SUBCHAPTER I—SOLID WASTES (Continued)

PART 266—STANDARDS FOR THE MANAGEMENT OF SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subparts A–B [Reserved]

Subpart C—Recyclable Materials Used in a Manner Constituting Disposal

Subparts D–E [Reserved]

Subpart F—Recyclable Materials Utilized for Precious Metal Recovery

Subpart G—Spent Lead-Acid Batteries Being Reclaimed

Subpart H—Hazardous Waste Burned in Boilers and Industrial Furnaces

Subparts I–L [Reserved]

Subpart M—Military Munitions

Appendices to Part 266

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Source: 50 FR 666, Jan. 4, 1985, unless otherwise noted.

Subparts A—B [Reserved]

Subpart C—Recyclable Materials Used in a Manner Constituting Disposal

§ 266.20 Applicability.

(a) The regulations of this subpart apply to recyclable materials that are applied to or placed on the land:

(1) Without mixing with any other substance(s); or

(2) After mixing or combination with any other substance(s). These materials will be referred to throughout this subpart as ‘‘materials used in a manner that constitutes disposal.’’

(b) Products produced for the general public’s use that are used in a manner that constitutes disposal and that contain recyclable materials are not presently subject to regulation if the recyclable materials have undergone a chemical reaction in the course of producing the products so as to become inseparable by physical means and if such products meet the applicable treatment standards in subpart D of part 268 (or applicable prohibition levels in § 268.32 or RCRA section 3004(d), where no treatment standards have been established) for each recyclable material (*i.e.*, hazardous waste) that they contain. Commercial fertilizers that are produced for the general public’s use that contain recyclable materials also are not presently subject to regulation provided they meet these same treatment standards or prohibition levels for each recyclable material that they contain. However, zinc-containing fertilizers using hazardous waste K061 that are produced for the general public’s use are not presently subject to regulation.

(c) Anti-skid/deicing uses of slags, which are generated from high temperature metals recovery (HTMR) processing of hazardous waste K061, K062, and F006, in a manner constituting disposal are not covered by the exemption in paragraph (b) of this section and remain subject to regulation.

[50 FR 666, Jan. 4, 1985, as amended at 52 FR 21307, June 5, 1987; 54 FR 36970, Sept. 6, 1989; 59 FR 43500, Aug. 24, 1994]

§ 266.21 Standards applicable to generators and transporters of materials used in a manner that constitutes disposal.

Generators and transporters of materials that are used in a manner that constitutes disposal are subject to the applicable requirements of parts 262 and 263 of this chapter, and the notification requirement under section 3010 of RCRA.

§ 266.22 Standards applicable to storers of materials that are to be used in a manner that constitutes disposal who are not the ultimate users.

Owners or operators of facilities that store recyclable materials that are to be used in a manner that constitutes disposal, but who are not the ultimate users of the materials, are regulated under all applicable provisions of subparts A through L of parts 264 and 265 and parts 270 and 124 of this chapter and the notification requirement under section 3010 of RCRA.

§ 266.23 Standards applicable to users of materials that are used in a manner that constitutes disposal.

(a) Owners or operators of facilities that use recyclable materials in a manner that constitutes disposal are regulated under all applicable provisions of subparts A through N of parts 124, 264, 265, 268, and 270 of this chapter and the notification requirement under section 3010 of RCRA. (These requirements do not apply to products which contain these recyclable materials under the provisions of § 266.20(b) of this chapter.)

(b) The use of waste or used oil or other material, which is contaminated with dioxin or any other hazardous waste (other than a waste identified solely on the basis of ignitability), for dust suppression or road treatment is prohibited.

[50 FR 666, Jan. 4, 1985, as amended at 50 FR 28750, July 15, 1985; 59 FR 48042, Sept. 19, 1994]

Subpart D–E [Reserved]

Subpart F—Recyclable Materials Utilized for Precious Metal Recovery

§ 266.70 Applicability and requirements.

(a) The regulations of this subpart apply to recyclable materials that are reclaimed to recover economically significant amounts of gold, silver, platinum, paladium, irridium, osmium, rhodium, ruthenium, or any combination of these.

(b) Persons who generate, transport, or store recyclable materials that are regulated under this subpart are subject to the following requirements:

(1) Notification requirements under section 3010 of RCRA;

(2) Subpart B of part 262 (for generators), §§ 263.20 and 263.21 (for transporters), and §§ 265.71 and 265.72 (for persons who store) of this chapter; and

(3) For precious metals exported to or imported from designated OECD member countries for recovery, subpart H of part 262 and § 265.12(a)(2) of this chapter. For precious metals exported to or imported from non-OECD countries for recovery, subparts E and F of 40 CFR part 262.

(c) Persons who store recycled materials that are regulated under this subpart must keep the following records to document that they are not accumulating these materials speculatively (as defined in § 261.1(c) of this chapter);

(1) Records showing the volume of these materials stored at the beginning of the calendar year;

(2) The amount of these materials generated or received during the calendar year; and

(3) The amount of materials remaining at the end of the calendar year.

(d) Recyclable materials that are regulated under this subpart that are accumulated speculatively (as defined in § 261.1(c) of this chapter) are subject to all applicable provisions of parts 262 through 265, 270 and 124 of this chapter.

[50 FR 666, Jan. 4, 1985, as amended at 61 FR 16315, Apr. 12, 1996]

Subpart G—Spent Lead-Acid Batteries Being Reclaimed

§ 266.80 Applicability and requirements.

(a) The regulations of this subpart apply to persons who reclaim (including regeneration) spent lead-acid batteries that are recyclable materials (“spent batteries”). Persons who generate, transport, or collect spent batteries, who regenerate spent batteries, or who store spent batteries but do not reclaim them (other than spent batteries that are to be regenerated) are not subject to regulation under parts 262 through 266 or part 270 or 124 of this chapter, and also are not subject to the requirements of section 3010 of RCRA.

(b) Owners or operators of facilities that store spent lead acid batteries before reclaiming (other than spent batteries that are to be regenerated) them are subject to the following requirements.

[50 FR 666, Jan. 4, 1985, as amended at 50 FR 33543, Aug. 20, 1985; 60 FR 25542, May 11, 1995]

Subpart H—Hazardous Waste Burned in Boilers and Industrial Furnaces

SOURCE: 56 FR 7208, Feb. 21, 1991, unless otherwise noted.

§ 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), (d), and (f) 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 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 part 279 of this chapter;

(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) (iv) through (vi) 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; and

(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 of a metal recovery furnace or mercury recovery furnace, must comply with the following requirements, except that an owner or operator of a lead or a nickel-chromium recovery furnace, or a metal recovery furnace that burns baghouse bags used to capture metallic dusts emitted by steel manufacturing, must comply with the requirements of paragraph (c)(3) of this section:

(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 or alternative methods that meet or exceed the SW–846 method performance capabilities. If SW–846 does not prescribe a method for a particular determination, the owner or operator shall use the best available method; 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-fired, and so is considered to be burned for destruction. The concentration of organic compounds in a waste as-generated may be reduced to the 500 ppm limit by *bona fide* treatment that removes or destroys organic constituents. Blending for dilution to meet the 500 ppm limit is prohibited and documentation that the waste has not been impermissibly diluted must be retained in the records required by paragraph (c)(1)(iii) of this section; or

(ii) The hazardous waste has a heating value of 5,000 Btu/lb or more, as-fired, and so is considered to be burned as fuel. The heating value of a waste as-generated may be reduced to below the 5,000 Btu/lb limit by *bona fide* treatment that removes or destroys organic constituents. Blending for dilution to meet the 5,000 Btu/lb limit is prohibited and documentation that the waste has not been impermissibly diluted must be retained in the records required by paragraph (c)(1)(iii) of this section.

(3) To be exempt from §§ 266.102 through 266.111, an owner or operator of a lead or nickel-chromium or mercury recovery furnace, or a metal recovery furnace that burns baghouse bags used to capture metallic dusts emitted by steel manufacturing, must provide a one-time written notice to the Director identifying each hazardous waste burned and specifying whether the owner or operator claims an exemption for each waste under this paragraph or paragraph (c)(1) of this section. The owner or operator must comply with the requirements of paragraph (c)(1) of this section for those wastes claimed to be exempt under that paragraph and must comply with the requirements below for those wastes claimed to be exempt under this paragraph (c)(3).

(i) The hazardous wastes listed in appendices XI, XII, and XIII, part 266, and baghouse bags used to capture metallic dusts emitted by steel manufacturing are exempt from the requirements of paragraph (c)(1) of this section, provided that:

(A) A waste listed in appendix IX of this part must contain recoverable levels of lead, a waste listed in appendix XII of this part must contain recoverable levels of nickel or chromium, a waste listed in appendix XIII of this part must contain recoverable levels of mercury and contain less than 500 ppm of 40 CFR part 261, appendix VIII organic constituents, and baghouse bags used to capture metallic dusts emitted by steel manufacturing must contain recoverable levels of metal; and

(B) The waste does not exhibit the Toxicity Characteristic of § 261.24 of this chapter for an organic constituent; and

(C) The waste is not a hazardous waste listed in subpart D of part 261 of this chapter because it is listed for an organic constituent as identified in appendix VII of part 261 of this chapter; and

(D) The owner or operator certifies in the one–time notice that hazardous waste is burned under the provisions of paragraph (c)(3) of this section and that sampling and analysis will be conducted or other information will be obtained as necessary to ensure continued compliance with these requirements. Sampling and analysis shall be conducted according to paragraph (c)(1)(ii) of this section and records to document compliance with paragraph (c)(3) of this section shall be kept for at least three years.

(ii) The Director may decide on a case-by-case basis that the toxic organic constituents in a material listed in appendix XI, XII, or XIII of this part that contains a total concentration of more than 500 ppm toxic organic compounds listed in appendix VIII, part 261 of this chapter, may pose a hazard to human health and the environment when burned in a metal recovery furnace exempt from the requirements of this subpart. In that situation, after adequate notice and opportunity for comment, the metal recovery furnace will become subject to the requirements of this subpart when burning that material. In making the hazard determination, the Director will consider the following factors:

(A) The concentration and toxicity of organic constituents in the material; and

(B) The level of destruction of toxic organic constituents provided by the furnace; and

(C) Whether the acceptable ambient levels established in appendices IV or V of this part may be exceeded for any toxic organic compound that may be emitted based on dispersion modeling to predict the maximum annual average off-site ground level concentration.

(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.

(f) Owners and operators of smelting, melting, and refining furnaces (including pyrometallurgical devices such as cupolas, sintering machines, roasters, and foundry furnaces) that process hazardous waste for recovery of economically significant amounts of the precious metals gold, silver, platinum, paladium, irridium, osmium, rhodium, or ruthenium, or any combination of these are conditionally exempt from regulation under this subpart, except for § 266.112. To be exempt from §§ 266.101 through 266.111, an owner or operator must:

(1) Provide a one-time written notice to the Director indicating the following:

(i) The owner or operator claims exemption under this paragraph;

(ii) The hazardous waste is burned for legitimate recovery of precious metal; and

(iii) The owner or operator will comply with the sampling and analysis and recordkeeping requirements of this paragraph; and

(2) Sample and analyze the hazardous waste as necessary to document that the waste is burned for recovery of economically significant amounts of precious metal using procedures specified by Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW–846, incorporated by reference in § 260.11 of this chapter or alternative methods that meet or exceed the SW–846 method performance capabilities. If SW–846 does not prescribe a method for a particular determination, the owner or operator shall use the best available method; and

(3) Maintain at the facility for at least three years records to document that all hazardous wastes burned are burned for recovery of economically significant amounts of precious metal.

[56 FR 7208, Feb. 21, 1991; 56 FR 32688, July 17, 1991, as amended at 56 FR 42513, Aug. 27, 1991; 56 FR 43877, Sept. 5, 1991; 57 FR 27888, June 22, 1992; 57 FR 38564, Aug. 25, 1992; 57 FR 41612, Sept. 10, 1992; 59 FR 38545, July 28, 1994; 59 FR 48042, Sept. 19, 1994]

§ 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 boiler or industrial furnace are subject to part 263 of this chapter.

(c) *Storage facilities.* (1) Owners and operators of facilities that store hazardous waste that is burned in a boiler or industrial furnace are subject to the applicable provisions of parts 264, 265, and 270 of this chapter, except as provided by paragraph (c)(2) of this section. These standards apply to storage by the burner as well as to storage facilities operated by intermediaries (processors, blenders, distributors, etc.) between the generator and the burner.

(2) Owners and operators of facilities that burn, in an onsite boiler or industrial furnace exempt from regulation under the small quantity burner provisions of § 266.108, hazardous waste that they generate are exempt from the regulations of parts 264, 265, and 270 of this chapter applicable to storage units for those storage units that store mixtures of hazardous waste and the primary fuel to the boiler or industrial furnace in tanks that feed the fuel mixture directly to the burner. Storage of hazardous waste prior to mixing with the primary fuel is subject to regulation as prescribed in paragraph (c)(1) of this section.

[56 FR 7208, Feb. 21, 1991, as amended at 57 FR 38564, Aug. 25, 1992]

§ 266.102 Permit standards for burners.

(a) *Applicability*—(1) *General.* Owners and operators of boilers and industrial furnaces burning hazardous waste and not operating under interim status must comply with the requirements of this section and §§ 270.22 and 270.66 of this chapter, unless exempt under the small quantity burner exemption of § 266.108.

(2) *Applicability of part 264 standards.* Owners and operators of boilers and industrial furnaces that burn hazardous waste are subject to the following provisions of part 264 of this chapter, except as provided otherwise by this subpart:

(i) In subpart A (General), 264.4;

(ii) In subpart B (General facility standards), §§ 264.11–264.18;

(iii) In subpart C (Preparedness and prevention), §§ 264.31–264.37;

(iv) In subpart D (Contingency plan and emergency procedures), §§ 264.51–264.56;

(v) In subpart E (Manifest system, recordkeeping, and reporting), the applicable provisions of §§ 264.71–264.77;

(vi) In subpart F (Corrective Action), §§ 264.90 and 264.101;

(vii) In subpart G (Closure and post-closure), §§ 264.111–264.115;

(viii) In subpart H (Financial requirements), §§ 264.141, 264.142, 264.143, and 264.147–264.151, except that States and the Federal government are exempt from the requirements of subpart H; and

(ix) Subpart BB (Air emission standards for equipment leaks), except §§ 264.1050(a).

(b) *Hazardous waste analysis.* (1) The owner or operator must provide an analysis of the hazardous waste that quantifies the concentration of any constituent identified in appendix VIII of part 261 of this chapter that may reasonably be expected to be in the waste. Such constituents must be identified and quantified if present, at levels detectable by analytical procedures prescribed by Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (incorporated by reference, see § 260.11 of this chapter). Alternative methods that meet or exceed the method performance capabilities of SW–846 methods may be used. If SW–846 does not prescribe a method for a particular determination, the owner or operator shall use the best available method. The appendix VIII, part 261 constituents excluded from this analysis must be identified and the basis for their exclusion explained. This analysis will be used to provide all information required by this subpart and § 270.22 and § 270.66 of this chapter and to enable the permit writer to prescribe such permit conditions as necessary to protect human health and the environment. Such analysis must be included as a portion of the part B permit application, or, for facilities operating under the interim status standards of this subpart, as a portion of the trial burn plan that may be submitted before the part B application under provisions of § 270.66(g) of this chapter as well as any other analysis required by the permit authority in preparing the permit. Owners and operators of boilers and industrial furnaces not operating under the interim status standards must provide the information required by §§ 270.22 or 270.66(c) of this chapter in the part B application to the greatest extent possible.

(2) Throughout normal operation, the owner or operator must conduct sampling and analysis as necessary to ensure that the hazardous waste, other fuels, and industrial furnace feedstocks fired into the boiler or industrial furnace are within the physical and chemical composition limits specified in the permit.

(c) *Emissions standards.* Owners and operators must comply with emissions standards provided by §§ 266.104 through 266.107.

(d) *Permits.* (1) The owner or operator may burn only hazardous wastes specified in the facility permit and only under the operating conditions specified under paragraph (e) of this section, except in approved trial burns under the conditions specified in § 270.66 of this chapter.

(2) Hazardous wastes not specified in the permit may not be burned until operating conditions have been specified under a new permit or permit modification, as applicable. Operating requirements for new wastes may be based on either trial burn results or alternative data included with part B of a permit application under § 270.22 of this chapter.

(3) Boilers and industrial furnaces operating under the interim status standards of § 266.103 are permitted under procedures provided by § 270.66(g) of this chapter.

(4) A permit for a new boiler or industrial furnace (those boilers and industrial furnaces not operating under the interim status standards) must establish appropriate conditions for each of the applicable requirements of this section, including but not limited to allowable hazardous waste firing rates and operating conditions necessary to meet the requirements of paragraph (e) of this section, in order to comply with the following standards:

(i) For the period beginning with initial introduction of hazardous waste and ending with initiation of the trial burn, and only for the minimum time required to bring the device to a point of operational readiness to conduct a trial burn, not to exceed a duration of 720 hours operating time when burning hazardous waste, the operating requirements must be those most likely to ensure compliance with the emission standards of §§ 266.104 through 266.107, based on the Director's engineering judgment. If the applicant is seeking a waiver from a trial burn to demonstrate conformance with a particular emission standard, the operating requirements during this initial period of operation shall include those specified by the applicable provisions of § 266.104, § 266.105, § 266.106, or § 266.107. The Director may extend the duration of this period for up to 720 additional hours when good cause for the extension is demonstrated by the applicant.

(ii) For the duration of the trial burn, the operating requirements must be sufficient to demonstrate compliance with the emissions standards of §§ 266.104 through 266.107 and must be in accordance with the approved trial burn plan;

(iii) For the period immediately following completion of the trial burn, and only for the minimum period sufficient to allow sample analysis, data computation, submission of the trial burn results by the applicant, review of the trial burn results and modification of the facility permit by the Director to reflect the trial burn results, the operating requirements must be those most likely to ensure compliance with the emission standards §§ 266.104 through 266.107 based on the Director's engineering judgment.

(iv) For the remaining duration of the permit, the operating requirements must be those demonstrated in a trial burn or by alternative data specified in § 270.22 of this chapter, as sufficient to ensure compliance with the emissions standards of §§ 266.104 through 266.107.

(e) *Operating requirements*—(1) *General.* A boiler or industrial furnace burning hazardous waste must be operated in accordance with the operating requirements specified in the permit at all times where there is hazardous waste in the unit.

(2) *Requirements to ensure compliance with the organic emissions standards*—(i) *DRE standard.* Operating conditions will be specified either on a case-by-case basis for each hazardous waste burned as those demonstrated (in a trial burn or by alternative data as specified in § 270.22) to be sufficient to comply with the destruction and removal efficiency (DRE) performance standard of § 266.104(a) or as those special operating requirements provided by § 266.104(a)(4) for the waiver of the DRE trial burn. When the DRE trial burn is not waived under § 266.104(a)(4), each set of operating requirements will specify the composition of the hazardous waste (including acceptable variations in the physical and chemical properties of the hazardous waste which will not affect compliance with the DRE performance standard) to which the operating requirements apply. For each such hazardous waste, the permit will specify acceptable operating limits including, but not limited to, the following conditions as appropriate:

(A) Feed rate of hazardous waste and other fuels measured and specified as prescribed in paragraph (e)(6) of this section;

(B) Minimum and maximum device production rate when producing normal product expressed in appropriate units, measured and specified as prescribed in paragraph (e)(6) of this section;

(C) Appropriate controls of the hazardous waste firing system;

(D) Allowable variation in boiler and industrial furnace system design or operating procedures;

(E) Minimum combustion gas temperature measured at a location indicative of combustion chamber temperature, measured and specified as prescribed in paragraph (e)(6) of this section;

(F) An appropriate indicator of combustion gas velocity, measured and specified as prescribed in paragraph (e)(6) of this section, unless documentation is provided under § 270.66 of this chapter demonstrating adequate combustion gas residence time; and

(G) Such other operating requirements as are necessary to ensure that the DRE performance standard of § 266.104(a) is met.

(ii) *Carbon monoxide and hydrocarbon standards.* The permit must incorporate a carbon monoxide (CO) limit and, as appropriate, a hydrocarbon (HC) limit as provided by paragraphs (b), (c), (d), (e) and (f) of § 266.104. The permit limits will be specified as follows:

(A) When complying with the CO standard of § 266.104(b)(1), the permit limit is 100 ppmv;

(B) When complying with the alternative CO standard under § 266.104(c), the permit limit for CO is based on the trial burn and is established as the average over all valid runs of the highest hourly rolling average CO level of each run, and the permit limit for HC is 20 ppmv (as defined in § 266.104(c)(1)), except as provided in § 266.104(f).

(C) When complying with the alternative HC limit for industrial furnaces under § 266.104(f), the permit limit for HC and CO is the baseline level when hazardous waste is not burned as specified by that paragraph.

(iii) *Start-up and shut-down.* During start-up and shut-down of the boiler or industrial furnace, hazardous waste (except waste fed solely as an ingredient under the Tier I (or adjusted Tier I) feed rate screening limits for metals and chloride/chlorine, and except low risk waste exempt from the trial burn requirements under §§ 266.104(a)(5), 266.105, 266.106, and 266.107) must not be fed into the device unless the device is operating within the conditions of operation specified in the permit.

(3) *Requirements to ensure conformance with the particulate standard.* (i) Except as provided in paragraphs (e)(3) (ii) and (iii) of this section, the permit shall specify the following operating requirements to ensure conformance with the particulate standard specified in § 266.105:

(A) Total ash feed rate to the device from hazardous waste, other fuels, and industrial furnace feedstocks, measured and specified as prescribed in paragraph (e)(6) of this section;

(B) Maximum device production rate when producing normal product expressed in appropriate units, and measured and specified as prescribed in paragraph (e)(6) of this section;

(C) Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system;

(D) Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures; and

(E) Such other operating requirements as are necessary to ensure that the particulate standard in § 266.111(b) is met.

(ii) Permit conditions to ensure conformance with the particulate matter standard shall not be provided for facilities exempt from the particulate matter standard under § 266.105(b);

(iii) For cement kilns and lightweight aggregate kilns, permit conditions to ensure compliance with the particulate standard shall not limit the ash content of hazardous waste or other feed materials.

(4) *Requirements to ensure conformance with the metals emissions standard.* (i) For conformance with the Tier I (or adjusted Tier I) metals feed rate screening limits of paragraphs (b) or (e) of § 266.106, the permit shall specify the following operating requirements:

(A) Total feed rate of each metal in hazardous waste, other fuels, and industrial furnace feedstocks measured and specified under provisions of paragraph (e)(6) of this section;

(B) Total feed rate of hazardous waste measured and specified as prescribed in paragraph (e)(6) of this section;

(C) A sampling and metals analysis program for the hazardous waste, other fuels, and industrial furnace feedstocks;

(ii) For conformance with the Tier II metals emission rate screening limits under § 266.106(c) and the Tier III metals controls under § 266.106(d), the permit shall specify the following operating requirements:

(A) Maximum emission rate for each metal specified as the average emission rate during the trial burn;

(B) Feed rate of total hazardous waste and pumpable hazardous waste, each measured and specified as prescribed in paragraph (e)(6)(i) of this section;

(C) Feed rate of each metal in the following feedstreams, measured and specified as prescribed in paragraphs (e)(6) of this section:

(*1*) Total feedstreams;

(*2*) Total hazardous waste feed; and

(*3*) Total pumpable hazardous waste feed;

(D) Total feed rate of chlorine and chloride in total feedstreams measured and specified as prescribed in paragraph (e)(6) of this section;

(E) Maximum combustion gas temperature measured at a location indicative of combustion chamber temperature, and measured and specified as prescribed in paragraph (e)(6) of this section;

(F) Maximum flue gas temperature at the inlet to the particulate matter air pollution control system measured and specified as prescribed in paragraph (e)(6) of this section;

(G) Maximum device production rate when producing normal product expressed in appropriate units and measured and specified as prescribed in paragraph (e)(6) of this section;

(H) Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system;

(I) Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures; and

(J) Such other operating requirements as are necessary to ensure that the metals standards under §§ 266.106(c) or 266.106(d) are met.

