- and after-tax costs of the BIF regulations are summarized in Table 1. When combined with the original "base case" cost estimates prepared in 1986, the revised cost estimate for the promulgated rule is \$15.2 million per year before taxes and \$10.3 million per year after-taxes.

The increased cost for CO and HC monitoring reflects the costs for installation of a more comprehensive CO monitoring system than was originally estimated and the cost of installing HC monitors on an estimated 20 devices (primarily cement kilns) that will operate under the Tier II CO and HC limits. The zero cost increase associated with the PM emission standard reflects the expectation that BIFs complying with the metals standards will achieve the 0.08 gr/dscf standard, and that most existing

industrial furnaces and some boilers are already subject to this emission level (or a more stringent level) as the result of State Implementation Plans or New Source Performance Standards. As a result, no incremental increase for compliance with the PM emission limit is projected.

The additional costs for interim status compliance reflects the increase in annualized costs (over a 10 year period) for preparation of the precompliance and compliance certification packages (including compliance testing) by approximately 150 BIFs. The additional cost for the Cl₂ standard is based on the incremental cost of analysis for Cl₂ beyond that already required to determine HCl emissions.

The increase in annual recordkeeping, sampling, and analysis costs reflects a reassessment of the estimated costs in the 1986 analysis. These increased costs reflect a before-tax increase of approximately \$2.4 million for recordkeeping and \$0.6 million for sampling and analysis.

The impact of the 1986 tax code changes was to reduce the marginal tax rate imposed on before-tax profits and, thus, has the affect of increasing the impact of compliance costs on after-tax profits. As a result, the change in the 1986 tax code is to increase the after-tax cost of the regulations by an estimated \$0.6 million per year. The increase in costs due to inflation reflects an estimated increase in compliance cost of 20 percent between the time of the initial analysis (based on 1985 dollars) and 1990.

TABLE 1

Cost element	Before taxes	After taxes	Note
CO and HC Monitoring	1,930,000	1,200,000	1
PM Standard	0	0	2
Interim Status Compliance	980,000	590,000	3
Cl ₂ Standards	30,000	20,000	4
Recordkeeping/Sampling & Analysis	3,050,000	1,700,000	5
Tax Code Changes	0	600,000	6
Inflation	1,640,000	980,000	7
Total	7,630,000	5,090,000	

Notes:

1. Based on installing 20 CO monitors using capital and O&M costs from the revised ICR.
2. No incremental costs because BIFs already meet standard by meeting metals limits and existing SIP and NSPS limits.
3. Assumes all not small quantity burner BIFs submit precompliance and compliance certification packages, 50% of BIFs submit a revised certification of precompliance, and 75% of compliance test can be used in lieu of the trial burn to obtain an operating permit, thus reducing the cost of the Part B permit.

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4. Assumes all BIFs complying with emissions limits (and not Tier I feed rate limits) conduct C₂ testing during compliance certification and trial burn tests (\$165/sample).

5. Increases waste sampling and analysis costs over those estimated at proposal for all non-small quantity burners by \$300/month. Provides an additional 16 hours per month for all non-small quantity burners and 2 hours per month for small quantity burners for additional recordkeeping.

6. The 1986 revisions to the Federal tax code reduced the Federal marginal tax rate (MTR) from 48% to 34%. The 1986 analysis assumed a MTR of 50% (48% Federal plus 2% State). The revised analysis assumes a MTR of 40% (34% Federal plus 6% State).

7. Adjustment for 20% inflation between 1985 and 1990 (\$8.2 million before tax cost estimate in 1985 dollars, adjusted to after-tax basis assuming a marginal tax rate of 40%.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) requires Federal regulatory agencies to evaluate the impacts of regulations on small entities. The RFA requires an initial screening analysis to determine whether the proposed rule will have a significant impact on a substantial number of small businesses. As indicated at proposal (52 FR 17030), the Agency estimates that a substantial number of small entities will not be significantly impacted by the rule. Although the Agency estimates that changes to the rule since proposal and re-evaluation of some cost estimates made during the initial impact analysis will result in a higher cost to the regulated industry, the Agency continues to believe that a substantial number of small entities will not be significantly impacted by the rule.

C. Paperwork Reduction Act

The information collection requirements in this 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.*, and assigned OMB Control number 2050-0073.

III. List of Subjects in 40 CFR Parts 260, 261, 264, 265, 266, 270, and 271

Administrative practices and procedures, Confidential business information, Hazardous materials transportation, Hazardous waste, Indian lands, Insurance, Incorporation by reference, Intergovernmental relations, Packaging and containers, Penalties, Recycling, Reporting and recordkeeping requirements, Security measures, Security bonds, Water pollution control, Water supply.