(iii) For conformance with an alternative implementation approach approved by the Director under § 266.106(f), the permit will specify the following operating requirements:

(A) Maximum emission rate for each metal specified as the average emission rate during the trial burn;

(B) Feed rate of total hazardous waste and pumpable hazardous waste, each measured and specified as prescribed in paragraph (e)(6)(i) of this section;

(C) Feed rate of each metal in the following feedstreams, measured and specified as prescribed in paragraph (e)(6) of this section:

(*1*) Total hazardous waste feed; and

(*2*) Total pumpable hazardous waste feed;

(D) Total feed rate of chlorine and chloride in total feedstreams measured and specified prescribed in paragraph (e)(6) of this section;

(E) Maximum combustion gas temperature measured at a location indicative of combustion chamber temperature, and measured and specified as prescribed in paragraph (e)(6) of this section;

(F) Maximum flue gas temperature at the inlet to the particulate matter air pollution control system measured and specified as prescribed in paragraph (e)(6) of this section;

(G) Maximum device production rate when producing normal product expressed in appropriate units and measured and specified as prescribed in paragraph (e)(6) of this section;

(H) Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system;

(I) Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures; and

(J) Such other operating requirements as are necessary to ensure that the metals standards under §§ 266.106(c) or 266.106(d) are met.

(5) *Requirements to ensure conformance with the hydrogen chloride and chlorine gas standards.* (i) For conformance with the Tier I total chloride and chlorine feed rate screening limits of § 266.107(b)(1), the permit will specify the following operating requirements:

(A) Feed rate of total chloride and chlorine in hazardous waste, other fuels, and industrial furnace feedstocks measured and specified as prescribed in paragraph (e)(6) of this section;

(B) Feed rate of total hazardous waste measured and specified as prescribed in paragraph (e)(6) of this section;

(C) A sampling and analysis program for total chloride and chorline for the hazardous waste, other fuels, and industrial furnace feestocks;

(ii) For conformance with the Tier II HCl and Cl_2 emission rate screening limits under § 266.107(b)(2) and the Tier III HCl and Cl_2 controls under § 266.107(c), the permit will specify the following operating requirements:

(A) Maximum emission rate for HCl and for Cl_2 specified as the average emission rate during the trial burn;

(B) Feed rate of total hazardous waste measured and specified as prescribed in paragraph (e)(6) of this section;

(C) Total feed rate of chlorine and chloride in total feedstreams, measured and specified as prescribed in paragraph (e)(6) of this section;

(D) Maximum device production rate when producing normal product expressed in appropriate units, measured and specified as prescribed in paragraph (e)(6) of this section;

(E) Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system;

(F) Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures; and

(G) Such other operating requirements as are necessary to ensure that the HCl and Cl_2 standards under § 266.107 (b)(2) or (c) are met.

(6) *Measuring parameters and establishing limits based on trial burn data*—(i) *General requirements.* As specified in paragraphs (e)(2) through (e)(5) of this section, each operating parameter shall be measured, and permit limits on the parameter shall be established, according to either of the following procedures:

(A) *Instantaneous limits.* A parameter may be measured and recorded on an instantaneous basis (i.e., the value that occurs at any time) and the permit limit specified as the time-weighted average during all valid runs of the trial burn; or

(B) *Hourly rolling average.* (*1*) The limit for a parameter may be established and continuously monitored on an hourly rolling average basis defined as follows:

(*i*) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

(*ii*) An hourly rolling average is the arithmetic mean of the 60 most recent 1-minute average values recorded by the continuous monitoring system.

(*2*) The permit limit for the parameter shall be established based on trial burn data as the average over all valid test runs of the highest hourly rolling average value for each run.

(ii) *Rolling average limits for carcinogenic metals and lead.* Feed rate limits for the carcinogenic metals (i.e., arsenic, beryllium, cadmium and chromium) and lead may be established either on an hourly rolling average basis as prescribed by paragraph (e)(6)(i) of this section or on (up to) a 24 hour rolling average basis. If the owner or operator elects to use an average period from 2 to 24 hours:

(A) The feed rate of each metal shall be limited at any time to ten times the feed rate that would be allowed on an hourly rolling average basis;

(B) The continuous monitor shall meet the following specifications:

(*1*) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

(*2*) The rolling average for the selected averaging period is defined as the arithmetic mean of one hour block averages for the averaging period. A one hour block average is the arithmetic mean of the one minute averages recorded during the 60-minute period beginning at one minute after the beginning of preceding clock hour; and

(C) The permit limit for the feed rate of each metal shall be established based on trial burn data as the average over all valid test runs of the highest hourly rolling average feed rate for each run.

(iii) *Feed rate limits for metals, total chloride and chlorine, and ash.* Feed rate limits for metals, total chlorine and chloride, and ash are established and monitored by knowing the concentration of the substance (i.e., metals, chloride/chlorine, and ash) in each feedstream and the flow rate of the feedstream. To monitor the feed rate of these substances, the flow rate of each feedstream must be monitored under the continuous monitoring requirements of paragraphs (e)(6) (i) and (ii) of this section.

(iv) *Conduct of trial burn testing.* (A) If compliance with all applicable emissions standards of §§ 266.104 through 266.107 is not demonstrated simultaneously during a set of test runs, the operating conditions of additional test runs required to demonstrate compliance with remaining emissions standards must be as close as possible to the original operating conditions.

(B) Prior to obtaining test data for purposes of demonstrating compliance with the emissions standards of §§ 266.104 through 266.107 or establishing limits on operating parameters under this section, the facility must operate under trial burn conditions for a sufficient period to reach steady-state operations. The Director may determine, however, that industrial furnaces that recycle collected particulate matter back into the furnace and that comply with an alternative implementation approach for metals under § 266.106(f) need not reach steady state conditions with respect to the flow of metals in the system prior to beginning compliance testing for metals emissions.

(C) Trial burn data on the level of an operating parameter for which a limit must be established in the permit must be obtained during emissions sampling for the pollutant(s) (i.e., metals, PM, HCl/Cl_2, organic compounds) for which the parameter must be established as specified by paragraph (e) of this section.

(7) *General requirements*—(i) *Fugitive emissions.* Fugitive emissions must be controlled by:

(A) Keeping the combustion zone totally sealed against fugitive emissions; or

(B) Maintaining the combustion zone pressure lower than atmospheric pressure; or

(C) An alternate means of control demonstrated (with part B of the permit application) to provide fugitive emissions control equivalent to maintenance of combustion zone pressure lower than atmospheric pressure.

(ii) *Automatic waste feed cutoff.* A boiler or industrial furnace must be operated with a functioning system that automatically cuts off the hazardous waste feed when operating conditions deviate from those established under this section. The Director may limit the number of cutoffs per an operating period on a case-by-case basis. In addition:

(A) The permit limit for (the indicator of) minimum combustion chamber temperature must be maintained while hazardous waste or hazardous waste residues remain in the combustion chamber,

(B) Exhaust gases must be ducted to the air pollution control system operated in accordance with the permit requirements while hazardous waste or hazardous waste residues remain in the combustion chamber; and

(C) Operating parameters for which permit limits are established must continue to be monitored during the cutoff, and the hazardous waste feed shall not be restarted until the levels of those parameters comply with the permit limits. For parameters that may be monitored on an instantaneous basis, the Director will establish a minimum period of time after a waste feed cutoff during which the parameter must not exceed the permit limit before the hazardous waste feed may be restarted.

(iii) *Changes.* A boiler or industrial furnace must cease burning hazardous waste when changes in combustion properties, or feed rates of the hazardous waste, other fuels, or industrial furnace feedstocks, or changes in the boiler or industrial furnace design or operating conditions deviate from the limits as specified in the permit.

(8) *Monitoring and Inspections.* (i) The owner or operator must monitor and record the following, at a minimum, while burning hazardous waste:

(A) If specified by the permit, feed rates and composition of hazardous waste, other fuels, and industrial furnace feedstocks, and feed rates of ash, metals, and total chloride and chlorine;

(B) If specified by the permit, carbon monoxide (CO), hydrocarbons (HC), and oxygen on a continuous basis at a common point in the boiler or industrial furnace downstream of the combustion zone and prior to release of stack gases to the atmosphere in accordance with operating requirements specified in paragraph (e)(2)(ii) of this section. CO, HC, and oxygen monitors must be installed, operated, and maintained in accordance with methods specified in appendix IX of this part.

(C) Upon the request of the Director, sampling and analysis of the hazardous waste (and other fuels and industrial furnace feedstocks as appropriate), residues, and exhaust emissions must be conducted to verify that the operating requirements established in the permit achieve the applicable standards of §§ 266.104, 266.105, 266.106, and 266.107.

(ii) All monitors shall record data in units corresponding to the permit limit unless otherwise specified in the permit.

(iii) The boiler or industrial furnace and associated equipment (pumps, values, pipes, fuel storage tanks, etc.) must be subjected to thorough visual inspection when it contains hazardous waste, at least daily for leaks, spills, fugitive emissions, and signs of tampering.

(iv) The automatic hazardous waste feed cutoff system and associated alarms must be tested at least once every 7 days when hazardous waste is burned to verify operability, unless the applicant demonstrates to the Director that weekly inspections will unduly restrict or upset operations and that less frequent inspections will be adequate. At a minimum, operational testing must be conducted at least once every 30 days.

(v) These monitoring and inspection data must be recorded and the records must be placed in the operating record required by § 264.73 of this chapter.

(9) *Direct transfer to the burner.* If hazardous waste is directly transferred from a transport vehicle to a boiler or industrial furnace without the use of a storage unit, the owner and operator must comply with § 266.111.

(10) *Recordkeeping.* The owner or operator must keep in the operating record of the facility all information and data required by this section until closure of the facility.

(11) *Closure.* At closure, the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters, and scrubber sludges) from the boiler or industrial furnace.

[56 FR 7208, Feb. 21, 1991; 56 FR 32688, July 17, 1991, as amended at 56 FR 42512, 42514, Aug. 27, 1991]

§ 266.103 Interim status standards for burners.

(a) *Purpose, scope, applicability*—(1) *General.* (i) The purpose of this section is to establish minimum national standards for owners and operators of ‘‘existing’’ boilers and industrial furnaces that burn hazardous waste where such standards define the acceptable management of hazardous waste during the period of interim status. The standards of this section apply to owners and operators of existing facilities until either a permit is issued under § 266.102(d) or until closure responsibilities identified in this section are fulfilled.

(ii) *Existing or in existence* means a boiler or industrial furnace that on or before August 21, 1991 is either in operation burning or processing hazardous waste or for which construction (including the ancillary facilities to burn or to process the hazardous waste) has commenced. 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 canceled or modified without substantial loss—for physical construction of the facility to be completed within a reasonable time.

(iii) If a boiler or industrial furnace is located at a facility that already has a permit or interim status, then the facility must comply with the applicable regulations dealing with permit modifications in § 270.42 or changes in interim status in § 270.72 of this chapter.

(2) *Exemptions.* The requirements of this section do not apply to hazardous waste and facilities exempt under §§ 266.100(b), or 266.108.

(3) *Prohibition on burning dioxin-listed wastes.* The following hazardous waste listed for dioxin and hazardous waste derived from any of these wastes may not be burned in a boiler or industrial furnace operating under interim status: F020, F021, F022, F023, F026, and F027.

(4) *Applicability of part 265 standards.* Owners and operators of boilers and industrial furnaces that burn hazardous waste and are operating under interim status are subject to the following provisions of part 265 of this chapter, except as provided otherwise by this section:

(i) In subpart A (General), § 265.4;

(ii) In subpart B (General facility standards), §§ 265.11–265.17;

(iii) In subpart C (Preparedness and prevention), §§ 265.31–265.37;

(iv) In subpart D (Contingency plan and emergency procedures), §§ 265.51–265.56;

(v) In subpart E (Manifest system, recordkeeping, and reporting), §§ 265.71–265.77, except that §§ 265.71, 265.72, and 265.76 do not apply to owners and operators of on-site facilities that do not receive any hazardous waste from off-site sources;

(vi) In subpart G (Closure and post-closure), §§ 265.111–265.115;

(vii) In subpart H (Financial requirements), §§ 265.141, 265.142, 265.143, and 265.147–265.151, except that States and the Federal government are exempt from the requirements of subpart H; and

(viii) Subpart BB (Air emission standards for equipment leaks), except § 265.1050(a).

(5) *Special requirements for furnaces.* The following controls apply during interim status to industrial furnaces (e.g., kilns, cupolas) that feed hazardous waste for a purpose other than solely as an ingredient (see paragraph (a)(5)(ii) of this section) at any location other than the hot end where products are normally discharged or where fuels are normally fired:

(i) *Controls.* (A) The hazardous waste shall be fed at a location where combustion gas temperatures are at least 1800 °F;

(B) The owner or operator must determine that adequate oxygen is present in combustion gases to combust organic constituents in the waste and retain documentation of such determination in the facility record;

(C) For cement kiln systems, the hazardous waste shall be fed into the kiln; and

(D) The hydrocarbon controls of § 266.104(c) or paragraph (c)(5) of this section apply upon certification of compliance under paragraph (c) of this section irrespective of the CO level achieved during the compliance test.

(ii) *Burning hazardous waste solely as an ingredient.* A hazardous waste is burned for a purpose other than solely as an ingredient if it meets either of these criteria:

(A) The hazardous waste has a total concentration of nonmetal compounds listed in part 261, appendix VIII, of this chapter exceeding 500 ppm by weight, as-fired, and so is considered to be burned for destruction. The concentration of nonmetal compounds in a waste as-generated may be reduced to the 500 ppm limit by *bona fide* treatment that removes or destroys nonmetal constituents. Blending for dilution to meet the 500 ppm limit is prohibited and documentation that the waste has not been impermissibly diluted must be retained in the facility record; or

(B) The hazardous waste has a heating value of 5,000 Btu/lb or more, as-fired, and so is considered to be burned as fuel. The heating value of a waste as-generated may be reduced to below the 5,000 Btu/lb limit by *bona fide* treatment that removes or destroys organic constituents. Blending to augment the heating value to meet the 5,000 Btu/lb limit is prohibited and documentation that the waste has not been impermissibly blended must be retained in the facility record.

(6) *Restrictions on burning hazardous waste that is not a fuel.* Prior to certification of compliance under paragraph (c) of this section, owners and operators shall not feed hazardous waste that has a heating value less than 5,000 Btu/lb, as-generated, (except that the heating value of a waste as-generated may be increased to above the 5,000 Btu/lb limit by *bona fide* treatment; however, blending to augment the heating value to meet the 5,000 Btu/lb limit is prohibited and records must be kept to document that impermissible blending has not occurred) in a boiler or industrial furnace, except that:

(i) Hazardous waste may be burned solely as an ingredient; or

(ii) Hazardous waste may be burned for purposes of compliance testing (or testing prior to compliance testing) for a total period of time not to exceed 720 hours; or

(iii) Such waste may be burned if the Director has documentation to show that, prior to August 21, 1991:

(A) The boiler or industrial furnace is operating under the interim status standards for incinerators provided by subpart O of part 265 of this chapter, or the interim status standards for thermal treatment units provided by subpart P of part 265 of this chapter; and

(B) The boiler or industrial furnace met the interim status eligibility requirements under § 270.70 of this chapter for subpart O or subpart P of part 265 of this chapter; and

(C) Hazardous waste with a heating value less than 5,000 Btu/lb was burned prior to that date; or

(iv) Such waste may be burned in a halogen acid furnace if the waste was burned as an excluded ingredient under § 261.2(e) of this chapter prior to February 21, 1991 and documentation is kept on file supporting this claim.

(7) *Direct transfer to the burner.* If hazardous waste is directly transferred from a transport vehicle to a boiler or industrial furnace without the use of a storage unit, the owner and operator must comply with § 266.111.

(b) *Certification of precompliance*—(1) *General.* The owner or operator must provide complete and accurate information specified in paragraph (b)(2) of this section to the Director on or before August 21, 1991, and must establish limits for the operating parameters specified in paragraph (b)(3) of this section. Such information is termed a ''certification of precompliance'' and constitutes a certification that the owner or operator has determined that, when the facility is operated within the limits specified in paragraph (b)(3) of this section, the owner or operator believes that, using best engineering judgment, emissions of particulate matter, metals, and HCl and Cl_2 are not likely to exceed the limits provided by §§ 266.105, 266.106, and 266.107. The facility may burn hazardous waste only under the operating conditions that the owner or operator establishes under paragraph (b)(3) of this section until the owner or operator submits a revised certification of precompliance under paragraph (b)(8) of this section or a certification of compliance under paragraph (c) of this section, or until a permit is issued.

(2) *Information required.* The following information must be submitted with the certification of precompliance to support the determination that the limits established for the operating parameters identified in paragraph (b)(3) of this section are not likely to result in an exceedance of the allowable emission rates for particulate matter, metals, and HCl and $Cl_{2\leqq}$

(i) General facility information:

(A) EPA facility ID number;

(B) Facility name, contact person, telephone number, and address;

(C) Description of boilers and industrial furnaces burning hazardous waste, including type and capacity of device;

(D) A scaled plot plan showing the entire facility and location of the boilers and industrial furnaces burning hazardous waste; and

(E) A description of the air pollution control system on each device burning hazardous waste, including the temperature of the flue gas at the inlet to the particulate matter control system.

(ii) Except for facilities complying with the Tier I or Adjusted Tier I feed rate screening limits for metals or total chlorine and chloride provided by §§ 266.106 (b) or (e) and 266.107 (b)(1) or (e), respectively, the estimated uncontrolled (at the inlet to the air pollution control system) emissions of particulate matter, each metal controlled by § 266.106, and hydrogen chloride and chlorine, and the following information to support such determinations:

(A) The feed rate (lb/hr) of ash, chlorine, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver, and thallium in each feedstream (hazardous waste, other fuels, industrial furnace feedstocks);

(B) The estimated partitioning factor to the combustion gas for the materials identified in paragraph (b)(2)(ii)(A) of this section and the basis for the estimate and an estimate of the partitioning to HCl and Cl_2 of total chloride and chlorine in feed materials. To estimate the partitioning factor, the owner or operator must use either best engineering judgment or the procedures specified in appendix IX of this part.

(C) For industrial furnaces that recycle collected particulate matter (PM) back into the furnace and that will certify compliance with the metals emissions standards under paragraph (c)(3)(ii)(A), the estimated enrichment factor for each metal. To estimate the enrichment factor, the owner or operator must use either best engineering judgment or the procedures specified in ‘‘Alternative Methodology for Implementing Metals Controls’’ in appendix IX of this part.

(D) If best engineering judgment is used to estimate partitioning factors or enrichment factors under paragraphs (b)(2)(ii)(B) or (b)(2)(ii)(C) respectively, the basis for the judgment. When best engineering judgment is used to develop or evaluate data or information and make determinations under this section, the determinations must be made by a qualified, registered professional engineer and a certification of his/her determinations in accordance with § 270.11(d) of this chapter must be provided in the certification of precompliance.

(iii) For facilities complying with the Tier I or Adjusted Tier I feed rate screening limits for metals or total chlorine and chloride provided by §§ 266.106 (b) or (e) and 266.107 (b)(1) or (e), the feed rate (lb/hr) of total chloride and chlorine, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver, and thallium in each feed stream (hazardous waste, other fuels, industrial furnace feedstocks).

(iv) For facilities complying with the Tier II or Tier III emission limits for metals or HCl and Cl_2 (under §§ 266.106 (c) or (d) or 266.107(b)(2) or (c)), the estimated controlled (outlet of the air pollution control system) emissions rates of particulate matter, each metal controlled by § 266.106, and HCl and Cl_2, and the following information to support such determinations:

(A) The estimated air pollution control system (APCS) removal efficiency for particulate matter, HCl, Cl_2, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver, and thallium.

(B) To estimate APCS removal efficiency, the owner or operator must use either best engineering judgment or the procedures prescribed in appendix IX of this part.

(C) If best engineering judgment is used to estimate APCS removal efficiency, the basis for the judgment. Use of best engineering judgment must be in conformance with provisions of paragraph (b)(2)(ii)(D) of this section.

(v) Determination of allowable emissions rates for HCl, Cl_2, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver, and thallium, and the following information to support such determinations:

(A) For all facilities:

(*1*) Physical stack height;

(*2*) Good engineering practice stack height as defined by 40 CFR 51.100(ii);

(*3*) Maximum flue gas flow rate;

(*4*) Maximum flue gas temperature;

(*5*) Attach a US Geological Service topographic map (or equivalent) showing the facility location and surrounding land within 5 km of the facility;

(*6*) Identify terrain type: complex or noncomplex; and

(*7*) Identify land use: urban or rural.

(B) For owners and operators using Tier III site specific dispersion modeling to determine allowable levels under § 266.106(d) or § 266.107(c), or adjusted Tier I feed rate screening limits under §§ 266.106(e) or 266.107(e):

(*1*) Dispersion model and version used;

(*2*) Source of meterological data;

(*3*) The dilution factor in micrograms per cubic meter per gram per second of emissions for the maximum annual average off-site (unless on-site is required) ground level concentration (MEI location); and

(*4*) Indicate the MEI location on the map required under paragraph (b)(2)(v)(A)(*5*);

(vi) For facilities complying with the Tier II or III emissions rate controls for metals or HCl and Cl_2, a comparison of the estimated controlled emissions rates determined under paragraph (b)(2)(iv) with the allowable emission rates determined under paragraph (b)(2)(v);

(vii) For facilities complying with the Tier I (or adjusted Tier I) feed rate screening limits for metals or total chloride and chlorine, a comparison of actual feed rates of each metal and total chlorine and chloride determined under paragraph (b)(2)(iii) of this section to the Tier I allowable feed rates; and

(viii) For industrial furnaces that feed hazardous waste for any purpose other than solely as an ingredient (as defined by paragraph (a)(5)(ii) of this section) at any location other than the product discharge end of the device, documentation of compliance with the requirements of paragraphs (a)(5)(i) (A), (B), and (C) of this section.

(ix) For industrial furnaces that recycle collected particulate matter (PM) back into the furnace and that will certify compliance with the metals emissions standards under paragraph (c)(3)(ii)(A) of this section:

(A) The applicable particulate matter standard in lb/hr; and

(B) The precompliance limit on the concentration of each metal in collected PM.

(3) *Limits on operating conditions.* The owner and operator shall establish limits on the following parameters consistent with the determinations made under paragraph (b)(2) of this section and certify (under provisions of paragraph (b)(9) of this section) to the Director that the facility will operate within the limits during interim status when there is hazardous waste in the unit until revised certification of precompliance under paragraph (b)(8) of this section or certification of compliance under paragraph (c) of this section:

(i) Feed rate of total hazardous waste and (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under § 266.106 (b) or (e)) pumpable hazardous waste;

(ii) Feed rate of each metal in the following feed streams:

(A) Total feed streams, except that industrial furnaces that comply with the alternative metals implementation approach under paragraph (b)(4) of this section must specify limits on the concentration of each metal in collected particulate matter in lieu of feed rate limits for total feedstreams;

(B) Total hazardous waste feed, unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106 (b) or (e); and

(C) Total pumpable hazardous waste feed, unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under § 266.106 (b) or (e);

(iii) Total feed rate of chlorine and chloride in total feed streams;

(iv) Total feed rate of ash in total feed streams, except that the ash feed rate for cement kilns and light-weight aggregate kilns is not limited; and

(v) Maximum production rate of the device in appropriate units when producing normal product, unless complying with the Tier I or Adjusted Tier I feed rate screening limits for chlorine under § 266.107 (b)(1) or (e) and for all metals under § 266.106 (b) or (e), and the uncontrolled particulate emissions do not exceed the standard under § 266.105.

(4) *Operating requirements for furnaces that recycle PM.* Owners and operators of furnaces that recycle collected particulate matter (PM) back into the furnace and that will certify compliance with the metals emissions controls under paragraph (c)(3)(ii)(A) of this section must comply with the special operating requirements provided in ‘‘Alternative Methodology for Implementing Metals Controls’’ in appendix IX of this part.

(5) *Measurement of feed rates and production rate*—(i) *General requirements.* Limits on each of the parameters specified in paragraph (b)(3) of this section (except for limits on metals concentrations in collected particulate matter (PM) for industrial furnaces that recycle collected PM) shall be established and continuously monitored under either of the following methods:

(A) *Instantaneous limits.* A limit for a parameter may be established and continuously monitored and recorded on an instantaneous basis (i.e., the value that occurs at any time) not to be exceeded at any time; or

(B) *Hourly rolling average limits.* A limit for a parameter may be established and continuously monitored on an hourly rolling average basis defined as follows:

(*1*) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

(*2*) An hourly rolling average is the arithmetic mean of the 60 most recent 1-minute average values recorded by the continuous monitoring system.

(ii) *Rolling average limits for carcinogenic metals and lead.* Feed rate limits for the carcinogenic metals (arsenic, beryllium, cadmium, and chromium) and lead may be established either on an hourly rolling average basis as prescribed by paragraph (b)(5)(i)(B) or on (up to) a 24 hour rolling average basis. If the owner or operator elects to use an averaging period from 2 to 24 hours:

(A) The feed rate of each metal shall be limited at any time to ten times the feed rate that would be allowed on a hourly rolling average basis;

(B) The continuous monitor shall meet the following specifications:

(*1*) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

(*2*) The rolling average for the selected averaging period is defined as the arithmetic mean of one hour block averages for the averaging period. A one hour block average is the arithmetic mean of the one minute averages recorded during the 60-minute period beginning at one minute after the beginning of preceding clock hour.

(iii) *Feed rate limits for metals, total chloride and chlorine, and ash.* Feed rate limits for metals, total chlorine and chloride, and ash are established and monitored by knowing the concentration of the substance (i.e., metals, chloride/chlorine, and ash) in each feedstream and the flow rate of the feedstream. To monitor the feed rate of these substances, the flow rate of each feedstream must be monitored under the continuous monitoring requirements of paragraphs (b)(5) (i) and (ii) of this section.

(6) *Public notice requirements at precompliance.* On or before August 21, 1991 the owner or operator must submit a notice with the following information for publication in a major local newspaper of general circulation and send a copy of the notice to the appropriate units of State and local government. The owner and operator must provide to the Director with the certification of precompliance evidence of submitting the notice for publication. The notice, which shall be entitled ‘‘Notice of Certification of Precompliance with Hazardous Waste Burning Requirements of 40 CFR 266.103(b)’’, must include:

(i) Name and address of the owner and operator of the facility as well as the location of the device burning hazardous waste;

(ii) Date that the certification of precompliance is submitted to the Director;

(iii) Brief description of the regulatory process required to comply with the interim status requirements of this section including required emissions testing to demonstrate conformance with emissions standards for organic compounds, particulate matter, metals, and HCl and Cl_2;

(iv) Types and quantities of hazardous waste burned including, but not limited to, source, whether solids or liquids, as well as an appropriate description of the waste;

(v) Type of device(s) in which the hazardous waste is burned including a physical description and maximum production rate of each device;

(vi) Types and quantities of other fuels and industrial furnace feedstocks fed to each unit;

(vii) Brief description of the basis for this certification of precompliance as specified in paragraph (b)(2) of this section;

(viii) Locations where the record for the facility can be viewed and copied by interested parties. These records and locations shall at a minimum include:

(A) The administrative record kept by the Ageny office where the supporting documentation was submitted or another location designated by the Director; and

(B) The BIF correspondence file kept at the facility site where the device is located. The correspondence file must include all correspondence between the facility and the Director, State and local regulatory officials, including copies of all certifications and notifications, such as the precompliance certification, precompliance public notice, notice of compliance testing, compliance test report, compliance certification, time extension requests and approvals or denials, enforcement notifications of violations, and copies of EPA and State site visit reports submitted to the owner or operator.

(ix) Notification of the establishment of a facility mailing list whereby interested parties shall notify the Agency that they wish to be placed on the mailing list to receive future information and notices about this facility; and

(x) Location (mailing address) of the applicable EPA Regional Office, Hazardous Waste Division, where further information can be obtained on EPA regulation of hazardous waste burning.

(7) *Monitoring other operating parameters.* When the monitoring systems for the operating parameters listed in paragraphs (c)(1) (v through xiii) of this section are installed and operating in conformance with vendor specifications or (for CO, HC, and oxygen) specifications provided by appendix IX of this part, as appropriate, the parameters shall be continuously monitored and records shall be maintained in the operating record.

(8) *Revised certification of precompliance.* The owner or operator may revise at any time the information and operating conditions documented under paragraphs (b)(2) and (b)(3) of this section in the certification of precompliance by submitting a revised certification of precompliance under procedures provided by those paragraphs.

(i) The public notice requirements of paragraph (b)(6) of this section do not apply to recertifications.

(ii) The owner and operator must operate the facility within the limits established for the operating parameters under paragraph (b)(3) of this section until a revised certification is submitted under this paragraph or a certification of compliance is submitted under paragraph (c) of this section.

(9) *Certification of precompliance statement.* The owner or operator must include the following signed statement with the certification of precompliance submitted to the Director:

> ''I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information and supporting documentation. Copies of all emissions tests, dispersion modeling results and other information used to determine conformance with the requirements of § 266.103(b) are available at the facility and can be obtained from the facility contact person listed above. Based on my inquiry of the person or persons who manages the facility, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
>
> I also acknowledge that the operating limits established in this certification pursuant to § 266.103(b) (3) and (4) are enforceable limits at which the facility can legally operate during interim status until: (1) A revised certification of precompliance is submitted, (2) a certification of compliance is submitted, or (3) an operating permit is issued.''

(c) *Certification of compliance.* The owner or operator shall conduct emissions testing to document compliance with the emissions standards of §§ 266.104 (b) through (e), 266.105, 266.106, 266.107, and paragraph (a)(5)(i)(D) of this section, under the procedures prescribed by this paragraph, except under extensions of time provided by paragraph (c)(7). Based on the compliance test, the owner or operator shall submit to the Director on or before August 21, 1992 a complete and accurate ''certification of compliance'' (under paragraph (c)(4) of this section) with those emission standards establishing limits on the operating parameters specified in paragraph (c)(1).

(1) *Limits on operating conditions.* The owner or operator shall establish limits on the following parameters based on operations during the compliance test (under procedures prescribed in paragraph (c)(4)(iv) of this section) or as otherwise specified and include these limits with the certification of compliance. The boiler or industrial furnace must be operated in accordance with these operating limits and the applicable emissions standards of §§ 266.104(b) through (e), 266.105, 266.106, 266.107, and 266.103(a)(5)(i)(D) at all times when there is hazardous waste in the unit.

(i) Feed rate of total hazardous waste and (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under §266.106(b) or (e) and the total chlorine and chloride feed rate screening limits under § 266.107(b) or (e)), pumpable hazardous waste;

(ii) Feed rate of each metal in the following feedstreams:

(A) Total feedstreams, except that:

(*1*) Facilities that comply with Tier I or Adjusted Tier I metals feed rate screening limits may set their operating limits at the metals feed rate screening limits determined under § 266.106(b) or (e); and

(*2*) Industrial furnaces that must comply with the alternative metals implementation approach under paragraph (c)(3)(ii) of this section must specify limits on the concentration of each metal in the collected particulate matter in lieu of feed rate limits for total feedsteams;

(B) Total hazardous waste feed (unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e)); and

(C) Total pumpable hazardous waste feed (unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e));

(iii) Total feed rate of chlorine and chloride in total feed streams, except that facilities that comply with Tier I or Adjusted Tier I feed rate screening limits may set their operating limits at the total chlorine and chloride feed rate screening limits determined under § 266.107(b)(1) or (e);

(iv) Total feed rate of ash in total feed streams, except that the ash feed rate for cement kilns and light-weight aggregate kilns is not limited;

(v) Carbon monoxide concentration, and where required, hydrocarbon concentration in stack gas. When complying with the CO controls of § 266.104(b), the CO limit is 100 ppmv, and when complying with the HC controls of § 266.104(c), the HC limit is 20 ppmv. When complying with the CO controls of § 266.104(c), the CO limit is established based on the compliance test;

(vi) Maximum production rate of the device in appropriate units when producing normal product, unless complying with the Tier I or Adjusted Tier I feed rate screening limits for chlorine under § 266.107(b)(1) or (e) and for all metals under § 266.106(b) or (e), and the uncontrolled particulate emissions do not exceed the standard under § 266.105;

(vii) Maximum combustion chamber temperature where the temperature measurement is as close to the combustion zone as possible and is upstream of any quench water injection (unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e));

(viii) Maximum flue gas temperature entering a particulate matter control device (unless complying with Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e) and the total chlorine and chloride feed rate screening limits under § 266.107(b) or (e));

(ix) For systems using wet scrubbers, including wet ionizing scrubbers (unless complying with Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b)(1) or (e)):

(A) Minimum liquid to flue gas ration;

(B) Minimum scrubber blowdown from the system or maximum suspended solids content of scrubber water; and

(C) Minimum pH level of the scrubber water;

(x) For systems using venturi scrubbers, the minimum differential gas pressure across the venturi (unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e) and the total chlorine and chloride feed rate screening limits under § 266.107(b)(1) or (e));

(xi) For systems using dry scrubbers (unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e) and the total chlorine and chloride feed rate screening limits under § 266.107(b)(1) or (e)):

(A) Minimum caustic feed rate; and

(B) Maximum flue gas flow rate;

(xii) For systems using wet ionizing scrubbers or electrostatic precipitators (unless complying with the Tier I or Adjusted Tier I metals feed rate screening limits under § 266.106(b) or (e) and the total chlorine and chloride feed rate screening limits under § 266.107(b)(1) or (e)):

(A) Minimum electrical power in kilovolt amperes (kVA) to the precipitator plates; and

(B) Maximum flue gas flow rate;

(xiii) For systems using fabric filters (baghouses), the minimum pressure drop (unless complying with the Tier I or Adjusted Tier I metal feed rate screening limits under § 266.106(b) or (e) and the total chlorine and chloride feed rate screening limits under § 266.107(b)(1) or (e)).

(2) *Prior notice of compliance testing.* At least 30 days prior to the compliance testing required by paragraph (c)(3) of this section, the owner or operator shall notify the Director and submit the following information:

(i) General facility information including:

(A) EPA facility ID number;

(B) Facility name, contact person, telephone number, and address;

(C) Person responsible for conducting compliance test, including company name, address, and telephone number, and a statement of qualifications;

(D) Planned date of the compliance test;

(ii) Specific information on each device to be tested including:

(A) Description of boiler or industrial furnace;

(B) A scaled plot plan showing the entire facility and location of the boiler or industrial furnace;

(C) A description of the air pollution control system;

(D) Identification of the continuous emission monitors that are installed, including:

(*1*) Carbon monoxide monitor;

(*2*) Oxygen monitor;

(*3*) Hydrocarbon monitor, specifying the minimum temperature of the system and, if the temperature is less than 150 °C, an explanation of why a heated system is not used (see paragraph (c)(5) of this section) and a brief description of the sample gas conditioning system;

(E) Indication of whether the stack is shared with another device that will be in operation during the compliance test;

(F) Other information useful to an understanding of the system design or operation.

(iii) Information on the testing planned, including a complete copy of the test protocol and Quality Assurance/Quality Control (QA/QC) plan, and a summary description for each test providing the following information at a minimum:

(A) Purpose of the test (e.g., demonstrate compliance with emissions of particulate matter); and

(B) Planned operating conditions, including levels for each pertinent parameter specified in paragraph (c)(1) of this section.

(3) *Compliance testing*—(i) *General.* Compliance testing must be conducted under conditions for which the owner or operator has submitted a certification of precompliance under paragraph (b) of this section and under conditions established in the notification of compliance testing required by paragraph (c)(2) of this section. The owner or operator may seek approval on a case-by-case basis to use compliance test data from one unit in lieu of testing a similar onsite unit. To support the request, the owner or operator must provide a comparison of the hazardous waste burned and other feedstreams, and the design, operation, and maintenance of both the tested unit and the similar unit. The Director shall provide a written approval to use compliance test data in lieu of testing a similar unit if he finds that the hazardous wastes, the devices, and the operating conditions are sufficiently similar, and the data from the other compliance test is adequate to meet the requirements of § 266.103(c).

(ii) *Special requirements for industrial furnaces that recycle collected PM.* Owners and operators of industrial furnaces that recycle back into the furnace particulate matter (PM) from the air pollution control system must comply with one of the following procedures for testing to determine compliance with the metals standards of § 266.106(c) or (d):

(A) The special testing requirements prescribed in ‘‘Alternative Method for Implementing Metals Controls’’ in appendix IX of this part; or

(B) Stack emissions testing for a minimum of 6 hours each day while hazardous waste is burned during interim status. The testing must be conducted when burning normal hazardous waste for that day at normal feed rates for that day and when the air pollution control system is operated under normal conditions. During interim status, hazardous waste analysis for metals content must be sufficient for the owner or operator to determine if changes in metals content may affect the ability of the facility to meet the metals emissions standards established under § 266.106(c) or (d). Under this option, operating limits (under paragraph (c)(1) of this section) must be established during compliance testing under paragraph (c)(3) of this section only on the following parameters;

(*1*) Feed rate of total hazardous waste;

(*2*) Total feed rate of chlorine and chloride in total feed streams;

(*3*) Total feed rate of ash in total feed streams, except that the ash feed rate for cement kilns and light-weight aggregate kilns is not limited;

(*4*) Carbon monoxide concentration, and where required, hydrocarbon concentration in stack gas;

(*5*) Maximum production rate of the device in appropriate units when producing normal product; or

(C) Conduct compliance testing to determine compliance with the metals standards to establish limits on the operating parameters of paragraph (c)(1) of this section only after the kiln system has been conditioned to enable it to reach equilibrium with respect to metals fed into the system and metals emissions. During conditioning, hazardous waste and raw materials having the same metals content as will be fed during the compliance test must be fed at the feed rates that will be fed during the compliance test.

(iii) *Conduct of compliance testing.* (A) If compliance with all applicable emissions standards of §§ 266.104 through 266.107 is not demonstrated simultaneously during a set of test runs, the operating conditions of additional test runs required to demonstrate compliance with remaining emissions standards must be as close as possible to the original operating conditions.

(B) Prior to obtaining test data for purposes of demonstrating compliance with the applicable emissions standards of §§ 266.104 through 266.107 or establishing limits on operating parameters under this section, the facility must operate under compliance test conditions for a sufficient period to reach steady-state operations. Industrial furnaces that recycle collected particulate matter back into the furnace and that comply with paragraphs (c)(3)(ii)(A) or (B) of this section, however, need not reach steady state conditions with respect to the flow of metals in the system prior to beginning compliance testing for metals.

(C) Compliance test data on the level of an operating parameter for which a limit must be established in the certification of compliance must be obtained during emissions sampling for the pollutant(s) (i.e., metals, PM, HCl/Cl_2, organic compounds) for which the parameter must be established as specified by paragraph (c)(1) of this section.

(4) *Certification of compliance.* Within 90 days of completing compliance testing, the owner or operator must certify to the Director compliance with the emissions standards of §§ 266.104 (b), (c), and (e), 266.105, 266.106, 266.107, and paragraph (a)(5)(i)(D) of this section. The certification of compliance must include the following information:

(i) General facility and testing information including:

(A) EPA facility ID number;

(B) Facility name, contact person, telephone number, and address;

(C) Person responsible for conducting compliance testing, including company name, address, and telephone number, and a statement of qualifications;

(D) Date(s) of each compliance test;

(E) Description of boiler or industrial furnace tested;

(F) Person responsible for quality assurance/quality control (QA/QC), title, and telephone number, and statement that procedures prescribed in the QA/QC plan submitted under § 266.103(c)(2)(iii) have been followed, or a description of any changes and an explanation of why changes were necessary.

(G) Description of any changes in the unit configuration prior to or during testing that would alter any of the information submitted in the prior notice of compliance testing under paragraph (c)(2) of this section, and an explanation of why the changes were necessary;

(H) Description of any changes in the planned test conditions prior to or during the testing that alter any of the information submitted in the prior notice of compliance testing under paragraph (c)(2) of this section, and an explanation of why the changes were necessary; and

(I) The complete report on results of emissions testing.

(ii) Specific information on each test including:

(A) Purpose(s) of test (e.g., demonstrate conformance with the emissions limits for particulate matter, metals, HCl, Cl_2, and CO)

(B) Summary of test results for each run and for each test including the following information:

(*1*) Date of run;

(*2*) Duration of run;

(*3*) Time-weighted average and highest hourly rolling average CO level for each run and for the test;

(*4*) Highest hourly rolling average HC level, if HC monitoring is required for each run and for the test;

(*5*) If dioxin and furan testing is required under § 266.104(e), time-weighted average emissions for each run and for the test of chlorinated dioxin and furan emissions, and the predicted maximum annual average ground level concentration of the toxicity equivalency factor;

(*6*) Time-weighted average particulate matter emissions for each run and for the test;

(*7*) Time-weighted average HCl and Cl_2 emissions for each run and for the test;

(*8*) Time-weighted average emissions for the metals subject to regulation under § 266.106 for each run and for the test; and

(*9*) QA/QC results.

(iii) Comparison of the actual emissions during each test with the emissions limits prescribed by §§ 266.104 (b), (c), and (e), 266.105, 266.106, and 266.107 and established for the facility in the certification of precompliance under paragraph (b) of this section.

(iv) Determination of operating limits based on all valid runs of the compliance test for each applicable parameter listed in paragraph (c)(1) of this section using either of the following procedures:

(A) *Instantaneous limits.* A parameter may be measured and recorded on an instantaneous basis (i.e., the value that occurs at any time) and the operating limit specified as the time-weighted average during all runs of the compliance test; or

(B) *Hourly rolling average basis.* (*1*) The limit for a parameter may be established and continuously monitored on an hourly rolling average basis defined as follows:

(*i*) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

(*ii*) An hourly rolling average is the arithmetic mean of the 60 most recent 1-minute average values recorded by the continuous monitoring system.

(*2*) The operating limit for the parameter shall be established based on compliance test data as the average over all test runs of the highest hourly rolling average value for each run.

(C) *Rolling average limits for carcinogenic metals and lead.* Feed rate limits for the carcinogenic metals (i.e., arsenic, beryllium, cadmium and chromium) and lead may be established either on an hourly rolling average basis as prescribed by paragraph (c)(4)(iv)(B) of this section or on (up to) a 24 hour rolling average basis. If the owner or operator elects to use an averaging period from 2 to 24 hours:

(*1*) The feed rate of each metal shall be limited at any time to ten times the feed rate that would be allowed on a hourly rolling average basis;

(*2*) The continuous monitor shall meet the following specifications:

(*i*) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

(*ii*) The rolling average for the selected averaging period is defined as arithmetic mean of one hour block averages for the averaging period. A one hour block average is the arithmetic mean of the one minute averages recorded during the 60-minute period beginning at one minute after the beginning of preceding clock hour; and

(*3*) The operating limit for the feed rate of each metal shall be established based on compliance test data as the average over all test runs of the highest hourly rolling average feed rate for each run.

(D) *Feed rate limits for metals, total chloride and chlorine, and ash.* Feed rate limits for metals, total chlorine and chloride, and ash are established and monitored by knowing the concentration of the substance (i.e., metals, chloride/chlorine, and ash) in each feedstream and the flow rate of the feedstream. To monitor the feed rate of these substances, the flow rate of each feedstream must be monitored under the continuous monitoring requirements of paragraphs (c)(4)(iv) (A) through (C) of this section.

(v) *Certification of compliance statement.* The following statement shall accompany the certification of compliance:

> ''I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information and supporting documentation. Copies of all emissions tests, dispersion modeling results and other information used to determine conformance with the requirements of § 266.103(c) are available at the facility and can be obtained from the facility contact person listed above. Based on my inquiry of the person or persons who manages the facility, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
>
> I also acknowledge that the operating conditions established in this certification pursuant to § 266.103(c)(4)(iv) are enforceable limits at which the facility can legally operate during interim status until a revised certification of compliance is submitted.''

(5) *Special requirements for HC monitoring systems.* When an owner or operator is required to comply with the hydrocarbon (HC) controls provided by § 266.104(c) or paragraph (a)(5)(i)(D) of this section, a conditioned gas monitoring system may be used in conformance with specifications provided in appendix IX of this part provided that the owner or operator submits a certification of compliance without using extensions of time provided by paragraph (c)(7) of this section.

(6) *Special operating requirements for industrial furnaces that recycle collected PM.* Owners and operators of industrial furnaces that recycle back into the furnace particulate matter (PM) from the air pollution control system must:

(i) When complying with the requirements of paragraph (c)(3)(ii)(A) of this section, comply with the operating requirements prescribed in ''Alternative Method to Implement the Metals Controls'' in appendix IX of this part; and

(ii) When complying with the requirements of paragraph (c)(3)(ii)(B) of this section, comply with the operating requirements prescribed by that paragraph.

(7) *Extensions of time.* (i) If the owner or operator does not submit a complete certification of compliance for all of the applicable emissions standards of §§ 266.104, 266.105, 266.106, and 266.107 by August 21, 1992, he/she must either:

(A) Stop burning hazardous waste and begin closure activities under paragraph (l) of this section for the hazardous waste portion of the facility; or

(B) Limit hazardous waste burning only for purposes of compliance testing (and pretesting to prepare for compliance testing) a total period of 720 hours for the period of time beginning August 21, 1992, submit a notification to the Director by August 21, 1992 stating that the facility is operating under restricted interim status and intends to resume burning hazardous waste, and submit a complete certification of compliance by August 23, 1993; or

(C) Obtain a case-by-case extension of time under paragraph (c)(7)(ii) of this section.

(ii) The owner or operator may request a case-by-case extension of time to extend any time limit provided by paragraph (c) of this section if compliance with the time limit is not practicable for reasons beyond the control of the owner or operator.

(A) In granting an extension, the Director may apply conditions as the facts warrant to ensure timely compliance with the requirements of this section and that the facility operates in a manner that does not pose a hazard to human health and the environment;

(B) When an owner or operator requests an extension of time to enable the facility to comply with the alternative hydrocarbon provisions of § 266.104(f) and obtain a RCRA operating permit because the facility cannot meet the HC limit of § 266.104(c) of this chapter:

(*1*) The Director shall, in considering whether to grant the extension:

(*i*) Determine whether the owner and operator have submitted in a timely manner a complete part B permit application that includes information required under § 270.22(b) of this chapter; and

(*ii*) Consider whether the owner and operator have made a good faith effort to certify compliance with all other emission controls, including the controls on dioxins and furans of § 266.104(e) and the controls on PM, metals, and HCl/Cl_2.

(*2*) If an extension is granted, the Director shall, as a condition of the extension, require the facility to operate under flue gas concentration limits on CO and HC that, based on available information, including information in the part B permit application, are baseline CO and HC levels as defined by § 266.104(f)(1).

(8) *Revised certification of compliance.* The owner or operator may submit at any time a revised certification of compliance (recertification of compliance) under the following procedures:

(i) Prior to submittal of a revised certification of compliance, hazardous waste may not be burned for more than a total of 720 hours under operating conditions that exceed those established under a current certification of compliance, and such burning may be conducted only for purposes of determining whether the facility can operate under revised conditions and continue to meet the applicable emissions standards of §§ 266.104, 266.105, 266.106, and 266.107;

(ii) At least 30 days prior to first burning hazardous waste under operating conditions that exceed those established under a current certification of compliance, the owner or operator shall notify the Director and submit the following information:

(A) EPA facility ID number, and facility name, contact person, telephone number, and address;

(B) Operating conditions that the owner or operator is seeking to revise and description of the changes in facility design or operation that prompted the need to seek to revise the operating conditions;

(C) A determination that when operating under the revised operating conditions, the applicable emissions standards of §§ 266.104, 266.105, 266.106, and 266.107 are not likely to be exceeded. To document this determination, the owner or operator shall submit the applicable information required under paragraph (b)(2) of this section; and

(D) Complete emissions testing protocol for any pretesting and for a new compliance test to determine compliance with the applicable emissions standards of §§ 266.104, 266.105, 266.106, and 266.107 when operating under revised operating conditions. The protocol shall include a schedule of pre-testing and compliance testing. If the owner and operator revises the scheduled date for the compliance test, he/she shall notify the Director in writing at least 30 days prior to the revised date of the compliance test;

(iii) Conduct a compliance test under the revised operating conditions and the protocol submitted to the Director to determine compliance with the applicable emissions standards of §§ 266.104, 266.105, 266.106, and 266.107; and

(iv) Submit a revised certification of compliance under paragraph (c)(4) of this section.

(d) *Periodic Recertifications.* The owner or operator must conduct compliance testing and submit to the Director a recertification of compliance under provisions of paragraph (c) of this section within three years from submitting the previous certification or recertification. If the owner or operator seeks to recertify compliance under new operating conditions, he/she must comply with the requirements of paragraph (c)(8) of this section.

(e) *Noncompliance with certification schedule.* If the owner or operator does not comply with the interim status compliance schedule provided by paragraphs (b), (c), and (d) of this section, hazardous waste burning must terminate on the date that the deadline is missed, closure activities must begin under paragraph (l) of this section, and hazardous waste burning may not resume except under an operating permit issued under § 270.66 of this chapter. For purposes of compliance with the closure provisions of paragraph (l) of this section and §§ 265.112(d)(2) and 265.113 of this chapter the boiler or industrial furnace has received ‘‘the known final volume of hazardous waste’’ on the date that the deadline is missed.

(f) *Start-up and shut-down.* Hazardous waste (except waste fed solely as an ingredient under the Tier I (or adjusted Tier I) feed rate screening limits for metals and chloride/chlorine) must not be fed into the device during start-up and shut-down of the boiler or industrial furnace, unless the device is operating within the conditions of operation specified in the certification of compliance.