Dated: December 31, 1990.

F. Henry Habicht II,
Deputy Administrator and Acting
Administrator.

PART 260—HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

I. In part 260:

1. The authority citation for part 260 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921 through 6927, 6930, 6934, 6935, 6937, 6938, 6939, and 6974.

2. Section 260.10 is amended by: (1) revising the introductory text; (2) revising the definition of "incinerator"; (3) amending the definition of "industrial furnace" by revising the introductory text and redesignating paragraph (12) as (13) and by adding new paragraph (12); and (4) adding, in alphabetical order, definitions for "carbon regeneration unit", "infrared incinerator", "plasma arc incinerator" and "sludge dryer" to read as follows:

§ 260.10 Definitions.

When used in parts 260 through 266 and 268 of this chapter, the following terms have the meanings given below:

Carbon regeneration unit means any enclosed thermal treatment device used to regenerate spent activated carbon.

Incinerator means any enclosed device that:

(1) Uses controlled flame combustion and neither meets the criteria for classification as a boiler, sludge dryer, or carbon regeneration unit, nor is listed as an industrial furnace; or

(2) Meets the definition of infrared incinerator or plasma arc incinerator.

Industrial furnace means any of the following enclosed devices that are integral components of manufacturing processes and that use thermal treatment to accomplish recovery of materials or energy:

(12) Halogen acid furnaces (HAFs) for the production of acid from halogenated hazardous waste generated by chemical production facilities where the furnace is located on the site of a chemical production facility, the acid product has a halogen acid content of at least 3%, the acid product is used in a manufacturing process, and, except for hazardous waste burned as fuel, hazardous waste fed to the furnace has a minimum halogen content of 20% as-generated.

Infrared incinerator means any enclosed device that uses electric powered resistance heaters as a source of radiant heat and which is not listed as an industrial furnace.

Plasma arc incinerator means any enclosed device using a high intensity electrical discharge or arc as a source of

heat and which is not listed as an industrial furnace.

Sludge dryer means any enclosed thermal treatment device that is used to dehydrate sludge and that has a maximum total thermal input, excluding the heating value of the sludge itself, of 2,500 Btu/lb of sludge treated on a wet-weight basis.

3. Paragraph (a) of § 260.11 is amended by adding to the first listing the following reference in alphabetical order:

§ 260.11 References.

(a) * * *
U.S. EPA, *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources*, August 1988, Available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4600. The document number is PB89-159-396.

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

II. In part 261:

1. The authority citation for part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, and 6938.

2. Section 261.2 is amended by redesignating paragraph (d)(2) as (d)(3) and adding new paragraph (d)(2) to read as follows:

§ 261.2 Definition of solid waste.

(d) * * *
(2) Secondary materials fed to a halogen acid furnace that exhibit a characteristic of a hazardous waste or are listed as a hazardous waste as defined in subparts C or D of this part.

3. Section 261.4 is amended by adding paragraph (a)(10) and revising paragraphs (b)(4), the first sentence of (b)(7), and (b)(8) to read as follows:

§ 261.4 Exclusions.

(a) * * *
(10) When used as a fuel, coke and coal tar from the iron and steel industry that contains or is produced from decanter tank tar sludge, EPA Hazardous Waste K087. The process of producing coke and coal tar from such decanter tank tar sludge in a coke oven is likewise excluded from regulation.

(b) * * *
(4) Fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste, generated primarily from

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the combustion of coal or other fossil fuels, except as provided by § 266.112 of this chapter for facilities that burn or process hazardous waste.

(7) Solid waste from the extraction, beneficiation, and processing of ores and minerals (including coal, phosphate rock and overburden from the mining of uranium ore), except as provided by § 266.112 of this chapter for facilities that burn or process hazardous waste.

(8) Cement kiln dust waste, except as provided by § 266.112 of this chapter for facilities that burn or process hazardous waste.

4. Section 261.6 is amended by removing paragraph (a)(3)(vii) and redesignating paragraphs (a)(3) (viii) and (ix) as (a)(3) (vii) and (viii) respectively.

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

III. In part 264:

1. The authority citation for part 264 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, and 6925.

2. Section 264.112 is amended by revising paragraph (d)(1) to read as follows:

§ 264.112 Closure of plan; amendment of plan.

(d) *Notification of partial closure and final closure.* (1) The owner or operator must notify the Regional Administrator in writing at least 60 days prior to the date on which he expects to begin closure of a surface impoundment, waste pile, land treatment or landfill unit, or final closure of a facility with such a unit. The owner or operator must notify the Regional Administrator in writing at least 45 days prior to the date on which he expects to begin final closure of a facility with only treatment or storage tanks, container storage, or incinerator units to be closed. The owner or operator must notify the Regional Administrator in writing at least 45 days prior to the date on which he expects to begin partial or final closure of a boiler or industrial furnace, whichever is earlier.