(g) *Automatic waste feed cutoff.* During the compliance test required by paragraph (c)(3) of this section, and upon certification of compliance under paragraph (c) of this section, a boiler or industrial furnace must be operated with a functioning system that automatically cuts off the hazardous waste feed when the applicable operating conditions specified in paragraphs (c)(1) (i) and (v through xiii) of this section deviate from those established in the certification of compliance. In addition:

(1) To minimize emissions of organic compounds, the minimum combustion chamber temperature (or the indicator of combustion chamber temperature) that occurred during the compliance test must be maintained while hazardous waste or hazardous waste residues remain in the combustion chamber, with the minimum temperature during the compliance test defined as either:

(i) If compliance with the combustion chamber temperature limit is based on a hourly rolling average, the minimum temperature during the compliance test is considered to be the average over all runs of the lowest hourly rolling average for each run; or

(ii) If compliance with the combustion chamber temperature limit is based on an instantaneous temperature measurement, the minimum temperature during the compliance test is considered to be the time-weighted average temperature during all runs of the test; and

(2) Operating parameters limited by the certification of compliance must continue to be monitored during the cutoff, and the hazardous waste feed shall not be restarted until the levels of those parameters comply with the limits established in the certification of compliance.

(h) *Fugitive emissions.* Fugitive emissions must be controlled by:

(1) Keeping the combustion zone totally sealed against fugitive emissions; or

(2) Maintaining the combustion zone pressure lower than atmospheric pressure; or

(3) An alternate means of control that the owner or operator can demonstrate provide fugitive emissions control equivalent to maintenance of combustion zone pressure lower than atmospheric pressure. Support for such demonstration shall be included in the operating record.

(i) *Changes.* A boiler or industrial furnace must cease burning hazardous waste when changes in combustion properties, or feed rates of the hazardous waste, other fuels, or industrial furnace feedstocks, or changes in the boiler or industrial furnace design or operating conditions deviate from the limits specified in the certification of compliance.

(j) *Monitoring and Inspections.* (1) The owner or operator must monitor and record the following, at a minimum, while burning hazardous waste:

(i) Feed rates and composition of hazardous waste, other fuels, and industrial furnace feed stocks, and feed rates of ash, metals, and total chloride and chlorine as necessary to ensure conformance with the certification of precompliance or certification of compliance;

(ii) Carbon monoxide (CO), oxygen, and if applicable, hydrocarbons (HC), on a continuous basis at a common point in the boiler or industrial furnace downstream of the combustion zone and prior to release of stack gases to the atmosphere in accordance with the operating limits specified in the certification of compliance. CO, HC, and oxygen monitors must be installed, operated, and maintained in accordance with methods specified in appendix IX of this part.

(iii) Upon the request of the Director, sampling and analysis of the hazardous waste (and other fuels and industrial furnace feed stocks as appropriate) and the stack gas emissions must be conducted to verify that the operating conditions established in the certification of precompliance or certification of compliance achieve the applicable standards of §§266.104, 266.105, 266.106, and 266.107.

(2) The boiler or industrial furnace and associated equipment (pumps, valves, pipes, fuel storage tanks, etc.) must be subjected to thorough visual inspection when they contain hazardous waste, at least daily for leaks, spills, fugitive emissions, and signs of tampering.

(3) The automatic hazardous waste feed cutoff system and associated alarms must be tested at least once every 7 days when hazardous waste is burned to verify operability, unless the owner or operator can demonstrate that weekly inspections will unduly restrict or upset operations and that less frequent inspections will be adequate. Support for such demonstration shall be included in the operating record. At a minimum, operational testing must be conducted at least once every 30 days.

(4) These monitoring and inspection data must be recorded and the records must be placed in the operating log.

(k) *Recordkeeping.* The owner or operator must keep in the operating record of the facility all information and data required by this section until closure of the boiler or industrial furnace unit.

(l) *Closure.* At closure, the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters, and scrubber sludges) from the boiler or industrial furnace and must comply with §§265.111–265.115 of this chapter.

[56 FR 7208, Feb. 21, 1991; 56 FR 32689, July 17, 1991, as amended at 56 FR 42512, 42514, Aug. 27, 1991; 57 FR 38564, Aug. 25, 1992; 57 FR 45000, Sept. 30, 1992; 60 FR 33913, June 29, 1995]

§266.104 Standards to control organic emissions.

(a) *DRE standard*—(1) *General.* Except as provided in paragraph (a)(3) of this section, a boiler or industrial furnace burning hazardous waste must achieve a destruction and removal efficiency (DRE) of 99.99% for all organic hazardous constituents in the waste feed. To demonstrate conformance with this requirement, 99.99% DRE must be demonstrated during a trial burn for each principal organic hazardous constituent (POHC) designated (under paragraph (a)(2) of this section) in its permit for each waste feed. DRE is determined for each POHC from the following equation:

$$\mathrm{DRE} = \left[1 - \frac{W_{out}}{W_{in}}\right] \times 100$$

where:

W_{in}= Mass feed rate of one principal organic hazardous constituent (POHC) in the hazardous waste fired to the boiler or industrial furnace; and

W_{out}= Mass emission rate of the same POHC present in stack gas prior to release to the atmosphere.

(2) *Designation of POHCs.* Principal organic hazardous constituents (POHCs) are those compounds for which compliance with the DRE requirements of this section shall be demonstrated in a trial burn in conformance with procedures prescribed in §270.66 of this chapter. One or more POHCs shall be designated by the Director for each waste feed to be burned. POHCs shall be designated based on the degree of difficulty of destruction of the organic constituents in the waste and on their concentrations or mass in the waste feed considering the results of waste analyses submitted with part B of the permit application. POHCs are most likely to be selected from among those compounds listed in part 261, appendix VIII of this chapter that are also present in the normal waste feed. However, if the applicant demonstrates to the Regional Administrator's satisfaction that a compound not listed in appendix VIII or not present in the normal waste feed is a suitable indicator of compliance with the DRE requirements of this section, that compound may be designated as a POHC. Such POHCs need not be toxic or organic compounds.

(3) *Dioxin-listed waste.* A boiler or industrial furnace burning hazardous waste containing (or derived from) EPA Hazardous Wastes Nos. F020, F021,

F022, F023, F026, or F027 must achieve a destruction and removal efficiency (DRE) of 99.9999% for each POHC designated (under paragraph (a)(2) of this section) in its permit. This performance must be demonstrated on POHCs that are more difficult to burn than tetra-, penta-, and hexachlorodibenzo-*p*-dioxins and dibenzofurans. DRE is determined for each POHC from the equation in paragraph (a)(1) of this section. In addition, the owner or operator of the boiler or industrial furnace must notify the Director of intent to burn EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, or F027.

(4) *Automatic waiver of DRE trial burn.* Owners and operators of boilers operated under the special operating requirements provided by § 266.110 are considered to be in compliance with the DRE standard of paragraph (a)(1) of this section and are exempt from the DRE trial burn.

(5) *Low risk waste.* Owners and operators of boilers or industrial furnaces that burn hazardous waste in compliance with the requirements of § 266.109(a) are considered to be in compliance with the DRE standard of paragraph (a)(1) of this section and are exempt from the DRE trial burn.

(b) *Carbon monoxide standard.* (1) Except as provided in paragraph (c) of this section, the stack gas concentration of carbon monoxide (CO) from a boiler or industrial furnace burning hazardous waste cannot exceed 100 ppmv on an hourly rolling average basis (i.e., over any 60 minute period), continuously corrected to 7 percent oxygen, dry gas basis.

(2) CO and oxygen shall be continuously monitored in conformance with ‘‘Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste’’ in appendix IX of this part.

(3) Compliance with the 100 ppmv CO limit must be demonstrated during the trial burn (for new facilities or an interim status facility applying for a permit) or the compliance test (for interim status facilities). To demonstrate compliance, the highest hourly rolling average CO level during any valid run of the trial burn or compliance test must not exceed 100 ppmv.

(c) *Alternative carbon monoxide standard.* (1) The stack gas concentration of carbon monoxide (CO) from a boiler or industrial furnace burning hazardous waste may exceed the 100 ppmv limit provided that stack gas concentrations of hydrocarbons (HC) do not exceed 20 ppmv, except as provided by paragraph (f) of this section for certain industrial furnaces.

(2) HC limits must be established under this section on an hourly rolling average basis (i.e., over any 60 minute period), reported as propane, and continuously corrected to 7 percent oxygen, dry gas basis.

(3) HC shall be continuously monitored in conformance with ‘‘Performance Specifications for Continuous Emission Monitoring of Hydrocarbons for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste’’ in appendix IX of this part. CO and oxygen shall be continuously monitored in conformance with paragraph (b)(2) of this section.

(4) The alternative CO standard is established based on CO data during the trial burn (for a new facility) and the compliance test (for an interim status facility). The alternative CO standard is the average over all valid runs of the highest hourly average CO level for each run. The CO limit is implemented on an hourly rolling average basis, and continuously corrected to 7 percent oxygen, dry gas basis.

(d) *Special requirements for furnaces.* Owners and operators of industrial furnaces (e.g., kilns, cupolas) that feed hazardous waste for a purpose other than solely as an ingredient (see § 266.103(a)(5)(ii)) at any location other than the end where products are normally discharged and where fuels are normally fired must comply with the hydrocarbon limits provided by paragraphs (c) or (f) of this section irrespective of whether stack gas CO concentrations meet the 100 ppmv limit of paragraph (b) of this section.

(e) *Controls for dioxins and furans.* Owners and operators of boilers and industrial furnaces that are equipped with a dry particulate matter control device that operates within the temperature range of 450–750 °F, and industrial furnaces operating under an alternative hydrocarbon limit established under paragraph (f) of this section must conduct a site-specific risk assessment as follows to demonstrate that emissions of chlorinated dibenzo-*p*-dioxins and dibenzofurans do not result in an increased lifetime cancer risk to the hypothetical maximum exposed individual (MEI) exceeding 1 in 100,000:

(1) During the trial burn (for new facilities or an interim status facility applying for a permit) or compliance test (for interim status facilities), determine emission rates of the tetra-octa congeners of chlorinated dibenzo-p-dioxins and dibenzofurans (CDDs/CDFs) using Method 0023A, Sampling Method for Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans Emissions from Stationary Sources, EPA Publication SW–846, as incorporated by reference in § 260.11 of this chapter.

(2) Estimate the 2,3,7,8-TCDD toxicity equivalence of the tetra-octa CDDs/CDFs congeners using ''Procedures for Estimating the Toxicity Equivalence of Chlorinated Dibenzo-p-Dioxin and Dibenzofuran Congeners'' in appendix IX of this part. Multiply the emission rates of CDD/CDF congeners with a toxicity equivalence greater than zero (see the procedure) by the calculated toxicity equivalence factor to estimate the equivalent emission rate of 2,3,7,8-TCDD;

(3) Conduct dispersion modeling using methods recommended in appendix W of part 51 of this chapter (''Guideline on Air Quality Models (Revised)'' (1986) and its supplements), the ''Hazardous Waste Combustion Air Quality Screening Procedure'', provided in appendix IX of this part, or in Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (incorporated by reference in § 260.11) to predict the maximum annual average off-site ground level concentration of 2,3,7,8–TCDD equivalents determined under paragraph (e)(2) of this section. The maximum annual average concentration must be used when a person resides on-site; and

(4) The ratio of the predicted maximum annual average ground level concentration of 2,3,7,8-TCDD equivalents to the risk-specific dose for 2,3,7,8-TCDD provided in appendix V of this part (2.2 X $10 - ^{-7}$) shall not exceed 1.0.

(f) *Monitoring CO and HC in the by-pass duct of a cement kiln.* Cement kilns may comply with the carbon monoxide and hydrocarbon limits provided by paragraphs (b), (c), and (d) of this section by monitoring in the by-pass duct provided that:

(1) Hazardous waste is fired only into the kiln and not at any location downstream from the kiln exit relative to the direction of gas flow; and

(2) The by-pass duct diverts a minimum of 10% of kiln off-gas into the duct.

(g) *Use of emissions test data to demonstrate compliance and establish operating limits.* Compliance with the requirements of this section must be demonstrated simultaneously by emissions testing or during separate runs under identical operating conditions. Further, data to demonstrate compliance with the CO and HC limits of this section or to establish alternative CO or HC limits under this section must be obtained during the time that DRE testing, and where applicable, CDD/CDF testing under paragraph (e) of this section and comprehensive organic emissions testing under paragraph (f) is conducted.

(h) *Enforcement.* For the purposes of permit enforcement, compliance with the operating requirements specified in the permit (under § 266.102) will be regarded as compliance with this section. However, evidence that compliance with those permit conditions is insufficient to ensure compliance with the requirements of this section may be ''information'' justifying modification or revocation and re-issuance of a permit under § 270.41 of this chapter.

[56 FR 7208, Feb. 21, 1991; 56 FR 32689, July 17, 1991, as amended at 57 FR 38565, Aug. 25, 1992; 58 FR 38883, July 20, 1993; 60 FR 33914, June 29, 1995; 62 FR 32463, June 13, 1997]

§ 266.105 Standards to control particulate matter.

(a) A boiler or industrial furnace burning hazardous waste may not emit particulate matter in excess of 180 milligrams per dry standard cubic meter (0.08 grains per dry standard cubic foot) after correction to a stack gas concentration of 7% oxygen, using procedures prescribed in 40 CFR part 60, appendix A, methods 1 through 5, and appendix IX of this part.

(b) An owner or operator meeting the requirements of § 266.109(b) for the low risk waste exemption is exempt from the particulate matter standard.

(c) For the purposes of permit enforcement, compliance with the operating requirements specified in the permit (under § 266.102) will be regarded as compliance with this section. However, evidence that compliance with those permit conditions is insufficient to ensure compliance with the requirements of this section may be ''information'' justifying modification or revocation and re-issuance of a permit under § 270.41 of this chapter.

§ 266.106 Standards to control metals emissions.

(a) *General.* The owner or operator must comply with the metals standards provided by paragraphs (b), (c), (d), (e), or (f) of this section for each metal listed in paragraph (b) of this section that is present in the hazardous waste at detectable levels using analytical procedures specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW–846), incorporated by reference in § 260.11 of this chapter.

(b) *Tier I feed rate screening limits.* Feed rate screening limits for metals are specified in appendix I of this part as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. Criteria for facilities that are not eligible to comply with the screening limits are provided in paragraph (b)(7) of this section.

(1) *Noncarcinogenic metals.* The feed rates of antimony, barium, lead, mercury, thallium, and silver in all feed streams, including hazardous waste, fuels, and industrial furnace feed stocks shall not exceed the screening limits specified in appendix I of this part.

(i) The feed rate screening limits for antimony, barium, mercury, thallium, and silver are based on either:

(A) An hourly rolling average as defined in § 266.102(e)(6)(i)(B); or

(B) An instantaneous limit not to be exceeded at any time.

(ii) The feed rate screening limit for lead is based on one of the following:

(A) An hourly rolling average as defined in § 266.102(e)(6)(i)(B);

(B) An averaging period of 2 to 24 hours as defined in § 266.102(e)(6)(ii) with an instantaneous feed rate limit not to exceed 10 times the feed rate that would be allowed on an hourly rolling average basis; or

(C) An instantaneous limit not to be exceeded at any time.

(2) *Carcinogenic metals.* (i) The feed rates of arsenic, cadmium, beryllium, and chromium in all feed streams, including hazardous waste, fuels, and industrial furnace feed stocks shall not exceed values derived from the screening limits specified in appendix I of this part. The feed rate of each of these metals is limited to a level such that the sum of the ratios of the actual feed rate to the feed rate screening limit specified in appendix I shall not exceed 1.0, as provided by the following equation:

$$\sum_{i=1}^{n} \frac{AFR_{(i)}}{FRSL_{(i)}} \leq 1.0$$

where:

n=number of carcinogenic metals

AFR=actual feed rate to the device for metal ''i''

FRSL=feed rate screening limit provided by appendix I of this part for metal ''i''.

(ii) The feed rate screening limits for the carcinogenic metals are based on either:

(A) An hourly rolling average; or

(B) An averaging period of 2 to 24 hours as defined in § 266.102(e)(6)(ii) with an instantaneous feed rate limit not to exceed 10 times the feed rate that would be allowed on an hourly rolling average basis.

(3) *TESH.* (i) The terrain-adjusted effective stack height is determined according to the following equation:

$$TESH=Ha+H1-Tr$$

where:

Ha=Actual physical stack height

H1=Plume rise as determined from appendix VI of this part as a function of stack flow rate and stack gas exhaust temperature.

Tr=Terrain rise within five kilometers of the stack.

(ii) The stack height (Ha) may not exceed good engineering practice as specified in 40 CFR 51.100(ii).

(iii) If the TESH for a particular facility is not listed in the table in the appendices, the nearest lower TESH listed in the table shall be used. If the TESH is four meters or less, a value of four meters shall be used.

(4) *Terrain type.* The screening limits are a function of whether the facility is located in noncomplex or complex terrain. A device located where any part of the surrounding terrain within 5 kilometers of the stack equals or exceeds the elevation of the physical stack height (Ha) is considered to be in complex terrain and the screening limits for complex terrain apply. Terrain measurements are to be made from U.S. Geological Survey 7.5-minute topographic maps of the area surrounding the facility.

(5) *Land use.* The screening limits are a function of whether the facility is located in an area where the land use is urban or rural. To determine whether land use in the vicinity of the facility is urban or rural, procedures provided in appendices IX or X of this part shall be used.

(6) *Multiple stacks.* Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator, or other thermal treatment unit subject to controls of metals emissions under a RCRA operating permit or interim status controls must comply with the screening limits for all such units assuming all hazardous waste is fed into the device with the worst-case stack based on dispersion characteristics. The worst-case stack is determined from the following equation 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 (m^3/second); and

T=exhaust temperature (°K).

The stack with the lowest value of K is the worst-case stack.

(7) *Criteria for facilities not eligible for screening limits.* If any criteria below are met, the Tier I and Tier II screening limits do not apply. Owners and operators of such facilities must comply with either the Tier III standards provided by paragraph (d) of this section or with the adjusted Tier I feed rate screening limits provided by paragraph (e) of this section.

(i) The device is located in a narrow valley less than one kilometer wide;

(ii) The device has a stack taller than 20 meters and is located such that the terrain rises to the physical height within one kilometer of the facility;

(iii) The device has a stack taller than 20 meters and is located within five kilometers of a shoreline of a large body of water such as an ocean or large lake;

(iv) The physical stack height of any stack is less than 2.5 times the height of any building within five building heights or five projected building widths of the stack and the distance from the stack to the closest boundary is within five building heights or five projected building widths of the associated building; or

(v) The Director determines that standards based on site-specific dispersion modeling are required.

(8) *Implementation.* The feed rate of metals in each feedstream must be monitored to ensure that the feed rate screening limits are not exceeded.

(c) *Tier II emission rate screening limits.* Emission rate screening limits are specified in appendix I as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. Criteria for facilities that are not eligible to comply with the screening limits are provided in paragraph (b)(7) of this section.

(1) *Noncarcinogenic metals.* The emission rates of antimony, barium, lead, mercury, thallium, and silver shall not exceed the screening limits specified in appendix I of this part.

(2) *Carcinogenic metals.* The emission rates of arsenic, cadmium, beryllium, and chromium shall not exceed values derived from the screening limits specified in appendix I of this part. The emission rate of each of these metals is

limited to a level such that the sum of the ratios of the actual emission rate to the emission rate screening limit specified in appendix I shall not exceed 1.0, as provided by the following equation:

$$\sum_{i=1}^{n} \frac{AER_{(i)}}{ERSL_{(i)}} \leq 1.0$$

where:

n=number of carcinogenic metals

AER=actual emission rate for metal ''i''

ERSL=emission rate screening limit provided by appendix I of this part for metal ''i''.

(3) *Implementation.* The emission rate limits must be implemented by limiting feed rates of the individual metals to levels during the trial burn (for new facilities or an interim status facility applying for a permit) or the compliance test (for interim status facilities). The feed rate averaging periods are the same as provided by paragraphs (b)(1)(i) and (ii) and (b)(2)(ii) of this section. The feed rate of metals in each feedstream must be monitored to ensure that the feed rate limits for the feedstreams specified under §§ 266.102 or 266.103 are not exceeded.

(4) *Definitions and limitations.* The definitions and limitations provided by paragraph (b) of this section for the following terms also apply to the Tier II emission rate screening limits provided by paragraph (c) of this section: terrain-adjusted effective stack height, good engineering practice stack height, terrain type, land use, and criteria for facilities not eligible to use the screening limits.

(5) *Multiple stacks.* (i) Owners and operators of facilities with more than one onsite stack from a boiler, industrial furnace, incinerator, or other thermal treatment unit subject to controls on metals emissions under a RCRA operating permit or interim status controls must comply with the emissions screening limits for any such stacks assuming all hazardous waste is fed into the device with the worst-case stack based on dispersion characteristics.

(ii) The worst-case stack is determined by procedures provided in paragraph (b)(6) of this section.

(iii) For each metal, the total emissions of the metal from those stacks shall not exceed the screening limit for the worst-case stack.

(d) *Tier III and Adjusted Tier I site-specific risk assessment.* The requirements of this paragraph apply to facilities complying with either the Tier III or Adjusted Tier I controls, except where specified otherwise.

(1) *General.* Conformance with the Tier III metals controls must be demonstrated by emissions testing to determine the emission rate for each metal. In addition, conformance with either the Tier III or Adjusted Tier I metals controls must be demonstrated by air dispersion modeling to predict the maximum annual average off-site ground level concentration for each dispersion modeling to predict the maximum annual average off-site ground level concentration for each metal, and a demonstration that acceptable ambient levels are not exceeded.

(2) *Acceptable ambient levels.* Appendices IV and V of this part list the acceptable ambient levels for purposes of this rule. Reference air concentrations (RACs) are listed for the noncarcinogenic metals and 10^{-5} risk-specific doses (RSDs) are listed for the carcinogenic metals. The RSD for a metal is the acceptable ambient level for that metal provided that only one of the four carcinogenic metals is emitted. If more than one carcinogenic metal is emitted, the acceptable ambient level for the carcinogenic metals is a fraction of the RSD as described in paragraph (d)(3) of this section.

(3) *Carcinogenic metals.* For the carcinogenic metals, arsenic, cadmium, beryllium, and chromium, the sum of the ratios of the predicted maximum annual average off-site ground level concentrations (except that on-site concentrations must be considered if a person resides on site) to the risk-specific dose (RSD) for all carcinogenic metals emitted shall not exceed 1.0 as determined by the following equation:

$$\sum_{i=1}^{n} \frac{\text{Predicted Ambient Concentration}_{(i)}}{\text{Risk-Specific Dose}_{(i)}} \leq 1.0$$

where: n=number of carcinogenic metals

(4) *Noncarcinogenic metals.* For the noncarcinogenic metals, the predicted maximum annual average off-site ground level concentration for each metal shall not exceed the reference air concentration (RAC).

(5) *Multiple stacks.* Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator, or other thermal treatment unit subject to controls on metals emissions under a RCRA operating permit or interim status controls must conduct emissions testing (except that facilities complying with Adjusted Tier I controls need not conduct emissions testing) and dispersion modeling to demonstrate that the aggregate emissions from all such on-site stacks do not result in an exceedance of the acceptable ambient levels.

(6) *Implementation.* Under Tier III, the metals controls must be implemented by limiting feed rates of the individual metals to levels during the trial burn (for new facilities or an interim status facility applying for a permit) or the compliance test (for interim status facilities). The feed rate averaging periods are the same as provided by paragraphs (b)(1) (i) and (ii) and (b)(2)(ii) of this section. The feed rate of metals in each feedstream must be monitored to ensure that the feed rate limits for the feedstreams specified under §§ 266.102 or 266.103 are not exceeded.

(e) *Adjusted Tier I feed rate screening limits.* The owner or operator may adjust the feed rate screening limits provided by appendix I of this part to account for site-specific dispersion modeling. Under this approach, the adjusted feed rate screening limit for a metal is determined by back-calculating from the acceptable ambient level provided by appendices IV and V of this part using dispersion modeling to determine the maximum allowable emission rate. This emission rate becomes the adjusted Tier I feed rate screening limit. The feed rate screening limits for carcinogenic metals are implemented as prescribed in paragraph (b)(2) of this section.

(f) *Alternative implementation approaches.* (1) The Director may approve on a case-by-case basis approaches to implement the Tier II or Tier III metals emission limits provided by paragraphs (c) or (d) of this section alternative to monitoring the feed rate of metals in each feedstream.

(2) The emission limits provided by paragraph (d) of this section must be determined as follows:

(i) For each noncarcinogenic metal, by back-calculating from the RAC provided in appendix IV of this part to determine the allowable emission rate for each metal using the dilution factor for the maximum annual average ground level concentration predicted by dispersion modeling in conformance with paragraph (h) of this section; and

(ii) For each carcinogenic metal by:

(A) Back-calculating from the RSD provided in appendix V of this part to determine the allowable emission rate for each metal if that metal were the only carcinogenic metal emitted using the dilution factor for the maximum annual average ground level concentration predicted by dispersion modeling in conformance with paragraph (h) of this section; and

(B) If more than one carcinogenic metal is emitted, selecting an emission limit for each carcinogenic metal not to exceed the emission rate determined by paragraph (f)(2)(ii)(A) of this section such that the sum for all carcinogenic metals of the ratios of the selected emission limit to the emission rate determined by that paragraph does not exceed 1.0.

(g) *Emission testing*—(1) *General.* Emission testing for metals shall be conducted using Method 0060, Determinations of Metals in Stack Emissions, EPA Publication SW–846, as incorporated by reference in § 260.11 of this chapter.

(2) *Hexavalent chromium.* Emissions of chromium are assumed to be hexavalent chromium unless the owner

or operator conducts emissions testing to determine hexavalent chromium emissions using procedures prescribed in Method 0061, Determination of Hexavalent Chromium Emissions from Stationary Sources, EPA Publication SW–846, as incorporated by reference in § 260.11 of this chapter.

(h) *Dispersion Modeling.* Dispersion modeling required under this section shall be conducted according to methods recommended in appendix W of part 51 of this chapter (''Guideline on Air Quality Models (Revised)'' (1986) and its supplements), the ''Hazardous Waste Combustion Air Quality Screening Procedure'', provided in appendix IX of this part, or in Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (incorporated by reference in § 260.11) to predict the maximum annual average off-site ground level concentration. However, on-site concentrations must be considered when a person resides onsite.

(i) *Enforcement.* For the purposes of permit enforcement, compliance with the operating requirements specified in the permit (under § 266.102) will be regarded as compliance with this section. However, evidence that compliance with those permit conditions is insufficient to ensure compliance with the requirements of this section may be ''information'' justifying modification or revocation and re-issuance of a permit under § 270.41 of this chapter.

[56 FR 7208, Feb. 21, 1991; 56 FR 32689, July 17, 1991; 57 FR 38565, Aug. 25, 1992; 58 FR 38883, July 20, 1993; 62 FR 32463, June 13, 1997]

§ 266.107 Standards to control hydrogen chloride (HCl) and chlorine gas (Cl_2) emissions.

(a) *General.* The owner or operator must comply with the hydrogen chloride (HCl) and chlorine (Cl_2) controls provided by paragraph (b), (c), or (e) of this section.

(b) *Screening limits*—(1) *Tier I feed rate screening limits.* Feed rate screening limits are specified for total chlorine in appendix II of this part as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. The feed rate of total chlorine and chloride, both organic and inorganic, in all feed streams, including hazardous waste, fuels, and industrial furnace feed stocks shall not exceed the levels specified.

(2) *Tier II emission rate screening limits.* Emission rate screening limits for HCl and Cl_2 are specified in appendix III of this part as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. The stack emission rates of HCl and Cl_2 shall not exceed the levels specified.

(3) *Definitions and limitations.* The definitions and limitations provided by § 266.106(b) for the following terms also apply to the screening limits provided by this paragraph: terrain-adjusted effective stack height, good engineering practice stack height, terrain type, land use, and criteria for facilities not eligible to use the screening limits.

(4) *Multiple stacks.* Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator, or other thermal treatment unit subject to controls on HCl or Cl_2 emissions under a RCRA operating permit or interim status controls must comply with the Tier I and Tier II screening limits for those stacks assuming all hazardous waste is fed into the device with the worst-case stack based on dispersion characteristics.

(i) The worst-case stack is determined by procedures provided in § 266.106(b)(6).

(ii) Under Tier I, the total feed rate of chlorine and chloride to all subject devices shall not exceed the screening limit for the worst-case stack.

(iii) Under Tier II, the total emissions of HCl and Cl_2 from all subject stacks shall not exceed the screening limit for the worst-case stack.

(c) *Tier III site-specific risk assessments*—(1) *General.* Conformance with the Tier III controls must be demonstrated by emissions testing to determine the emission rate for HCl and Cl_2, air dispersion modeling to predict the maximum annual average off-site ground level concentration for each compound, and a demonstration that acceptable ambient levels are not exceeded.

(2) *Acceptable ambient levels.* Appendix IV of this part lists the reference air

concentrations (RACs) for HCl (7 micrograms per cubic meter) and Cl_2 (0.4 micrograms per cubic meter).

(3) *Multiple stacks.* Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator, or other thermal treatment unit subject to controls on HCl or Cl_2 emissions under a RCRA operating permit or interim status controls must conduct emissions testing and dispersion modeling to demonstrate that the aggregate emissions from all such on-site stacks do not result in an exceedance of the acceptable ambient levels for HCl and Cl_2.

(d) *Averaging periods.* The HCl and Cl_2 controls are implemented by limiting the feed rate of total chlorine and chloride in all feedstreams, including hazardous waste, fuels, and industrial furnace feed stocks. Under Tier I, the feed rate of total chloride and chlorine is limited to the Tier I Screening Limits. Under Tier II and Tier III, the feed rate of total chloride and chlorine is limited to the feed rates during the trial burn (for new facilities or an interim status facility applying for a permit) or the compliance test (for interim status facilities). The feed rate limits are based on either:

(1) An hourly rolling average as defined in § 266.102(e)(6); or

(2) An instantaneous basis not to be exceeded at any time.

(e) *Adjusted Tier I feed rate screening limits.* The owner or operator may adjust the feed rate screening limit provided by appendix II of this part to account for site-specific dispersion modeling. Under this approach, the adjusted feed rate screening limit is determined by back-calculating from the acceptable ambient level for Cl_2 provided by appendix IV of this part using dispersion modeling to determine the maximum allowable emission rate. This emission rate becomes the adjusted Tier I feed rate screening limit.

(f) *Emissions testing.* Emissions testing for HCl and Cl_2 shall be conducted using the procedures described in Methods 0050 or 0051, EPA Publication SW–846, as incorporated by reference in § 260.11 of this chapter.

(g) *Dispersion modeling.* Dispersion modeling shall be conducted according to the provisions of § 266.106(h).

(h) *Enforcement.* For the purposes of permit enforcement, compliance with the operating requirements specified in the permit (under § 266.102) will be regarded as compliance with this section. However, evidence that compliance with those permit conditions is insufficient to ensure compliance with the requirements of this section may be ‘‘information’’ justifying modification or revocation and re-issuance of a permit under § 270.41 of this chapter.

[56 FR 7208, Feb. 21, 1991; 56 FR 32690, July 17, 1991; 57 FR 38566, Aug. 25, 1992; 62 FR 32463, June 13, 1997]

§ 266.108 Small quantity on-site burner exemption.

(a) *Exempt quantities.* Owners and operators of facilities that burn hazardous waste in an on-site boiler or industrial furnace are exempt from the requirements of this subpart provided that:

(1) The quantity of hazardous waste burned in a device for a calendar month does not exceed the limits provided in the following table based on the terrain-adjusted effective stack height as defined in § 266.106(b)(3):

EXEMPT QUANTITIES FOR SMALL QUANTITY BURNER EXEMPTION

Terrain-adjusted effective stack height of device (meters)	Allowable hazardous waste burning rate (gallons/month)	Terrain-adjusted effective stack height of device (meters)	Allowable hazardous waste burning rate (gallons/month)
0 to 3.9	0	40.0 to 44.9	210
4.0 to 5.9	13	45.0 to 49.9	260
6.0 to 7.9	18	50.0 to 54.9	330
8.0 to 9.9	27	55.0 to 59.9	400
10.0 to 11.9	40	60.0 to 64.9	490
12.0 to 13.9	48	65.0 to 69.9	610
14.0 to 15.9	59	70.0 to 74.9	680
16.0 to 17.9	69	75.0 to 79.9	760
18.0 to 19.9	76	80.0 to 84.9	850
20.0 to 21.9	84	85.0 to 89.9	960
22.0 to 23.9	93	90.0 to 94.9	1,100
24.0 to 25.9	100	95.0 to 99.9	1,200
26.0 to 27.9	110	100.0 to 104.9	1,300
28.0 to 29.9	130	105.0 to 109.9	1,500
30.0 to 34.9	140	110.0 to 114.9	1,700
35.0 to 39.9	170	115.0 or greater	1,900

(2) The maximum hazardous waste firing rate does not exceed at any time 1 percent of the total fuel requirements for the device (hazardous waste plus other fuel) on a total heat input or

mass input basis, whichever results in the lower mass feed rate of hazardous waste.

(3) The hazardous waste has a minimum heating value of 5,000 Btu/lb, as generated; and

(4) The hazardous waste fuel does not contain (and is not derived from) EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, or F027.

(b) *Mixing with nonhazardous fuels.* If hazardous waste fuel is mixed with a nonhazardous fuel, the quantity of hazardous waste before such mixing is used to comply with paragraph (a).

(c) *Multiple stacks.* If an owner or operator burns hazardous waste in more than one on-site boiler or industrial furnace exempt under this section, the quantity limits provided by paragraph (a)(1) of this section are implemented according to the following equation:

$$\sum_{i=1}^{n} \frac{\text{Actual Quantity Burned}_{(i)}}{\text{Allowable Quantity Burned}_{(i)}} \leq 1.0$$

where:

n means the number of stacks;

Actual Quantity Burned means the waste quantity burned per month in device ‘‘i’’;

Allowable Quantity Burned means the maximum allowable exempt quantity for stack ‘‘i’’ from the table in (a)(1) above.

NOTE: Hazardous wastes that are subject to the special requirements for small quantity generators under § 261.5 of this chapter may be burned in an off-site device under the exemption provided by § 266.108, but must be included in the quantity determination for the exemption.

(d) *Notification requirements.* The owner or operator of facilities qualifying for the small quantity burner exemption under this section must provide a one-time signed, written notice to EPA indicating the following:

(1) The combustion unit is operating as a small quantity burner of hazardous waste;

(2) The owner and operator are in compliance with the requirements of this section; and

(3) The maximum quantity of hazardous waste that the facility may burn per month as provided by § 266.108(a)(1).

(e) *Recordkeeping requirements.* The owner or operator must maintain at the facility for at least three years sufficient records documenting compliance with the hazardous waste quantity, firing rate, and heating value limits of this section. At a minimum, these records must indicate the quantity of hazardous waste and other fuel burned in each unit per calendar month, and the heating value of the hazardous waste.

[56 FR 7208, Feb. 21, 1991; 56 FR 32690, July 17, 1991, as amended at 56 FR 42515, Aug. 27, 1991; 57 FR 38566, Aug. 25, 1992]

§ 266.109 Low risk waste exemption.

(a) *Waiver of DRE standard.* The DRE standard of § 266.104(a) does not apply if the boiler or industrial furnace is operated in conformance with (a)(1) of this section and the owner or operator demonstrates by procedures prescribed in (a)(2) of this section that the burning will not result in unacceptable adverse health effects.

(1) The device shall be operated as follows:

(i) A minimum of 50 percent of fuel fired to the device shall be fossil fuel, fuels derived from fossil fuel, tall oil, or, if approved by the Director on a case-by-case basis, other nonhazardous fuel with combustion characteristics comparable to fossil fuel. Such fuels are termed ‘‘primary fuel’’ for purposes of this section. (Tall oil is a fuel derived from vegetable and rosin fatty acids.) The 50 percent primary fuel firing rate shall be determined on a total heat or mass input basis, whichever results in the greater mass feed rate of primary fuel fired;

(ii) Primary fuels and hazardous waste fuels shall have a minimum as-fired heating value of 8,000 Btu/lb;

(iii) The hazardous waste is fired directly into the primary fuel flame zone of the combustion chamber; and

(iv) The device operates in conformance with the carbon monoxide controls provided by § 266.104(b)(1). Devices subject to the exemption provided by this section are not eligible for the alternative carbon monoxide controls provided by § 266.104(c).

(2) Procedures to demonstrate that the hazardous waste burning will not pose unacceptable adverse public health effects are as follows:

(i) Identify and quantify those nonmetal compounds listed in appendix VIII, part 261 of this chapter that could reasonably be expected to be present in the hazardous waste. The constituents excluded from analysis must be identified and the basis for their exclusion explained;

(ii) Calculate reasonable, worst case emission rates for each constitutent identified in paragraph (a)(2)(i) of this section by assuming the device achieves 99.9 percent destruction and removal efficiency. That is, assume that 0.1 percent of the mass weight of each constitutent fed to the device is emitted.

(iii) For each constituent identified in paragraph (a)(2)(i) of this section, use emissions dispersion modeling to predict the maximum annual average ground level concentration of the constituent.

(A) Dispersion modeling shall be conducted using methods specified in §266.106(h).

(B) Owners and operators of facilities with more than one on-site stack from a boiler or industrial furnace that is exempt under this section must conduct dispersion modeling of emissions from all stacks exempt under this section to predict ambient levels prescribed by this paragraph.

(iv) Ground level concentrations of constituents predicted under paragraph (a)(2)(iii) of this section must not exceed the following levels:

(A) For the noncarcinogenic compounds listed in appendix IV of this part, the levels established in appendix IV;

(B) For the carcinogenic compounds listed in appendix V of this part, the sum for all constituents of the ratios of the actual ground level concentration to the level established in appendix V cannot exceed 1.0; and

(C) For constituents not listed in appendix IV or V, 0.1 micrograms per cubic meter.

(b) *Waiver of particular matter standard.* The particulate matter standard of §266.105 does not apply if:

(1) The DRE standard is waived under paragraph (a) of this section; and

(2) The owner or operator complies with the Tier I or adjusted Tier I metals feed rate screening limits provided by §266.106 (b) or (e).

[56 FR 7208, Feb. 21, 1991; 56 FR 32690, July 17, 1991, as amended at 56 FR 42515, Aug. 27, 1991]

§266.110 Waiver of DRE trial burn for boilers.

Boilers that operate under the special requirements of this section, and that do not burn hazardous waste containing (or derived from) EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, or F027, are considered to be in conformance with the DRE standard of §266.104(a), and a trial burn to demonstrate DRE is waived. When burning hazardous waste:

(a) A minimum of 50 percent of fuel fired to the device shall be fossil fuel, fuels derived from fossil fuel, tall oil, or, if approved by the Director on a case-by-case basis, other nonhazardous fuel with combustion characteristics comparable to fossil fuel. Such fuels are termed ‘‘primary fuel’’ for purposes of this section. (Tall oil is a fuel derived from vegetable and rosin fatty acids.) The 50 percent primary fuel firing rate shall be determined on a total heat or mass input basis, whichever results in the greater mass feed rate of primary fuel fired;

(b) Boiler load shall not be less than 40 percent. Boiler load is the ratio at any time of the total heat input to the maximum design heat input;

(c) Primary fuels and hazardous waste fuels shall have a minimum as-fired heating value of 8,000 Btu/lb, and each material fired in a burner where hazardous waste is fired must have a heating value of at least 8,000 Btu/lb, as-fired;

(d) The device shall operate in conformance with the carbon monoxide standard provided by §266.104(b)(1). Boilers subject to the waiver of the DRE trial burn provided by this section are not eligible for the alternative carbon monoxide standard provided by §266.104(c);

(e) The boiler must be a watertube type boiler that does not feed fuel using a stoker or stoker type mechanism; and

(f) The hazardous waste shall be fired directly into the primary fuel flame zone of the combustion chamber with an air or steam atomization firing system, mechanical atomization system, or a rotary cup atomization system under the following conditions:

(1) *Viscosity*. The viscosity of the hazardous waste fuel as-fired shall not exceed 300 SSU;

(2) *Particle size*. When a high pressure air or steam atomizer, low pressure atomizer, or mechanical atomizer is used, 70% of the hazardous waste fuel must pass through a 200 mesh (74 micron) screen, and when a rotary cup atomizer is used, 70% of the hazardous waste must pass through a 100 mesh (150 micron) screen;

(3) *Mechanical atomization systems*. Fuel pressure within a mechanical atomization system and fuel flow rate shall be maintained within the design range taking into account the viscosity and volatility of the fuel;

(4) *Rotary cup atomization systems*. Fuel flow rate through a rotary cup atomization system must be maintained within the design range taking into account the viscosity and volatility of the fuel.

[56 FR 7208, Feb. 21, 1991; 56 FR 32690, July 17, 1991, as amended at 56 FR 42515, Aug. 27, 1991]

§ 266.111 Standards for direct transfer.

(a) *Applicability*. The regulations in this section apply to owners and operators of boilers and industrial furnaces subject to §§ 266.102 or 266.103 if hazardous waste is directly transferred from a transport vehicle to a boiler or industrial furnace without the use of a storage unit.

(b) *Definitions*. (1) When used in this section, the following terms have the meanings given below:

Direct transfer equipment means any device (including but not limited to, such devices as piping, fittings, flanges, valves, and pumps) that is used to distribute, meter, or control the flow of hazardous waste between a container (i.e., transport vehicle) and a boiler or industrial furnace.

Container means any portable device in which hazardous waste is transported, stored, treated, or otherwise handled, and includes transport vehicles that are containers themselves (e.g., tank trucks, tanker-trailers, and rail tank cars), and containers placed on or in a transport vehicle.

(2) This section references several requirements provided in subparts I and J of parts 264 and 265. For purposes of this section, the term ‘‘tank systems’’ in those referenced requirements means direct transfer equipment as defined in paragraph (b)(1) of this section.

(c) *General operating requirements*. (1) No direct transfer of a pumpable hazardous waste shall be conducted from an open-top container to a boiler or industrial furnace.

(2) Direct transfer equipment used for pumpable hazardous waste shall always be closed, except when necessary to add or remove the waste, and shall not be opened, handled, or stored in a manner that may cause any rupture or leak.

(3) The direct transfer of hazardous waste to a boiler or industrial furnace shall be conducted so that it does not:

(i) Generate extreme heat or pressure, fire, explosion, or violent reaction;

(ii) Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health;

(iii) Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;

(iv) Damage the structural integrity of the container or direct transfer equipment containing the waste;

(v) Adversely affect the capability of the boiler or industrial furnace to meet the standards provided by §§ 266.104 through 266.107; or

(vi) Threaten human health or the environment.

(4) Hazardous waste shall not be placed in direct transfer equipment, if it could cause the equipment or its secondary containment system to rupture, leak, corrode, or otherwise fail.

(5) The owner or operator of the facility shall use appropriate controls and practices to prevent spills and overflows from the direct transfer equipment or its secondary containment systems. These include at a minimum:

(i) Spill prevention controls (e.g., check valves, dry discount couplings); and

(ii) Automatic waste feed cutoff to use if a leak or spill occurs from the direct transfer equipment.

(d) *Areas where direct transfer vehicles (containers) are located*. Applying the definition of container under this section, owners and operators must comply with the following requirements:

(1) The containment requirements of § 264.175 of this chapter;

(2) The use and management requirements of subpart I, part 265 of this chapter, except for §§ 265.170 and 265.174, and except that in lieu of the special requirements of § 265.176 for ignitable or reactive waste, the owner or operator may comply with the requirements for the maintenance of protective distances between the waste management area and any public ways, streets, alleys, or an adjacent property line that can be built upon as required in Tables 2–1 through 2–6 of the National Fire Protection Association's (NFPA) ''Flammable and Combustible Liquids Code,'' (1977 or 1981), (incorporated by reference, see § 260.11). The owner or operator must obtain and keep on file at the facility a written certification by the local Fire Marshall that the installation meets the subject NFPA codes; and

(3) The closure requirements of § 264.178 of this chapter.

(e) *Direct transfer equipment.* Direct transfer equipment must meet the following requirements:

(1) *Secondary containment.* Owners and operators shall comply with the secondary containment requirements of § 265.193 of this chapter, except for paragraphs 265.193 (a), (d), (e), and (i) as follows:

(i) For all new direct transfer equipment, prior to their being put into service; and

(ii) For existing direct transfer equipment within 2 years after August 21, 1991.

(2) *Requirements prior to meeting secondary containment requirements.* (i) For existing direct transfer equipment that does not have secondary containment, the owner or operator shall determine whether the equipment is leaking or is unfit for use. The owner or operator shall obtain and keep on file at the facility a written assessment reviewed and certified by a qualified, registered professional engineer in accordance with § 270.11(d) of this chapter that attests to the equipment's integrity by August 21, 1992.

(ii) This assessment shall determine whether the direct transfer equipment is adequately designed and has sufficient structural strength and compatibility with the waste(s) to be transferred to ensure that it will not collapse, rupture, or fail. At a minimum, this assessment shall consider the following:

(A) Design standard(s), if available, according to which the direct transfer equipment was constructed;

(B) Hazardous characteristics of the waste(s) that have been or will be handled;

(C) Existing corrosion protection measures;

(D) Documented age of the equipment, if available, (otherwise, an estimate of the age); and

(E) Results of a leak test or other integrity examination such that the effects of temperature variations, vapor pockets, cracks, leaks, corrosion, and erosion are accounted for.

(iii) If, as a result of the assessment specified above, the direct transfer equipment is found to be leaking or unfit for use, the owner or operator shall comply with the requirements of §§ 265.196 (a) and (b) of this chapter.

(3) *Inspections and recordkeeping.* (i) The owner or operator must inspect at least once each operating hour when hazardous waste is being transferred from the transport vehicle (container) to the boiler or industrial furnace:

(A) Overfill/spill control equipment (e.g., waste-feed cutoff systems, bypass systems, and drainage systems) to ensure that it is in good working order;

(B) The above ground portions of the direct transfer equipment to detect corrosion, erosion, or releases of waste (e.g., wet spots, dead vegetation); and

(C) Data gathered from monitoring equipment and leak-detection equipment, (e.g., pressure and temperature gauges) to ensure that the direct transfer equipment is being operated according to its design.

(ii) The owner or operator must inspect cathodic protection systems, if used, to ensure that they are functioning properly according to the schedule provided by § 265.195(b) of this chapter:

(iii) Records of inspections made under this paragraph shall be maintained in the operating record at the facility, and available for inspection for at least 3 years from the date of the inspection.

(4) *Design and installation of new ancillary equipment.* Owners and operators

must comply with the requirements of § 265.192 of this chapter.

(5) *Response to leaks or spills.* Owners and operators must comply with the requirements of § 265.196 of this chapter.

(6) *Closure.* Owners and operators must comply with the requirements of § 265.197 of this chapter, except for § 265.197 (c)(2) through (c)(4).

[50 FR 666, Jan. 4, 1985, as amended at 56 FR 42515, Aug. 27, 1991]

§ 266.112 Regulation of residues.

A residue derived from the burning or processing of hazardous waste in a boiler or industrial furnace is not excluded from the definition of a hazardous waste under § 261.4(b) (4), (7), or (8) unless the device and the owner or operator meet the following requirements:

(a) The device meets the following criteria:

(1) *Boilers.* Boilers must burn at least 50% coal on a total heat input or mass input basis, whichever results in the greater mass feed rate of coal;

(2) *Ore or mineral furnaces.* Industrial furnaces subject to § 261.4(b)(7) must process at least 50% by weight normal, nonhazardous raw materials;

(3) *Cement kilns.* Cement kilns must process at least 50% by weight normal cement-production raw materials;

(b) The owner or operator demonstrates that the hazardous waste does not significantly affect the residue by demonstrating conformance with either of the following criteria:

(1) *Comparison of waste-derived residue with normal residue.* The waste-derived residue must not contain appendix VIII, part 261 constituents (toxic constituents) that could reasonably be attributable to the hazardous waste at concentrations significantly higher than in residue generated without burning or processing of hazardous waste, using the following procedure. Toxic compounds that could reasonably be attributable to burning or processing the hazardous waste (constituents of concern) include toxic constituents in the hazardous waste, and the organic compounds listed in appendix VIII of this part that may be generated as products of incomplete combustion. Sampling and analyses shall be in conformance with procedures prescribed in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* incorporated by reference in § 260.11(a) of this chapter.

(i) *Normal residue.* Concentrations of toxic constituents of concern in normal residue shall be determined based on analyses of a minimum of 10 samples representing a minimum of 10 days of operation. Composite samples may be used to develop a sample for analysis provided that the compositing period does not exceed 24 hours. The upper tolerance limit (at 95% confidence with a 95% proportion of the sample distribution) of the concentration in the normal residue shall be considered the statistically-derived concentration in the normal residue. If changes in raw materials or fuels reduce the statistically-derived concentrations of the toxic constituents of concern in the normal residue, the statistically-derived concentrations must be revised or statistically-derived concentrations of toxic constituents in normal residue must be established for a new mode of operation with the new raw material or fuel. To determine the upper tolerance limit in the normal residue, the owner or operator shall use statistical procedures prescribed in ‘‘Statistical Methodology for Bevill Residue Determinations’’ in appendix IX of this part.