3. Section 264.340 is amended by revising paragraph (a) to read as follows:

§ 264.340 Applicability.

(a) The regulations of this subpart apply to owners and operators of hazardous waste incinerators (as defined in § 260.10 of this chapter), except as § 264.1 provides otherwise.

PART 265—INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

IV. In part 265:

1. The authority citation for part 265 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, 6925, and 6935.

2. Section 265.112 is amended by revising paragraphs (a), (d)(1), and (d)(2) to read as follows:

§ 265.112 Closure plan; amendment of plan.

(a) *Written plan.* By May 19, 1981, or by six months after the effective date of the rule that first subjects a facility to provisions of this section, the owner or operator of a hazardous waste management facility must have a written closure plan. Until final closure is completed and certified in accordance with § 265.115, a copy of the most current plan must be furnished to the Regional Administrator upon request, including request by mail. In addition, for facilities without approved plans, it must also be provided during site inspections, on the day of inspection, to any officer, employee, or representative of the Agency who is duly designated by the Administrator.

(d) *Notification of partial closure and final closure.* (1) The owner or operator must submit the closure plan to the Regional Administrator at least 180 days prior to the date on which he expects to begin closure of the first surface impoundment, waste pile, land treatment, or landfill unit, or final closure if it involves such a unit, whichever is earlier. The owner or operator must submit the closure plan to the Regional Administrator at least 45 days prior to the date on which he expects to begin partial or final closure of a boiler or industrial furnace. The owner or operator must submit the closure plan to the Regional Administrator at least 45 days prior to the date on which he expects to begin final closure of a facility with only tanks, container storage, or incinerator units. Owners or operators with approved closure plans must notify the Regional Administrator in writing at

least 60 days prior to the date on which he expects to begin closure of a surface impoundment, waste pile, landfill, or land treatment unit, or final closure of a facility involving such a unit. Owners or operators with approved closure plans must notify the Regional Administrator in writing at least 45 days prior to the date on which he expects to begin partial or final closure of a boiler or industrial furnace. Owners or operators with approved closure plans must notify the Regional Administrator in writing at least 45 days prior to the date on which he expects to begin final closure of a facility with only tanks, container storage, or incinerator units.

(2) Except for boilers and industrial furnaces that operate under interim status as specified by § 266.103(c)(7)(i) (B) or (C), the date when he "expects to begin closure" must be either within 30 days after the date on which any hazardous waste management unit receives the known final volume of hazardous wastes, or, if there is a reasonable possibility that the hazardous waste management unit will receive additional hazardous wastes, no later than one year after the date on which the unit received the most recent volume of hazardous waste. If the owner or operator of a hazardous waste management unit can demonstrate to the Regional Administrator that the hazardous waste management unit or facility has the capacity to receive additional hazardous wastes and he has taken, and will continue to take, all steps to prevent threats to human health and the environment, including compliance with all interim status requirements, the Regional Administrator may approve an extension to this one-year limit. For boilers and industrial furnaces that operate under interim status as specified by § 266.103(c)(7)(i) (B) or (C), the date when he "expects to begin closure" must be within 30 days after failure to submit a complete certification of compliance by the applicable deadline under § 266.103(c)(7)(i) (B) or (C).

3. Section 265.113 is amended by revising paragraphs (a), introductory text, and (b), introductory text, to read as follows:

§ 265.113 Closure; time allowed for closure.

(a) Within 90 days after receiving the final volume of hazardous wastes at a hazardous waste management unit or facility, or within 90 days after approval of the closure plan, whichever is later, or, for a boiler or industrial furnace that does not submit a complete certification

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of compliance by the applicable deadline under § 266.103(c)(7)(i) (B) or (C), within 90 days after the applicable deadline, the owner or operator must treat, remove from the unit or facility or dispose of on-site, all hazardous wastes in accordance with the approved closure plan. The Regional Administrator may approve a longer period if the owner or operator demonstrates that:

(b) The owner or operator must complete partial or final closure activities in accordance with the approved closure plan and within 180 days after receiving the final volume of hazardous wastes at the hazardous waste management unit or facility, or 180 days after approval of the closure plan, if that is later, or, for a boiler or industrial furnace that does not submit a complete certification of compliance by the applicable deadline under § 266.103(c)(7)(i) (B) or (C), within 180 days after the applicable deadline. The Regional Administrator may approve an extension to the closure period if the owner or operator demonstrates that:

4. Section 265.340 is amended by revising paragraph (a) to read as follows:

§ 265.340 Applicability.