(ii) *Waste-derived residue.* Waste-derived residue shall be sampled and analyzed as often as necessary to determine whether the residue generated during each 24-hour period has concentrations of toxic constituents that are higher than the concentrations established for the normal residue under paragraph (b)(1)(i) of this section. If so, hazardous waste burning has significantly affected the residue and the residue shall not be excluded from the definition of a hazardous waste. Concentrations of toxic constituents of concern in the waste-derived residue shall be determined based on analysis of one or more samples obtained over a 24-hour period. Multiple samples may be analyzed, and multiple samples may be taken to form a composite sample for analysis provided that the sampling period does not exceed 24 hours. If more than one sample is analyzed to characterize waste-derived residues generated over a 24-hour period, the concentration of each toxic constituent shall be the arithmetic mean of the concentrations in the samples. No results may be disregarded; or

(2) *Comparison of waste-derived residue concentrations with health-based limits*—(i) *Nonmetal constituents.* The concentration of each nonmetal toxic constituent of concern (specified in paragraph (b)(1) of this section) in the waste-derived residue must not exceed the health-based level specified in appendix VII of this part, or the level of detection (using analytical procedures prescribed in SW–846), whichever is higher. If a health-based limit for a constituent of concern is not listed in appendix VII of this part, then a limit of 0.002 micrograms per kilogram or the level of detection (using analytical procedures prescribed in SW–846), whichever is higher, shall be used. The levels specified in appendix VII of this part (and the default level of 0.002 micrograms per kilogram or the level of detection for constituents as identified in Note 1 of appendix VII of this chapter) are administratively stayed under the condition, for those constituents specified in paragraph (b)(1) of this section, that the owner or operator complies with alternative levels defined as the land disposal restriction limits specified in § 268.43 of this chapter for FO39 nonwastewaters. In complying with those alternative levels, if an owner or operator is unable to detect a constituent despite documenting use of best good-faith efforts as defined by applicable Agency guidance or standards, the owner or operator is deemed to be in compliance for that constituent. Until new guidance or standards are developed, the owner or operator may demonstrate such good-faith efforts by achieving a detection limit for the constituent that does not exceed an order of magnitude above the level provided by § 268.43 for FO39 nonwastewaters. The stay will remain in effect until further administrative action is taken and notice is published in the FEDERAL REGISTER and the Code of Federal Regulations; and

(ii) *Metal constituents.* The concentration of metals in an extract obtained using the Toxicity Characteristic Leaching Procedure of § 261.24 of this chapter must not exceed the levels specified in appendix VII of this part; and

(iii) *Sampling and analysis.* Waste-derived residue shall be sampled and analyzed as often as necessary to determine whether the residue generated during each 24-hour period has concentrations of toxic constituents that are higher than the health-based levels. Concentrations of toxic constituents of concern in the waste-derived residue shall be determined based on analysis of one or more samples obtained over a 24-hour period. Multiple samples may be analyzed, and multiple samples may be taken to form a composite sample for analysis provided that the sampling period does not exceed 24 hours. If more than one sample is analyzed to characterize waste-derived residues generated over a 24-hour period, the concentration of each toxic constituent shall be the arithmetic mean of the concentrations in the samples. No results may be disregarded; and

(c) Records sufficient to document compliance with the provisions of this section shall be retained until closure of the boiler or industrial furnace unit. At a minimum, the following shall be recorded.

(1) Levels of constituents in appendix VIII, part 261, that are present in waste-derived residues;

(2) If the waste-derived residue is compared with normal residue under paragraph (b)(1) of this section:

(i) The levels of constituents in appendix VIII, part 261, that are present in normal residues; and

(ii) Data and information, including analyses of samples as necessary, obtained to determine if changes in raw materials or fuels would reduce the concentration of toxic constituents of concern in the normal residue.

[50 FR 666, Jan. 4, 1985, as amended at 56 FR 42516, Aug. 27, 1991; 57 FR 38566, Aug. 25, 1992; 58 FR 59602, Nov. 9, 1993]

Subparts I–L [Reserved]

Subpart M—Military Munitions

SOURCE: 62 FR 6654, Feb. 12, 1997, unless otherwise noted.

§ 266.200 Applicability.

(a) The regulations in this subpart identify when military munitions become a solid waste, and, if these wastes are also hazardous under this subpart or 40 CFR part 261, the management standards that apply to these wastes.

(b) Unless otherwise specified in this subpart, all applicable requirements in 40 CFR parts 260 through 270 apply to waste military munitions.

§ 266.201 Definitions.

In addition to the definitions in 40 CFR 260.10, the following definitions apply to this subpart:

Active range means a military range that is currently in service and is being regularly used for range activities.

Chemical agents and munitions are defined as in 50 U.S.C. section 1521(j)(1).

Director is as defined in 40 CFR 270.2.

Explosives or munitions emergency response specialist is as defined in 40 CFR 260.10.

Explosives or munitions emergency is as defined in 40 CFR 260.10.

Explosives or munitions emergency response is as defined in 40 CFR 260.10.

Inactive range means a military range that is not currently being used, but that is still under military control and considered by the military to be a potential range area, and that has not been put to a new use that is incompatible with range activities.

Military means the Department of Defense (DOD), the Armed Services, Coast Guard, National Guard, Department of Energy (DOE), or other parties under contract or acting as an agent for the foregoing, who handle military munitions.

Military munitions is as defined in 40 CFR 260.10.

Military range means designated land and water areas set aside, managed, and used to conduct research on, develop, test, and evaluate military munitions and explosives, other ordnance, or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas.

Unexploded ordnance (UXO) means military munitions that have been primed, fused, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and remain unexploded either by malfunction, design, or any other cause.

§ 266.202 Definition of solid waste.

(a) A military munition is not a solid waste when:

(1) Used for its intended purpose, including:

(i) Use in training military personnel or explosives and munitions emergency response specialists (including training in proper destruction of unused propellant or other munitions); or

(ii) Use in research, development, testing, and evaluation of military munitions, weapons, or weapon systems; or

(iii) Recovery, collection, and on-range destruction of unexploded ordnance and munitions fragments during range clearance activities at active or inactive ranges. However, ‘‘use for intended purpose’’ does not include the on-range disposal or burial of unexploded ordnance and contaminants when the burial is not a result of product use.

(2) An unused munition, or component thereof, is being repaired, reused, recycled, reclaimed, disassembled, reconfigured, or otherwise subjected to materials recovery activities, unless such activities involve use constituting disposal as defined in 40 CFR 261.2(c)(1), or burning for energy recovery as defined in 40 CFR 261.2(c)(2).

(b) An unused military munition is a solid waste when any of the following occurs:

(1) The munition is abandoned by being disposed of, burned, detonated (except during intended use as specified in paragraph (a) of this section), incinerated, or treated prior to disposal; or

(2) The munition is removed from storage in a military magazine or other storage area for the purpose of being disposed of, burned, or incinerated, or treated prior to disposal, or

(3) The munition is deteriorated or damaged (e.g., the integrity of the munition is compromised by cracks, leaks, or other damage) to the point

that it cannot be put into serviceable condition, and cannot reasonably be recycled or used for other purposes; or

(4) The munition has been declared a solid waste by an authorized military official.

(c) A used or fired military munition is a solid waste:

(1) When transported off range or from the site of use, where the site of use is not a range, for the purposes of storage, reclamation, treatment, disposal, or treatment prior to disposal; or

(2) If recovered, collected, and then disposed of by burial, or landfilling either on or off a range.

(d) For purposes of RCRA section 1004(27), a used or fired military munition is a solid waste, and, therefore, is potentially subject to RCRA corrective action authorities under sections 3004(u) and (v), and 3008(h), or imminent and substantial endangerment authorities under section 7003, if the munition lands off-range and is not promptly rendered safe and/or retrieved. Any imminent and substantial threats associated with any remaining material must be addressed. If remedial action is infeasible, the operator of the range must maintain a record of the event for as long as any threat remains. The record must include the type of munition and its location (to the extent the location is known).

§ 266.203 Standards applicable to the transportation of solid waste military munitions.

(a) *Criteria for hazardous waste regulation of waste non-chemical military munitions in transportation.* (1) Waste military munitions that are being transported and that exhibit a hazardous waste characteristic or are listed as hazardous waste under 40 CFR part 261, are listed or identified as a hazardous waste (and thus are subject to regulation under 40 CFR parts 260 through 270), unless all the following conditions are met:

(i) The waste military munitions are not chemical agents or chemical munitions;

(ii) The waste military munitions must be transported in accordance with the Department of Defense shipping controls applicable to the transport of military munitions;

(iii) The waste military munitions must be transported from a military owned or operated installation to a military owned or operated treatment, storage, or disposal facility; and

(iv) The transporter of the waste must provide oral notice to the Director within 24 hours from the time the transporter becomes aware of any loss or theft of the waste military munitions, or any failure to meet a condition of paragraph (a)(1) of this section that may endanger health or the environment. In addition, a written submission describing the circumstances shall be provided within 5 days from the time the transporter becomes aware of any loss or theft of the waste military munitions or any failure to meet a condition of paragraph (a)(1) of this section.

(2) If any waste military munitions shipped under paragraph (a)(1) of this section are not received by the receiving facility within 45 days of the day the waste was shipped, the owner or operator of the receiving facility must report this non-receipt to the Director within 5 days.

(3) The exemption in paragraph (a)(1) of this section from regulation as hazardous waste shall apply only to the transportation of non-chemical waste military munitions. It does not affect the regulatory status of waste military munitions as hazardous wastes with regard to storage, treatment or disposal.

(4) The conditional exemption in paragraph (a)(1) of this section applies only so long as all of the conditions in paragraph (a)(1) of this section are met.

(b) *Reinstatement of exemption.* If any waste military munition loses its exemption under paragraph (a)(1) of this section, an application may be filed with the Director for reinstatement of the exemption from hazardous waste transportation regulation with respect to such munition as soon as the munition is returned to compliance with the conditions of paragraph (a)(1) of this section. If the Director finds that reinstatement of the exemption is appropriate based on factors such as the transporter's provision of a satisfactory explanation of the circumstances of the violation, or a demonstration that the violations are not likely to recur, the Director may reinstate the exemption under paragraph (a)(1) of this section. If the Director does not take action on the reinstatement application within 60 days after receipt of the application, then reinstatement shall be deemed granted, retroactive to the date of the application. However, the Director may terminate a conditional exemption reinstated by default in the preceding sentence if the Director finds that reinstatement is inappropriate based on factors such as the transporter's failure to provide a satisfactory explanation of the circumstances of the violation, or failure to demonstrate that the violations are not likely to recur. In reinstating the exemption under paragraph (a)(1) of this section, the Director may specify additional conditions as are necessary to ensure and document proper transportation to protect human health and the environment.

(c) *Amendments to DOD shipping controls.* The Department of Defense shipping controls applicable to the transport of military munitions referenced in paragraph (a)(1)(ii) of this section are Government Bill of Lading (GBL) (GSA Standard Form 1109), requisition tracking form DD Form 1348, the Signature and Talley Record (DD Form 1907), Special Instructions for Motor Vehicle Drivers (DD Form 836), and the Motor Vehicle Inspection Report (DD Form 626) in effect on November 8, 1995, except as provided in the following sentence. Any amendments to the Department of Defense shipping controls shall become effective for purposes of paragraph (a)(1) of this section on the date the Department of Defense publishes notice in the FEDERAL REGISTER that the shipping controls referenced in paragraph (a)(1)(ii) of this section have been amended.

§ 266.204 Standards applicable to emergency responses.

Explosives and munitions emergencies involving military munitions or explosives are subject to 40 CFR 262.10(i), 263.10(e), 264.1(g)(8), 265.1(c)(11), and 270.1(c)(3), or alternatively to 40 CFR 270.61.

§ 266.205 Standards applicable to the storage of solid waste military munitions.

(a) *Criteria for hazardous waste regulation of waste non-chemical military munitions in storage.* (1) Waste military munitions in storage that exhibit a hazardous waste characteristic or are listed as hazardous waste under 40 CFR Part 261, are listed or identified as a hazardous waste (and thus are subject to regulation under 40 CFR Parts 260 through 279), unless all the following conditions are met:

(i) The waste military munitions are not chemical agents or chemical munitions.

(ii) The waste military munitions must be subject to the jurisdiction of the Department of Defense Explosives Safety Board (DDESB).

(iii) The waste military munitions must be stored in accordance with the DDESB storage standards applicable to waste military munitions.

(iv) Within 90 days of August 12, 1997 or within 90 days of when a storage unit is first used to store waste military munitions, whichever is later, the owner or operator must notify the Director of the location of any waste storage unit used to store waste military munitions for which the conditional exemption in paragraph (a)(1) is claimed.

(v) The owner or operator must provide oral notice to the Director within 24 hours from the time the owner or operator becomes aware of any loss or theft of the waste military munitions, or any failure to meet a condition of paragraph (a)(1) that may endanger health or the environment. In addition, a written submission describing the circumstances shall be provided within 5 days from the time the owner or operator becomes aware of any loss or theft of the waste military munitions or any failure to meet a condition of paragraph (a)(1) of this section.

(vi) The owner or operator must inventory the waste military munitions at least annually, must inspect the waste military munitions at least quarterly for compliance with the conditions of paragraph (a)(1) of this section, and must maintain records of the findings of these inventories and inspections for at least three years.

(vii) Access to the stored waste military munitions must be limited to appropriately trained and authorized personnel.

(2) The conditional exemption in paragraph (a)(1) of this section from regulation as hazardous waste shall apply only to the storage of non-chemical waste military munitions. It does not affect the regulatory status of waste military munitions as hazardous wastes with regard to transportation, treatment or disposal.

(3) The conditional exemption in paragraph (a)(1) of this section applies only so long as all of the conditions in paragraph (a)(1) of this section are met.

(b) Notice of termination of waste storage. The owner or operator must notify the Director when a storage unit identified in paragraph (a)(1)(iv) of this section will no longer be used to store waste military munitions.

(c) Reinstatement of conditional exemption. If any waste military munition loses its conditional exemption under paragraph (a)(1) of this section, an application may be filed with the Director for reinstatement of the conditional exemption from hazardous waste storage regulation with respect to such munition as soon as the munition is returned to compliance with the conditions of paragraph (a)(1) of this section. If the Director finds that reinstatement of the conditional exemption is appropriate based on factors such as the owner's or operator's provision of a satisfactory explanation of the circumstances of the violation, or a demonstration that the violations are not likely to recur, the Director may reinstate the conditional exemption under paragraph (a)(1) of this section. If the Director does not take action on the reinstatement application within 60 days after receipt of the application, then reinstatement shall be deemed granted, retroactive to the date of the application. However, the Director may terminate a conditional exemption reinstated by default in the preceding sentence if he/she finds that reinstatement is inappropriate based on factors such as the owner's or operator's failure to provide a satisfactory explanation of the circumstances of the violation, or failure to demonstrate that the violations are not likely to recur. In reinstating the conditional exemption under paragraph (a)(1) of this section, the Director may specify additional conditions as are necessary to ensure and document proper storage to protect human health and the environment.

(d) Waste chemical munitions. (1) Waste military munitions that are chemical agents or chemical munitions and that exhibit a hazardous waste characteristic or are listed as hazardous waste under 40 CFR Part 261, are listed or identified as a hazardous waste and shall be subject to the applicable regulatory requirements of RCRA subtitle C.

(2) Waste military munitions that are chemical agents or chemical munitions and that exhibit a hazardous waste characteristic or are listed as hazardous waste under 40 CFR Part 261, are not subject to the storage prohibition in RCRA section 3004(j), codified at 40 CFR 268.50.

(e) Amendments to DDESB storage standards. The DDESB storage standards applicable to waste military munitions, referenced in paragraph (a)(1)(iii) of this section, are DOD 6055.9–STD (''DOD Ammunition and Explosive Safety Standards''), in effect on November 8, 1995, except as provided in the following sentence. Any amendments to the DDESB storage standards shall become effective for purposes of paragraph (a)(1) of this section on the date the Department of Defense publishes notice in the FEDERAL REGISTER that the DDESB standards referenced in paragraph (a)(1) of this section have been amended.

§ 266.206 Standards applicable to the treatment and disposal of waste military munitions.

The treatment and disposal of hazardous waste military munitions are subject to the applicable permitting, procedural, and technical standards in 40 CFR Parts 260 through 270.

APPENDIX I TO PART 266—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR METALS

TABLE I–A—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR NONCARCINOGENIC METALS FOR FACILITIES IN NONCOMPLEX TERRAIN

[Values for urban areas]

Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
4	6.0E+01	1.0E+04	1.8E+01	6.0E+01	6.0E+02	6.0E+01
6	6.8E+01	1.1E+04	2.0E+01	6.8E+01	6.8E+02	6.8E+01
8	7.6E+01	1.3E+04	2.3E+01	7.6E+01	7.6E+02	7.6E+01
10	8.6E+01	1.4E+04	2.6E+01	8.6E+01	8.6E+02	8.6E+01
12	9.6E+01	1.7E+04	3.0E+01	9.6E+01	9.6E+02	9.6E+01
14	1.1E+02	1.8E+04	3.4E+01	1.1E+02	1.1E+03	1.1E+02
16	1.3E+02	2.1E+04	3.6E+01	1.3E+02	1.3E+03	1.3E+02
18	1.4E+02	2.4E+04	4.3E+01	1.4E+02	1.4E+03	1.4E+02
20	1.6E+02	2.7E+04	4.6E+01	1.6E+02	1.6E+03	1.6E+02
22	1.8E+02	3.0E+04	5.4E+01	1.8E+02	1.8E+03	1.8E+02
24	2.0E+02	3.4E+04	6.0E+01	2.0E+02	2.0E+03	2.0E+02
26	2.3E+02	3.9E+04	6.8E+01	2.3E+02	2.3E+03	2.3E+02
28	2.6E+02	4.3E+04	7.8E+01	2.6E+02	2.6E+03	2.6E+02
30	3.0E+02	5.0E+04	9.0E+01	3.0E+02	3.0E+03	3.0E+02
35	4.0E+02	6.6E+04	1.1E+02	4.0E+02	4.0E+03	4.0E+02
40	4.6E+02	7.8E+04	1.4E+02	4.6E+02	4.6E+03	4.6E+02
45	6.0E+02	1.0E+05	1.8E+02	6.0E+02	6.0E+03	6.0E+02
50	7.8E+02	1.3E+05	2.3E+02	7.8E+02	7.8E+03	7.8E+02
55	9.6E+02	1.7E+05	3.0E+02	9.6E+02	9.6E+03	9.6E+02
60	1.2E+03	2.0E+05	3.6E+02	1.2E+03	1.2E+04	1.2E+03
65	1.5E+03	2.5E+05	4.3E+02	1.5E+03	1.5E+04	1.5E+03
70	1.7E+03	2.8E+05	5.0E+02	1.7E+03	1.7E+04	1.7E+03
75	1.9E+03	3.2E+05	5.8E+02	1.9E+03	1.9E+04	1.9E+03
80	2.2E+03	3.6E+05	6.4E+02	2.2E+03	2.2E+04	2.2E+03
85	2.5E+03	4.0E+05	7.6E+02	2.5E+03	2.5E+04	2.5E+03
90	2.8E+03	4.6E+05	8.2E+02	2.8E+03	2.8E+04	2.8E+03
95	3.2E+03	5.4E+05	9.6E+02	3.2E+03	3.2E+04	3.2E+03
100	3.6E+03	6.0E+05	1.1E+03	3.6E+03	3.6E+04	3.6E+03
105	4.0E+03	6.8E+05	1.2E+03	4.0E+03	4.0E+04	4.0E+03
110	4.6E+03	7.8E+05	1.4E+03	4.6E+03	4.6E+04	4.6E+03
115	5.4E+03	8.6E+05	1.6E+03	5.4E+03	5.4E+04	5.4E+03
120	6.0E+03	1.0E+06	1.8E+03	6.0E+03	6.0E+04	6.0E+03

TABLE I–B—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR NONCARCINOGENIC METALS FOR FACILITIES IN NONCOMPLEX TERRAIN

[Values for rural areas]

Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
4	3.1E+01	5.2E+03	9.4E+00	3.1E+01	3.1E+02	3.1E+01
6	3.6E+01	6.0E+03	1.1E+01	3.6E+01	3.6E+02	3.6E+01
8	4.0E+01	6.8E+03	1.2E+01	4.0E+01	4.0E+02	4.0E+01
10	4.6E+01	7.8E+03	1.4E+01	4.6E+01	4.6E+02	4.6E+01
12	5.8E+01	9.6E+03	1.7E+01	5.8E+01	5.8E+02	5.8E+01
14	6.8E+01	1.1E+04	2.1E+01	6.8E+01	6.8E+02	6.8E+01
16	8.6E+01	1.4E+04	2.6E+01	8.6E+01	8.6E+02	8.6E+01
18	1.1E+02	1.8E+04	3.2E+01	1.1E+02	1.1E+03	1.1E+02
20	1.3E+02	2.2E+04	4.0E+01	1.3E+02	1.3E+03	1.3E+02
22	1.7E+02	2.8E+04	5.0E+01	1.7E+02	1.7E+03	1.7E+02
24	2.2E+02	3.6E+04	6.4E+01	2.2E+02	2.2E+03	2.2E+02
26	2.8E+02	4.6E+04	8.2E+01	2.8E+02	2.8E+03	2.8E+02
28	3.5E+02	5.8E+04	1.0E+02	3.5E+02	3.5E+03	3.5E+02
30	4.3E+02	7.6E+04	1.3E+02	4.3E+02	4.3E+03	4.3E+02
35	7.2E+02	1.2E+05	2.1E+02	7.2E+02	7.2E+03	7.2E+02
40	1.1E+03	1.8E+05	3.2E+02	1.1E+03	1.1E+04	1.1E+03
45	1.5E+03	2.5E+05	4.6E+02	1.5E+03	1.5E+04	1.5E+03
50	2.0E+03	3.3E+05	6.0E+02	2.0E+03	2.0E+04	2.0E+03
55	2.6E+03	4.4E+05	7.8E+02	2.6E+03	2.6E+04	2.6E+03
60	3.4E+03	5.8E+05	1.0E+03	3.4E+03	3.4E+04	3.4E+03
65	4.6E+03	7.6E+05	1.4E+03	4.6E+03	4.6E+04	4.6E+03
70	5.4E+03	9.0E+05	1.6E+03	5.4E+03	5.4E+04	5.4E+03
75	6.4E+03	1.1E+06	1.9E+03	6.4E+03	6.4E+04	6.4E+03
80	7.6E+03	1.3E+06	2.3E+03	7.6E+03	7.6E+04	7.6E+03
85	9.4E+03	1.5E+06	2.8E+03	9.4E+03	9.4E+04	9.4E+03
90	1.1E+04	1.8E+06	3.3E+03	1.1E+04	1.1E+05	1.1E+04
95	1.3E+04	2.2E+06	3.9E+03	1.3E+04	1.3E+05	1.3E+04
100	1.5E+04	2.6E+06	4.6E+03	1.5E+04	1.5E+05	1.5E+04
105	1.8E+04	3.0E+06	5.4E+03	1.8E+04	1.8E+05	1.8E+04
110	2.2E+04	3.6E+06	6.6E+03	2.2E+04	2.2E+05	2.2E+04
115	2.6E+04	4.4E+06	7.8E+03	2.6E+04	2.6E+05	2.6E+04
120	3.1E+04	5.0E+06	9.2E+03	3.1E+04	3.1E+05	3.1E+04

TABLE I–C—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR NONCARCINOGENIC METALS FOR FACILITIES IN COMPLEX TERRAIN

Values for urban and rural areas						
Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
4	1.4E+01	2.4E+03	4.3E+00	1.4E+01	1.4E+02	1.4E+01
6	2.1E+01	3.5E+03	6.2E+00	2.1E+01	2.1E+02	2.1E+01
8	3.0E+01	5.0E+03	9.2E+00	3.0E+01	3.0E+02	3.0E+01

TABLE I–C—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR NONCARCINOGENIC METALS FOR FACILITIES IN COMPLEX TERRAIN—Continued