(a) The regulations of this subpart apply to owners and operators of hazardous waste incinerators (as defined in § 260.10 of this chapter), except as § 265.1 provides otherwise.

PART 266—STANDARDS FOR THE MANAGEMENT OF SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

V. In part 266:

1. The authority citation for part 266 continues to read as follows:

Authority: Secs. 1006, 2002(a), 3004, and 3014 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), 6924, and 6934).

2. Subpart D is hereby removed and reserved and subpart H is added to read as follows:

Subpart H—Hazardous Waste Burned in Boilers and Industrial Furnaces

Sec.
266.100 Applicability.
266.101 Management prior to burning.
266.102 Permit standards for burners.
266.103 Interim status standards for burners.
266.104 Standards to control organic emissions.

Sec.
266.105 Standards to control particulate matter.
266.106 Standards to control metals emissions.
266.107 Standards to control hydrogen chloride (HCl) and chlorine gas (Cl₂) emissions.
266.108 Small quantity on-site burner exemption.
266.109 Low risk waste exemption.
266.110 Waiver of DRE trial burn for boilers.
266.111 Standards for direct transfer.
266.112 Regulation of residues.

§ 266.100 Applicability.

(a) The regulations of this subpart apply to hazardous waste burned or processed in a boiler or industrial furnace (as defined in § 260.10 of this chapter) irrespective of the purpose of burning or processing, except as provided by paragraphs (b), (c), and (d) of this section. In this subpart, the term "burn" means burning for energy recovery or destruction, or processing for materials recovery or as an ingredient. The emissions standards of §§ 266.104, 266.105, 266.106, and 266.107 apply to facilities operating under interim status or under a RCRA operating permit as specified in §§ 266.102 and 266.103.

(b) The following hazardous wastes and facilities are not subject to regulation under this subpart:

(1) Used oil burned for energy recovery that is also a hazardous waste solely because it exhibits a characteristic of hazardous waste identified in subpart C of part 261 of this chapter. Such used oil is subject to regulation under subpart E of part 266 rather than this subpart;

(2) Gas recovered from hazardous or solid waste landfills when such gas is burned for energy recovery.

(3) Hazardous wastes that are exempt from regulation under §§ 261.4 and 261.6(a)(3) (v-viii) of this chapter, and hazardous wastes that are subject to the special requirements for conditionally exempt small quantity generators under § 261.5 of this chapter.

(4) Coke ovens, if the only hazardous waste burned is EPA Hazardous Waste No. K087, decanter tank tar sludge from coking operations.

(c) Owners and operators of smelting, melting, and refining furnaces (including pyrometallurgical devices such as cupolas, sintering machines, roasters, and foundry furnaces, but not including cement kilns, aggregate kilns, or halogen acid furnaces burning hazardous waste) that process hazardous waste solely for metal recovery are conditionally exempt from regulation under this subpart, except for §§ 266.101 and 266.112.

(1) To be exempt from §§ 266.102 through 266.111, an owner or operator must:

(i) Provide a one-time written notice to the Director indicating the following:

(A) The owner or operator claims exemption under this paragraph;

(B) The hazardous waste is burned solely for metal recovery consistent with the provisions of paragraph (c)(2) of this section;

(C) The hazardous waste contains recoverable levels of metals; and

(D) The owner or operator will comply with the sampling and analysis and recordkeeping requirements of this paragraph;

(ii) Sample and analyze the hazardous waste and other feedstocks as necessary to comply with the requirements of this paragraph under procedures specified by Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in § 260.11 of this chapter; and

(iii) Maintain at the facility for at least three years records to document compliance with the provisions of this paragraph including limits on levels of toxic organic constituents and Btu value of the waste, and levels of recoverable metals in the hazardous waste compared to normal nonhazardous waste feedstocks.

(2) A hazardous waste meeting either of the following criteria is not processed solely for metal recovery:

(i) The hazardous waste has a total concentration of organic compounds listed in part 261, appendix VIII, of this chapter exceeding 500 ppm by weight, as-generated, and so is considered to be burned for destruction; or

(ii) The hazardous waste has a heating value of 5,000 Btu/lb or more, as-generated or as-fired into the furnace, and so is considered to be burned as fuel.

(d) The standards for direct transfer operations under § 266.111 apply only to facilities subject to the permit standards of § 266.102 or the interim status standards of § 266.103.

(e) The management standards for residues under § 266.112 apply to any boiler or industrial furnace burning hazardous waste.

(Approved by the Office of Management and Budget under control number 2050-0073)

§ 266.101 Management prior to burning.

(a) *Generators.* Generators of hazardous waste that is burned in a boiler or industrial furnace are subject to part 262 of this chapter.

(b) *Transporters.* Transporters of hazardous waste that is burned in a