	Values for urban and rural areas					
Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
10	4.3E+01	7.6E+03	1.3E+01	4.3E+01	4.3E+02	4.3E+01
12	5.4E+01	9.0E+03	1.7E+01	5.4E+01	5.4E+02	5.4E+01
14	6.8E+01	1.1E+04	2.0E+01	6.8E+01	6.8E+02	6.8E+01
16	7.8E+01	1.3E+04	2.4E+01	7.8E+01	7.8E+02	7.8E+01
18	8.6E+01	1.4E+04	2.6E+01	8.6E+01	8.6E+02	8.6E+01
20	9.6E+01	1.6E+04	2.9E+01	9.6E+01	9.6E+02	9.6E+01
22	1.0E+02	1.8E+04	3.2E+01	1.0E+02	1.0E+03	1.0E+02
24	1.2E+02	1.9E+04	3.5E+01	1.2E+02	1.2E+03	1.2E+02
26	1.3E+02	2.2E+04	3.6E+01	1.3E+02	1.3E+03	1.3E+02
28	1.4E+02	2.4E+04	4.3E+01	1.4E+02	1.4E+03	1.4E+02
30	1.6E+02	2.7E+04	4.6E+01	1.6E+02	1.6E+03	1.6E+02
35	2.0E+02	3.3E+04	5.8E+01	2.0E+02	2.0E+03	2.0E+02
40	2.4E+02	4.0E+04	7.2E+01	2.4E+02	2.4E+03	2.4E+02
45	3.0E+02	5.0E+04	9.0E+01	3.0E+02	3.0E+03	3.0E+02
50	3.6E+02	6.0E+04	1.1E+02	3.6E+02	3.6E+03	3.6E+02
55	4.6E+02	7.6E+04	1.4E+02	4.6E+02	4.6E+03	4.6E+02
60	5.8E+02	9.4E+04	1.7E+02	5.8E+02	5.8E+03	5.8E+02
65	6.8E+02	1.1E+05	2.1E+02	6.8E+02	6.8E+03	6.8E+02
70	7.8E+02	1.3E+05	2.4E+02	7.8E+02	7.8E+03	7.8E+02
75	8.6E+02	1.4E+05	2.6E+02	8.6E+02	8.6E+03	8.6E+02
80	9.6E+02	1.6E+05	2.9E+02	9.6E+02	9.6E+03	9.6E+02
85	1.1E+03	1.8E+05	3.3E+02	1.1E+03	1.1E+04	1.1E+03
90	1.2E+03	2.0E+05	3.6E+02	1.2E+03	1.2E+04	1.2E+03
95	1.4E+03	2.3E+05	4.0E+02	1.4E+03	1.4E+04	1.4E+03
100	1.5E+03	2.6E+05	4.6E+02	1.5E+03	1.5E+04	1.5E+03
105	1.7E+03	2.8E+05	5.0E+02	1.7E+03	1.7E+04	1.7E+03
110	1.9E+03	3.2E+05	5.8E+02	1.9E+03	1.9E+04	1.9E+03
115	2.1E+03	3.6E+05	6.4E+02	2.1E+03	2.1E+04	2.1E+03
120	2.4E+03	4.0E+05	7.2E+02	2.4E+03	2.4E+04	2.4E+03

TABLE I–D—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR CARCINOGENIC METALS FOR FACILITIES IN NONCOMPLEX TERRAIN

	Values for use in urban areas				Values for use in rural areas			
Terrain adjusted eff. stack ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
4	4.6E−01	1.1E+00	1.7E−01	8.2E−01	2.4E−01	5.8E−01	8.6E−02	4.3E−01
6	5.4E−01	1.3E+00	1.9E−01	9.4E−01	2.8E−01	6.6E−01	1.0E−01	5.0E−01
8	6.0E−01	1.4E+00	2.2E−01	1.1E+00	3.2E−01	7.6E−01	1.1E−01	5.6E−01
10	6.8E−01	1.6E+00	2.4E−01	1.2E+00	3.6E−01	8.6E−01	1.3E−01	6.4E−01

12	7.6E−01	1.8E+00	2.7E−01	1.4E+00	4.3E−01	1.1E+00	1.6E−01	7.8E−01
14	8.6E−01	2.1E+00	3.1E−01	1.5E+00	5.4E−01	1.3E+00	2.0E−01	9.6E−01
16	9.6E−01	2.3E+00	3.5E−01	1.7E+00	6.8E−01	1.6E+00	2.4E−01	1.2E+00
18	1.1E+00	2.6E+00	4.0E−01	2.0E+00	8.2E−01	2.0E+00	3.0E−01	1.5E+00
20	1.2E+00	3.0E+00	4.4E−01	2.2E+00	1.0E+00	2.5E+00	3.7E−01	1.9E+00
22	1.4E+00	3.4E+00	5.0E−01	2.5E+00	1.3E+00	3.2E+00	4.8E−01	2.4E+00
24	1.6E+00	3.9E+00	5.8E−01	2.8E+00	1.7E+00	4.0E+00	6.0E−01	3.0E+00
26	1.8E+00	4.3E+00	6.4E−01	3.2E+00	2.1E+00	5.0E+00	7.6E−01	3.9E+00
28	2.0E+00	4.8E+00	7.2E−01	3.6E+00	2.7E+00	6.4E+00	9.8E−01	5.0E+00
30	2.3E+00	5.4E+00	8.2E−01	4.0E+00	3.5E+00	8.2E+00	1.2E+00	6.2E+00
35	3.0E+00	6.8E+00	1.0E+00	5.4E+00	5.4E+00	1.3E+01	1.9E+00	9.6E+00
40	3.6E+00	9.0E+00	1.3E+00	6.8E+00	8.2E+00	2.0E+01	3.0E+00	1.5E+01
45	4.6E+00	1.1E+01	1.7E+00	8.6E+00	1.1E+01	2.8E+01	4.2E+00	2.1E+01
50	6.0E+00	1.4E+01	2.2E+00	1.1E+01	1.5E+01	3.7E+01	5.4E+00	2.8E+01
55	7.6E+00	1.8E+01	2.7E+00	1.4E+01	2.0E+01	5.0E+01	7.2E+00	3.6E+01
60	9.4E+00	2.2E+01	3.4E+00	1.7E+01	2.7E+01	6.4E+01	9.6E+00	4.8E+01
65	1.1E+01	2.8E+01	4.2E+00	2.1E+01	3.6E+01	8.6E+01	1.3E+01	6.4E+01
70	1.3E+01	3.1E+01	4.6E+00	2.4E+01	4.3E+01	1.0E+02	1.5E+01	7.6E+01
75	1.5E+01	3.6E+01	5.4E+00	2.7E+01	5.0E+01	1.2E+02	1.8E+01	9.0E+01
80	1.7E+01	4.0E+01	6.0E+00	3.0E+01	6.0E+01	1.4E+02	2.2E+01	1.1E+02
85	1.9E+01	4.6E+01	6.8E+00	3.4E+01	7.2E+01	1.7E+02	2.6E+01	1.3E+02
90	2.2E+01	5.0E+01	7.8E+00	3.9E+01	8.6E+01	2.0E+02	3.0E+01	1.5E+02
95	2.5E+01	5.8E+01	9.0E+00	4.4E+01	1.0E+02	2.4E+02	3.6E+01	1.8E+02
100	2.8E+01	6.8E+01	1.0E+01	5.0E+01	1.2E+02	2.9E+02	4.3E+01	2.2E+02
105	3.2E+01	7.6E+01	1.1E+01	5.6E+01	1.4E+02	3.4E+02	5.0E+01	2.6E+02
110	3.6E+01	8.6E+01	1.3E+01	6.4E+01	1.7E+02	4.0E+02	6.0E+01	3.0E+02
115	4.0E+01	9.6E+01	1.5E+01	7.2E+01	2.0E+02	4.8E+02	7.2E+01	3.6E+02
120	4.6E+01	1.1E+02	1.7E+01	8.2E+01	2.4E+02	5.8E+02	8.6E+01	4.3E+02

TABLE I–E—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR CARCINOGENIC METALS FOR FACILITIES IN COMPLEX TERRAIN

Values for use in urban and rural areas				
Terrain adjusted eff. stack ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
4	1.1E−01	2.6E−01	4.0E−02	2.0E−01
6	1.6E−01	3.9E−01	5.8E−02	2.9E−01
8	2.4E−01	5.8E−01	8.6E−02	4.3E−01
10	3.5E−01	8.2E−01	1.3E−01	6.2E−01
12	4.3E−01	1.0E+00	1.5E−01	7.6E−01
14	5.0E−01	1.3E+00	1.9E−01	9.4E−01
16	6.0E−01	1.4E+00	2.2E−01	1.1E+00
18	6.8E−01	1.6E+00	2.4E−01	1.2E+00
20	7.6E−01	1.8E+00	2.7E−01	1.3E+00
22	8.2E−01	1.9E+00	3.0E−01	1.5E+00
24	9.0E−01	2.1E+00	3.3E−01	1.6E+00
26	1.0E+00	2.4E+00	3.6E−01	1.8E+00
28	1.1E+00	2.7E+00	4.0E−01	2.0E+00
30	1.2E+00	3.0E+00	4.4E−01	2.2E+00
35	1.5E+00	3.7E+00	5.4E−01	2.7E+00

TABLE I–E—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR CARCINOGENIC METALS FOR FACILITIES IN COMPLEX TERRAIN—Continued

	Values for use in urban and rural areas			
Terrain adjusted eff. stack ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
40	1.9E+00	4.6E+00	6.8E−01	3.4E+00
45	2.4E+00	5.4E+00	8.4E−01	4.2E+00
50	2.9E+00	6.8E+00	1.0E+00	5.0E+00
55	3.5E+00	8.4E+00	1.3E+00	6.4E+00
60	4.3E+00	1.0E+01	1.5E+00	7.8E+00
65	5.4E+00	1.3E+01	1.9E+00	9.6E+00
70	6.0E+00	1.4E+01	2.2E+00	1.1E+01
75	6.8E+00	1.6E+01	2.4E+00	1.2E+01
80	7.6E+00	1.8E+01	2.7E+00	1.3E+01
85	8.2E+00	2.0E+01	3.0E+00	1.5E+01
90	9.4E+00	2.3E+01	3.4E+00	1.7E+01
95	1.0E+01	2.5E+01	4.0E+00	1.9E+01
100	1.2E+01	2.8E+01	4.3E+00	2.1E+01
105	1.3E+01	3.2E+01	4.8E+00	2.4E+01
110	1.5E+01	3.5E+01	5.4E+00	2.7E+01
115	1.7E+01	4.0E+01	6.0E+00	3.0E+01
120	1.9E+01	4.4E+01	6.4E+00	3.3E+01

[56 FR 7228, Feb. 21, 1991; 56 FR 32690, July 17, 1991]

APPENDIX II TO PART 266—TIER I FEED RATE SCREENING LIMITS FOR TOTAL CHLORINE

Terrain-adjusted effective stack height (m)	Noncomplex Terrain		Complex Terrain
	Urban (g/hr)	Rural (g/hr)	(g/hr)
4	8.2E+01	4.2E+01	1.9E+01
6	9.1E+01	4.8E+01	2.8E+01
8	1.0E+02	5.3E+01	4.1E+01
10	1.2E+02	6.2E+01	5.8E+01
12	1.3E+02	7.7E+01	7.2E+01
14	1.5E+02	9.1E+01	9.1E+01
16	1.7E+02	1.2E+02	1.1E+02
18	1.9E+02	1.4E+02	1.2E+02
20	2.1E+02	1.8E+02	1.3E+02
22	2.4E+02	2.3E+02	1.4E+02
24	2.7E+02	2.9E+02	1.6E+02
26	3.1E+02	3.7E+02	1.7E+02
28	3.5E+02	4.7E+02	1.9E+02
30	3.9E+02	5.8E+02	2.1E+02
35	5.3E+02	9.6E+02	2.6E+02
40	6.2E+02	1.4E+03	3.3E+02
45	8.2E+02	2.0E+03	4.0E+02
50	1.1E+03	2.6E+03	4.8E+02
55	1.3E+03	3.5E+03	6.2E+02
60	1.6E+03	4.6E+03	7.7E+02
65	2.0E+03	6.2E+03	9.1E+02
70	2.3E+03	7.2E+03	1.1E+03
75	2.5E+03	8.6E+03	1.2E+03
80	2.9E+03	1.0E+04	1.3E+03
85	3.3E+03	1.2E+04	1.4E+03
90	3.7E+03	1.4E+04	1.6E+03
95	4.2E+03	1.7E+04	1.8E+03
100	4.8E+03	2.1E+04	2.0E+03
105	5.3E+03	2.4E+04	2.3E+03
110	6.2E+03	2.9E+04	2.5E+03
115	7.2E+03	3.5E+04	2.8E+03
120	8.2E+03	4.1E+04	3.2E+03

[56 FR 32690, July 17, 1991]

APPENDIX III TO PART 266—TIER II EMISSION RATE SCREENING LIMITS FOR FREE CHLORINE AND HYDROGEN CHLORIDE

Terrain-adjusted effective stack height (m)	Noncomplex terrain				Complex terrain	
	Values for urban areas		Values for rural areas		Values for use in urban and rural areas	
	$C1_2$ (g/hr)	HC1 (g/hr)	$C1_2$ (g/hr)	HC1 (g/hr)	$C1_2$ (g/hr)	HC1 (g/hr)
4	8.2E+01	1.4E+03	4.2E+01	7.3E+02	1.9E+01	3.3E+02
6	9.1E+01	1.6E+03	4.8E+01	8.3E+02	2.8E+01	4.9E+02
8	1.0E+02	1.8E+03	5.3E+01	9.2E+02	4.1E+01	7.1E+02
10	1.2E+02	2.0E+03	6.2E+01	1.1E+03	5.8E+01	1.0E+03
12	1.3E+02	2.3E+03	7.7E+01	1.3E+03	7.2E+01	1.3E+03
14	1.5E+02	2.6E+03	9.1E+01	1.6E+03	9.1E+01	1.6E+03
16	1.7E+02	2.9E+03	1.2E+02	2.0E+03	1.1E+02	1.8E+03
18	1.9E+02	3.3E+03	1.4E+02	2.5E+03	1.2E+02	2.0E+03
20	2.1E+02	3.7E+03	1.8E+02	3.1E+03	1.3E+02	2.3E+03
22	2.4E+02	4.2E+03	2.3E+02	3.9E+03	1.4E+02	2.4E+03
24	2.7E+02	4.8E+03	2.9E+02	5.0E+03	1.6E+02	2.8E+03
26	3.1E+02	5.4E+03	3.7E+02	6.5E+03	1.7E+02	3.0E+03
28	3.5E+02	6.0E+03	4.7E+02	8.1E+03	1.9E+02	3.4E+03
30	3.9E+02	6.9E+03	5.8E+02	1.0E+04	2.1E+02	3.7E+03
35	5.3E+02	9.2E+03	9.6E+02	1.7E+04	2.6E+02	4.6E+03
40	6.2E+02	1.1E+04	1.4E+03	2.5E+04	3.3E+02	5.7E+03
45	8.2E+02	1.4E+04	2.0E+03	3.5E+04	4.0E+02	7.0E+03
50	1.1E+03	1.8E+04	2.6E+03	4.6E+04	4.8E+02	8.4E+03
55	1.3E+03	2.3E+04	3.5E+03	6.1E+04	6.2E+02	1.1E+04
60	1.6E+03	2.9E+04	4.6E+03	8.1E+04	7.7E+02	1.3E+04
65	2.0E+03	3.4E+04	6.2E+03	1.1E+05	9.1E+02	1.6E+04

APPENDIX III TO PART 266—TIER II EMISSION RATE SCREENING LIMITS FOR FREE CHLORINE AND HYDROGEN CHLORIDE—Continued

Terrain-adjusted effective stack height (m)	Noncomplex terrain				Complex terrain	
	Values for urban areas		Values for rural areas		Values for use in urban and rural areas	
	$C1_2$ (g/hr)	HC1 (g/hr)	$C1_2$ (g/hr)	HC1 (g/hr)	$C1_2$ (g/hr)	HC1 (g/hr)
70	2.3E+03	3.9E+04	7.2E+03	1.3E+05	1.1E+03	1.8E+04
75	2.5E+03	4.5E+04	8.6E+03	1.5E+05	1.2E+03	2.0E+04
80	2.9E+03	5.0E+04	1.0E+04	1.8E+05	1.3E+03	2.3E+04
85	3.3E+03	5.8E+04	1.2E+04	2.2E+05	1.4E+03	2.5E+04
90	3.7E+03	6.6E+04	1.4E+04	2.5E+05	1.6E+03	2.9E+04
95	4.2E+03	7.4E+04	1.7E+04	3.0E+05	1.8E+03	3.2E+04
100	4.8E+03	8.4E+04	2.1E+04	3.6E+05	2.0E+03	3.5E+04
105	5.3E+03	9.2E+04	2.4E+04	4.3E+05	2.3E+03	3.9E+04
110	6.2E+03	1.1E+05	2.9E+04	5.1E+05	2.5E+03	4.5E+04
115	7.2E+03	1.3E+05	3.5E+04	6.1E+05	2.8E+03	5.0E+04
120	8.2E+03	1.4E+05	4.1E+04	7.2E+05	3.2E+03	5.6E+04

[56 FR 32691, July 17, 1991]

APPENDIX IV TO PART 266—REFERENCE AIR CONCENTRATIONS*

Constituent	CAS No.	RAC (ug/m³)
Acetaldehyde	75–07–0	10
Acetonitrile	75–05–8	10
Acetophenone	98–86–2	100
Acrolein	107–02–8	20
Aldicarb	116–06–3	1
Aluminum Phosphide	20859–73–8	0.3
Allyl Alcohol	107–18–6	5
Antimony	7440–36–0	0.3
Barium	7440–39–3	50
Barium Cyanide	542–62–1	50
Bromomethane	74–83–9	0.8
Calcium Cyanide	592–01–8	30
Carbon Disulfide	75–15–0	200
Chloral	75–87–6	2
Chlorine (free)		0.4
2-Chloro-1,3-butadiene	126–99–8	3
Chromium III	16065–83–1	1000
Copper Cyanide	544–92–3	5
Cresols	1319–77–3	50
Cumene	98–82–8	1
Cyanide (free)	57–12–15	20
Cyanogen	460–19–5	30
Cyanogen Bromide	506–68–3	80
Di-n-butyl Phthalate	84–74–2	100
o-Dichlorobenzene	95–50–1	10
p-Dichlorobenzene	106–46–7	10
Dichlorodifluoromethane	75–71–8	200
2,4-Dichlorophenol	120–83–2	3
Diethyl Phthalate	84–66–2	800
Dimethoate	60–51–5	0.8
2,4-Dinitrophenol	51–28–5	2
Dinoseb	88–85–7	0.9
Diphenylamine	122–39–4	20
Endosulfan	115–29–1	0.05
Endrin	72–20–8	0.3
Fluorine	7782–41–4	50
Formic Acid	64–18–6	2000
Glycidyaldehyde	765–34–4	0.3
Hexachlorocyclopentadiene	77–47–4	5
Hexachlorophene	70–30–4	0.3
Hydrocyanic Acid	74–90–8	20
Hydrogen Chloride	7647–01–1	7
Hydrogen Sulfide	7783–06–4	3
Isobutyl Alcohol	78–83–1	300
Lead	7439–92–1	0.09
Maleic Anyhdride	108–31–6	100
Mercury	7439–97–6	0.3
Methacrylonitrile	126–98–7	0.1
Methomyl	16752–77–5	20
Methoxychlor	72–43–5	50
Methyl Chlorocarbonate	79–22–1	1000
Methyl Ethyl Ketone	78–93–3	80
Methyl Parathion	298–00–0	0.3
Nickel Cyanide	557–19–7	20
Nitric Oxide	10102–43–9	100
Nitrobenzene	98–95–3	0.8
Pentachlorobenzene	608–93–5	0.8
Pentachlorophenol	87–86–5	30
Phenol	108–95–2	30
M-Phenylenediamine	108–45–2	5
Phenylmercuric Acetate	62–38–4	0.075
Phosphine	7803–51–2	0.3
Phthalic Anhydride	85–44–9	2000
Potassium Cyanide	151–50–8	50
Potassium Silver Cyanide	506–61–6	200
Pyridine	110–86–1	1
Selenious Acid	7783–60–8	3
Selenourea	630–10–4	5
Silver	7440–22–4	3
Silver Cyanide	506–64–9	100
Sodium Cyanide	143–33–9	30
Strychnine	57–24–9	0.3
1,2,4,5-Tetrachlorobenzene	95–94–3	0.3
2,3,4,6-Tetrachlorophenol	58–90–2	30
Tetraethyl Lead	78–00–2	0.0001
Tetrahydrofuran	109–99–9	10
Thallic Oxide	1314–32–5	0.3
Thallium	7440–28–0	0.5
Thallium (I) Acetate	563–68–8	0.5
Thallium (I) Carbonate	6533–73–9	0.3
Thallium (I) Chloride	7791–12–0	0.3
Thallium (I) Nitrate	10102–45–1	0.5
Thallium Selenite	12039–52–0	0.5
Thallium (I) Sulfate	7446–18–6	0.075
Thiram	137–26–8	5
Toluene	108–88–3	300
1,2,4-Trichlorobenzene	120–82–1	20
Trichloromonofluoromethane	75–69–4	300

APPENDIX IV TO PART 266—REFERENCE AIR CONCENTRATIONS*—Continued

Constituent	CAS No.	RAC (ug/m³)
2.4.5-Trichlorophenol	95–95–4	100
Vanadium Pentoxide	1314–62–1	20
Warfarin	81–81–2	0.3
Xylenes	1330–20–7	80
Zinc Cyanide	557–21–1	50
Zinc Phosphide	1314–84–7	0.3

*The RAC for other appendix VIII part 261 constituents not listed herein or in appendix V of this part is 0.1 ug/m³.

[56 FR 7232, Feb. 21, 1991; 56 FR 32691, July 17, 1991]

APPENDIX V TO PART 266—RISK SPECIFIC DOSES (10^{-5})

Constituent	CAS No.	Unit risk (m3/ug)	RsD (ug/m3)
Acrylamide	79–06–1	1.3E−03	7.7E−03
Acrylonitrile	107–13–1	6.8E−05	1.5E−01
Aldrin	309–00–2	4.9E−03	2.0E−03
Aniline	62–53–3	7.4E−06	1.4E+00
Arsenic	7440–38–2	4.3E−03	2.3E−03
Benz(a)anthracene	56–55–3	8.9E−04	1.1E−02
Benxene	71–43–2	8.3E−06	1.2E+00
Benzidine	92–87–5	6.7E−02	1.5E−04
Benzo(a)pyrene	50–32–8	3.3E−03	3.0E−03
Beryllium	7440–41–7	2.4E−03	4.2E−03
Bis(2-chloroethyl)ether	111–44–4	3.3E−04	3.0E−02
Bis(chloromethyl)ether	542–88–1	6.2E−02	1.6E−04
Bis(2-ethylhexyl)-phthalate	117–81–7	2.4E−07	4.2E+01
1,3-Butadiene	106–99–0	2.8E−04	3.6E−02
Cadmium	7440–43–9	1.8E−03	5.6E−03
Carbon Tetrachloride	56–23–5	1.5E−05	6.7E−01
Chlordane	57–74–9	3.7E−04	2.7E−02
Chloroform	67–66–3	2.3E−05	4.3E−01
Chloromethane	74–87–3	3.6E−06	2.8E+00
Chromium VI	7440–47–3	1.2E−02	8.3E−04
DDT	50–29–3	9.7E−05	1.0E−01
Dibenz(a,h)anthracene	53–70–3	1.4E−02	7.1E−04
1,2-Dibromo-3-chloropropane	96–12–8	6.3E−03	1.6E−03
1,2-Dibromoethane	106–93–4	2.2E−04	4.5E−02
1,1-Dichloroethane	75–34–3	2.6E−05	3.8E−01
1,2-Dichloroethane	107–06–2	2.6E−05	3.8E−01
1,1-Dichloroethylene	75–35–4	5.0E−05	2.0E−01
1,3-Dichloropropene	542–75–6	3.5E−01	2.9E−05
Dieldrin	60–57–1	4.6E−03	2.2E−03
Diethylstilbestrol	56–53–1	1.4E−01	7.1E−05
Dimethylnitrosamine	62–75–9	1.4E−02	7.1E−04
2,4-Dinitrotoluene	121–14–2	8.8E−05	1.1E−01
1,2-Diphenylhydrazine	122–66–7	2.2E−04	4.5E−02
1,4-Dioxane	123–91–1	1.4E−06	7.1E+00
Epichlorohydrin	106–89–8	1.2E−06	8.3E+00
Ethylene Oxide	75–21–8	1.0E−04	1.0E−01
Ethylene Dibromide	106–93–4	2.2E−04	4.5E−02
Formaldehyde	50–00–0	1.3E−05	7.7E−01
Heptachlor	76–44–8	1.3E−03	7.7E−03
Heptachlor Epoxide	1024–57–3	2.6E−03	3.8E−03
Hexachlorobenzene	118–74–1	4.9E−04	2.0E−02
Hexachlorobutadiene	87–68–3	2.0E−05	5.0E−01
Alpha-hexachloro-cyclohexane	319–84–6	1.8E−03	5.6E−03
Beta-hexachloro-cyclohexane	319–85–7	5.3E−04	1.9E−02
Gamma-hexachloro-cyclohexane	58–89–9	3.8E−04	2.6E−02
Hexachlorocyclo-hexane, Technical		5.1E−04	2.0E−02
Hexachlorodibenxo-p-dioxin(1,2 Mixture)		1.3E+0	7.7E−06
Hexachloroethane	67–72–1	4.0E−06	2.5E+00
Hydrazine	302–01–2	2.9E−03	3.4E−03
Hydrazine Sulfate	302–01–2	2.9E−03	3.4E−03
3-Methylcholanthrene	56–49–5	2.7E−03	3.7E−03
Methyl Hydrazine	60–34–4	3.1E−04	3.2E−02
Methylene Chloride	75–09–2	4.1E−06	2.4E+00
4,4’-Methylene-bis-2-chloroaniline	101–14–4	4.7E−05	2.1E−01
Nickel	7440–02–0	2.4E−04	4.2E−02
Nickel Refinery Dust	7440–02–0	2.4E−04	4.2E−02
Nickel Subsulfide	12035–72–2	4.8E−04	2.1E−02

APPENDIX V TO PART 266—RISK SPECIFIC DOSES (10^{-5})—Continued

Constituent	CAS No.	Unit risk (m3/ug)	RsD (ug/m3)
2-Nitropropane	79–46–9	2.7E−02	3.7E−04
N-Nitroso-n-butylamine	924–16–3	1.6E−03	6.3E−03
N-Nitroso-n-methylurea	684–93–5	8.6E−02	1.2E−04
N-Nitrosodiethylamine	55–18–5	4.3E−02	2.3E−04
N-Nitrosopyrrolidine	930–55–2	6.1E−04	1.6E−02
Pentachloronitrobenzene	82–68–8	7.3E−05	1.4E−01
PCBs	1336–36–3	1.2E−03	8.3E−03
Pronamide	23950–58–5	4.6E−06	2.2E+00
Reserpine	50–55–5	3.0E−03	3.3E−03
2,3,7,8-Tetrachloro-dibenzo-p-dioxin	1746–01–6	4.5E+01	2.2E−07
1,1,2,2-Tetrachloroethane	79–34–5	5.8E−05	1.7E−01
Tetrachloroethylene	127–18–4	4.8E−07	2.1E+01
Thiourea	62–56–6	5.5E−04	1.8E−02
1,1,2-Trichloroethane	79–00–5	1.6E−05	6.3E−01
Trichloroethylene	79–01–6	1.3E−06	7.7E+00
2,4,6-Trichlorophenol	88–06–2	5.7E−06	1.8E+00
Toxaphene	8001–35–2	3.2E−04	3.1E−02
Vinyl Chloride	75–01–4	7.1E−06	1.4E+00

[56 FR 7232, Feb. 21, 1991]

APPENDIX VI TO PART 266—STACK PLUME RISE

[Estimated Plume Rise (in Meters) Based on Stack Exit Flow Rate and Gas Temperature]

Flow rate (m3/s)	Exhaust Temperature (K°)										
	<325	325–349	350–399	400–449	450–499	500–599	600–699	700–799	800–999	1000–1499	>1499
<0.5	0	0	0	0	0	0	0	0	0	0	0
0.5–0.9	0	0	0	0	0	0	0	0	1	1	1
1.0–1.9	0	0	0	0	1	1	2	3	3	3	4
2.0–2.9	0	0	1	3	4	4	6	6	7	8	9
3.0–3.9	0	1	2	5	6	7	9	10	11	12	13
4.0–4.9	1	2	4	6	8	10	12	13	14	15	17
5.0–7.4	2	3	5	8	10	12	14	16	17	19	21
7.5–9.9	3	5	8	12	15	17	20	22	22	23	24
10.0–12.4	4	6	10	15	19	21	23	24	25	26	27
12.5–14.9	4	7	12	18	22	23	25	26	27	28	29
15.0–19.9	5	8	13	20	23	24	26	27	28	29	31
20.0–24.9	6	10	17	23	25	27	29	30	31	32	34
25.0–29.9	7	12	20	25	27	29	31	32	33	35	36
30.0–34.9	8	14	22	26	29	31	33	35	36	37	39
35.0–39.9	9	16	23	28	30	32	35	36	37	39	41
40.0–49.9	10	17	24	29	32	34	36	38	39	41	42
50.0–59.9	12	21	26	31	34	36	39	41	42	44	46
60.0–69.9	14	22	27	33	36	39	42	43	45	47	49
70.0–79.9	16	23	29	35	38	41	44	46	47	49	51
80.0–89.9	17	25	30	36	40	42	46	48	49	51	54
90.0–99.9	19	26	31	38	42	44	48	50	51	53	56
100.0–119.9	21	26	32	39	43	46	49	52	53	55	58
120.0–139.9	22	28	35	42	46	49	52	55	56	59	61
140.0–159.9	23	30	36	44	48	51	55	58	59	62	65
160.0–179.9	25	31	38	46	50	54	58	60	62	65	67
180.0–199.9	26	32	40	48	52	56	60	63	65	67	70
>199.9	26	33	41	49	54	58	62	65	67	69	73

[56 FR 7233, Feb. 21, 1991]

APPENDIX VII TO PART 266—HEALTH-BASED LIMITS FOR EXCLUSION OF WASTE-DERIVED RESIDUES*

METALS—TCLP EXTRACT CONCENTRATION LIMITS

Constituent	CAS No.	Concentration limits (mg/L)
Antimony	7440–36–0	1xE+00
Arsenic	7440–38–2	5xE+00
Barium	7440–39–3	1xE+02
Beryllium	7440–41–7	7xE−03
Cadmium	7440–43–9	1xE+00
Chromium	7440–47–3	5xE+00
Lead	7439–92–1	5xE+00
Mercury	7439–97–6	2xE−01
Nickel	7440–02–0	7xE+01
Selenium	7782–49–2	1xE+00
Silver	7440–22–4	5xE+00
Thallium	7440–28–0	7xE+00

NONMETALS—RESIDUE CONCENTRATION LIMITS

Constituent	CAS No.	Concentration limits for residues (mg/kg)
Acetonitrile	75–05–8	2xE−01
Acetophenone	98–86–2	4xE+00
Acrolein	107–02–8	5xE−01
Acrylamide	79–06–1	2xE−04
Acrylonitrile	107–13–1	7xE−04
Aldrin	309–00–2	2xE−05
Allyl alcohol	107–18–6	2xE−01
Aluminum phosphide	20859–73–8	1xE−02
Aniline	62–53–3	6xE−02
Barium cyanide	542–62–1	1xE+00
Benz(a)anthracene	56–55–3	1xE−04
Benzene	71–43–2	5xE−03
Benzidine	92–87–5	1xE−06
Bis(2-chloroethyl) ether	111–44–4	3xE−04
Bis(chloromethyl) ether	542–88–1	2xE−06
Bis(2-ethylhexyl) phthalate	117–81–7	3xE+01
Bromoform	75–25–2	7xE−01
Calcium cyanide	592–01–8	1xE−06
Carbon disulfide	75–15–0	4xE+00
Carbon tetrachloride	56–23–5	5xE−03
Chlordane	57–74–9	3xE−04
Chlorobenzene	108–90–7	1xE+00
Chloroform	67–66–3	6xE−02
Copper cyanide	544–92–3	2xE−01
Cresols (Cresylic acid)	1319–77–3	2xE+00
Cyanogen	460–19–5	1xE+00
DDT	50–29–3	1xE−03
Dibenz(a, h)-anthracene	53–70–3	7xE−06
1,2-Dibromo-3-chloropropane	96–12–8	2xE−05
p-Dichlorobenzene	106–46–7	7.5xE−02
Dichlorodifluoromethane	75–71–8	7xE+00
1,1-Dichloroethylene	75–35–4	5xE−03
2,4-Dichlorophenol	120–83–2	1xE−01
1,3-Dichloropropene	542–75–6	1xE−03
Dieldrin	60–57–1	2xE−05
Diethyl phthalate	84–66–2	3xE+01
Diethylstilbesterol	56–53–1	7xE−07
Dimethoate	60–51–5	3xE−02
2,4-Dinitrotoluene	121–14–2	5xE−04
Diphenylamine	122–39–4	9xE−01
1,2-Diphenylhydrazine	122–66–7	5xE−04
Endosulfan	115–29–7	2xE−03
Endrin	72–20–8	2xE−04
Epichlorohydrin	106–89–8	4xE−02
Ethylene dibromide	106–93–4	4xE−07
Ethylene oxide	75–21–8	3xE−04
Fluorine	7782–41–4	4xE+00
Formic acid	64–18–6	7xE+01
Heptachlor	76–44–8	8xE−05
Heptachlor epoxide	1024–57–3	4xE−05
Hexachlorobenzene	118–74–1	2xE−04
Hexachlorobutadiene	87–68–3	5xE−03
Hexachlorocyclopentadiene	77–47–4	2xE−01
Hexachlorodibenzo-p-dioxins	19408–74–3	6xE−08
Hexachloroethane	67–72–1	3xE−02
Hydrazine	302–01–1	1xE−04
Hydrogen cyanide	74–90–8	7xE−05
Hydrogen sulfide	7783–06–4	1xE−06
Isobutyl alcohol	78–83–1	1xE+01
Methomyl	16752–77–5	1xE+00
Methoxychlor	72–43–5	1xE−01
3-Methylcholanthrene	56–49–5	4xE−05
4,4′-Methylenebis (2-chloroaniline).	101–14–4	2xE−03
Methylene chloride	75–09–2	5xE−02
Methyl ethyl ketone (MEK)	78–93–3	2xE+00
Methyl hydrazine	60–34–4	3xE−04
Methyl parathion	298–00–0	2xE−02
Naphthalene	91–20–3	1xE+01
Nickel cyanide	557–19–7	7xE−01
Nitric oxide	10102–43–9	4xE+00
Nitrobenzene	98–95–3	2xE−02
N-Nitrosodi-n-butylamine	924–16–3	6xE−05
N-Nitrosodiethylamine	55–18–5	2xE−06
N-Nitroso-N-methylurea	684–93–5	1xE−07
N-Nitrosopyrrolidine	930–55–2	2xE−04
Pentachlorobenzene	608–93–5	3xE−02
Pentachloronitrobenzene (PCNB).	82–68–8	1xE−01
Pentachlorophenol	87–86–5	1xE+00
Phenol	108–95–2	1xE+00
Phenylmercury acetate	62–38–4	3xE−03
Phosphine	7803–51–2	1xE−02
Polychlorinated biphenyls, N.O.S.	1336–36–3	5xE−05
Potassium cyanide	151–50–8	2xE+00
Potassium silver cyanide	506–61–6	7xE+00
Pronamide	23950–58–5	3xE+00
Pyridine	110–86–1	4xE−02
Reserpine	50–55–5	3xE−05
Selenourea	630–10–4	2xE−01
Silver cyanide	506–64–9	4xE+00
Sodium cyanide	143–33–9	1xE+00
Strychnine	57–24–9	1xE−02
1,2,4,5-Tetrachlorobenzene	95–94–3	1xE−02
1,1,2,2-tetrachloroethane	79–34–5	2xE−03
Tetrachloroethylene	127–18–4	7xE−01
2,3,4,6-Tetrachlorophenol	58–90–2	1xE−02
Tetraethyl lead	78–00–2	4xE−06
Thiourea	62–56–6	2xE−04
Toluene	108–88–3	1xE+01
Toxaphene	8001–35–2	5xE−03
1,1,2-Trichloroethane	79–00–5	6xE−03
Trichloroethylene	79–01–6	5xE−03
Trichloromonofluoromethane	75–69–4	1xE+01
2,4,5-Trichlorophenol	95–95–4	4xE+00
2,4,6-Trichlorophenol	88–06–2	4xE+00
Vanadium pentoxide	1314–62–1	7xE−01
Vinyl chloride	75–01–4	2xE−03

*NOTE 1: The health-based concentration limits for appendix VIII part 261 constituents for which a health-based concentration is not provided below is 2xE−06 mg/kg.

NOTE 2: The levels specified in this appendix and the default level of 0.002 micrograms per kilogram or the level of detection for constituents as identified in Note 1 of this appendix are administratively stayed under the condition, for those constituents specified in §266.112(b)(1), that the owner or operator complies with alternative levels defined as the land disposal restriction limits specified in §268.43 of this chapter for FO39 nonwastewaters. See §266.112(b)(2)(i).

[56 FR 7234, Feb. 21, 1991; 56 FR 32691, July 17, 1991, as amended at 58 FR 59603, Nov. 9, 1993]

APPENDIX VIII TO PART 266—POTENTIAL PICS FOR DETERMINATION OF EXCLUSION OF WASTE-DERIVED RESIDUES

PICS FOUND IN STACK EFFLUENTS

Volatiles	Semivolatiles
Benzene	Bis(2-ethylhexyl)phthalate
Toluene	Naphthalene
Carbon tetrachloride	Phenol
Chloroform	Diethyl phthalate
Methylene chloride	Butyl benzyl phthalate
Trichloroethylene	2,4-Dimethylphenol
Tetrachloroethylene	o-Dichlorobenzene
1,1,1-Trichloroethane	m-Dichlorobenzene
Chlorobenzene	p-Dichlorobenzene
cis-1,4-Dichloro-2-butene	Hexachlorobenzene
Bromochloromethane	2,4,6-Trichlorophenol
Bromodichloromethane	Fluoranthene
Bromoform	o-Nitrophenol
Bromomethane	1,2,4-Trichlorobenzene
Methylene bromide	o-Chlorophenol
Methyl ethyl ketone	Pentachlorophenol
	Pyrene
	Dimethyl phthalate
	Mononitrobenzene
	2,6-Toluene diisocyanate

[56 FR 7235, Feb. 21, 1991; 56 FR 32691, July 17, 1991]

APPENDIX IX TO PART 266—METHODS MANUAL FOR COMPLIANCE WITH THE BIF REGULATIONS

Burning Hazardous Waste in Boilers and Industrial Furnaces

TABLE OF CONTENTS

SECTION 1.0 INTRODUCTION

This document presents required methods for demonstrating compliance uith U.S. Environmental Protection Agency regulations for boilers and industrial furnaces (BIFs) burning hazardous waste (see 40 CFR part 266, subpart H). Included in this document are:

1. Performance Specifications for Continuous Emission Monitoring (CEM) of Carbon Monoxide, Oxygen, and Hydrocarbons in Stack Gases.
2. Sampling and Analytical (S&A) Methods for Multiple Metals, Hexavalent Chromium, HCl and Chlorine, Polychlorinated Dibenzo-p-dioxins and Dibenzofurans, and Aldehydes and Ketones.
3. Procedures for Estimating the Toxicity Equivalency of Chlorinated Dibenzo-p-dioxin and Dibenzofuran Congeners.
4. Hazardous Waste Combustion Air Quality Screening Procedures (HWCAQSP).
5. Simplified Land Use Classification Procedure for Compliance vith Tier I and Tier II Limits.
6. Statistical Methodology for Bevill Residue Determinations.

7. Procedures for Determining Default Values for Air Pollution Control System Removal Efficiencies.

8. Procedures for Determining Default Values for Partitioning of Metals, Ash, and Total Chloride/Chlorine.

9. Alternate Methodology for Implementing Metals Controls.

Additional methods referenced in subpart H of part 266 but not included in this document can be found in 40 CFR parts 60 and 61, and ‘‘Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods’’ (SW–846).

The CEM performance specifications of section 2.0, the S&A methods of section 3.0 and the toxicity equivalency procedure for dioxins and furans of section 4.0 are required procedures for determining compliance with BIF regulations. The CEM performance specifications and the S&A methods are interim. The finalized CEM performance specifications and methods will be published in SW–846 or 40 CFR parts 60 and 6l.

SECTION 2.0 PERFORMANCE SPECIFICATIONS FOR CONTINUOUS EMISSION MONITORING SYSTEMS

2.l *Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste*

2.1.1 *Applicability and Principle*

2.1.1.1 Applicability. These performance specifications apply to carbon monoxide (CO) and oxygen (O_2) continuous emission monitoring systems (CEMSs) installed on incinerators, boilers, and industrial furnaces burning hazardous waste. The specifications include procedures which are intended to be used to evaluate the acceptability of the CEMS at the time of its installation or whenever specified in regulations or permits. The procedures are not designed to evaluate CEMS performance over an extended period of time. The source owner or operator is responsible for the proper calibration, maintenance, and operation of the CEMS at all times.

2.1.1.2 Principle. Installation and measurement location specifications, performance and equipment specifications, test and data reduction procedures, and brief quality assurance guidelines are included in the specifications. Calibration drift, relative accuracy, calibration error, and response time tests are conducted to determine conformance of the CEMS with the specifications.

2.1.2 *Definitions*

2.1.2.1 Continuous Emission Monitoring System (CEMS). A continuous monitor is one in which the sample to be analyzed passes the measurement section of the analyzer without interruption, and which evaluates the detector response to the sample at least once each 15 seconds and computes and records the results at least every 60 seconds. A CEMS consists of all the equipment used to acquire data and includes the sample extraction and transport hardware, the analyzer(s), and the data recording/processing hardware and software.

2.1.2.2 Monitoring System Types. The specifications require CEMSs capable of accepting calibration gases. Alternative system designs may be used if approved by the Regional Administrator. There are two basic types of monitoring systems: extractive and in-situ.

2.1.2.2.1 Extractive. Systems that use a pump or other mechanical, pneumatic, or hydraulic means to draw a sample of the stack or flue gas and convey it to a remotely located analyzer.

2.1.2.2.2 In-situ. Systems that perform an analysis without removing a sample from the stack. Point in-situ analyzers place the sensing or detecting element directly in the flue gas stream. Cross-stack in-situ analyzers measure the parameter of interest by placing a source beam on one side of the stack and the detector (in single-pass instruments) or a retroreflector (in double-pass instruments) on the other side, and measuring the parameter of interest (e.g., CO) by the attenuation of the beam by the gas in its path.

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

2.1.2.4 Span or Span Value. Full scale instrument measurement range.

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

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

2.1.2.7 Accuracy. A measure of agreement between a measured value and an accepted or true value, expressed as the percentage difference between the true and measured values relative to the true value. For these performance specifications, accuracy is checked by conducting a calibration error (CE) test and a relative accuracy (RA) test. Certain facilities, such as those using solid waste or batch-fed processes, may observe long periods of almost no CO emissions with brief, high-level CO emission spikes. These facilities, as well as facilities whose CO emissions never exceed 5–10 ppm, may need to be exempted from the RA requirement because the RA test procedure cannot ensure acquisition of meaningful test results under these conditions. An alternative procedure for accuracy determination is described in section 2.1.9.

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

2.1.2.9 Relative Accuracy (RA). A comparison of the CEMS response to a value measured by a performance test method (PTM). The PA test is used to validate the calibration technique and verify the ability of the CEMS to provide representative and accurate measurements.

2.1.2.10 Performance Test Method (PTM). The sampling and analysis procedure used to obtain reference measurements for comparison to CEMS measurements. The applicable test methods are Method 10, 10A, or 10B (for the determination of CO) and Method 3 or 3A (for the determination of 0^2). These methods are found in 40 CFR part 60, appendix A.

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

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

2.1.3 *Installation and Measurement Location Specifications*

2.1.3.1 CEMS Installation and Measurement Locations. The CEMS shall be installed in a location in which measurements representative of the source's emissions can be obtained. The optimum location of the sample interface for the CEMS is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, the degree to which it represents total emissions, and the degree to which it represents the combustion situation in the firebox. The location should be as free from in-leakage influences as possible and reasonably free from severe flow disturbances. The sample location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs and at least 0.5 diameter upstream from the exhaust or control device. The equivalent duct diameter is calculated as per 40 CFR part 60, appendix A, method 1, section 2.1. If these criteria are not achievable or if the location is otherwise less than optimum, the possibility of stratification should be checked as described in Section 2.1.3.3 to determine whether the location would cause failure of the relative accuracy test.

2.1.3.1.1 For extractive or point in-situ CEMSs, the measurement point should be within or centrally located over the centroidal area of the stack or duct cross section.

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

2.1.3.1.3 Both the CO and O_2 monitors should be installed at the same general location. If this is not possible, they may be installed at different locations if the effluent gases at both sample locations are not stratified and there is no in-leakage of air between sampling locations.

2.1.3.2 Performance Test Method (PTM) Measurement Location and Traverse Points.

2.1.3.2.1 Select an accessible PTM measurement point at least two equivalent diameters downstream from the nearest control device, the point of CO generation, or other point at which a change in the CO concentration may occur, and at least a half equivalent diameter upstream from the effluent exhaust or control device. When pollutant concentration changes are due solely to diluent leakage (e.g., air heater leakages) and CO and O_2 are simultaneously measured at the same location, one half diameter may be used in place of two equivalent diameters. The CEMS and PTM locations need not be the same.

2.1.3.2.2 Select traverse points that ensure acquisition of representative samples over the stack or duct cross section. At a minimum, establish a measurement line that passes through the centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the equivalent diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 17, 50, and 83 percent of the measurement line. If the measurement line is no longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used at a site located within eight equivalent diameters downstream of a flow disturbance. The tester may select other traverse points, provided that they can be shown to the satisfaction of the Administrator to provide a representative sample over the stack or duct cross-section. Conduct all necessary PTM tests within

3 cm of the selected traverse points. Sampling must not be performed within 3 cm of the duct or stack inner wall.

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

2.1.4 *CEMS Performance and Equipment Specifications*

Table 2.1–1 summarizes the performance specifications for the CEMSs. Two sets of standards for CO are given; one for low-range and another for high-range measurements. The high-range specifications relate to measurement and quantification of short duration high concentration peaks, while the low-range specifications relate to the overall average operating condition of the burning device. The dual-range specifications can be met by using (1) one analyzer for each range, (2) a dual range unit, or (3) a single measurement range instrument capable of meeting both specifications with a single unit. Adjustments cannot be made to the analyzer between determinations of low- and high-level accuracy within the single measurement range. In the second case, when the concentration exceeds the span of the lower range, the data acquisition system recorder shall switch to the high range automatically.

2.1.4.1 CEMS Span Value. In order to measure high and low concentrations with the same or similar degree of accuracy, the maximum ranges (span values) are specified for low and high range analyzers. The span values are listed in Table 2.1–2. Tier I and Tier II format definitions are established in 40 CFR part 266, subpart H.

TABLE 2.1–1—Performance Specifications of CO and O_2 Monitors

Parameter	CO monitors		O_2 monitors
	Low range	High range	
Calibration drift 24 hours.	<6 ppm[1]	<90 ppm	<0.5% O_2
Calibration error.	<10 ppm[1]	<150 ppm	<0.5% O_2
Response time	<2 min	<2 min	<2 min
Relative accuracy[2].	(3)	(3)	(incorporated in CO RA calculation)

[1] For Tier II, CD and CE are <3% and <5% of twice the permit limit, respectively.

[2] Expressed as the sum of the mean absolute value plus the 95% confidence interval of a series of measurements.

[3] The greater of 10% of PTM or 10 ppm.

TABLE 2.1–2—CEMS Span Values for CO and O_2 Monitors

	CO monitors		O_2 monitors (percent)
	Low range (ppm)	High range (ppm)	
Tier I rolling average format.	200	3,000	25
Tier II rolling average format.	2 × permit limit.	3,000	25

2.1.4.2 Daily Calibration Gas Values. The owner or operator must choose calibration gas concentrations (or calibration filters for in-situ systems) that include zero and high-level calibration values for the daily calibration checks. For a single measurement range monitor, three CO calibration gas concentrations (or calibration filters for in-situ systems) shall be used, i.e., the zero and high-level concentrations of the low-range CO analyzer and the high-level concentration of the high-range CO analyzer.

2.1.4.2.1 The zero level for the CO or O_2 analyzer may be between zero and 20 percent of the span value, e.g., 0–40 ppm for low-range CO analyzer, 0–600 ppm for the high-range CO analyzer, and 0–5 percent for the O_2 analyzer (for Tier I).

2.1.4.2.2 The high-level concentration for the CO or O_2 analyzer shall be between 50 and 90 percent of the span value, i.e., 100–180 ppm for the low-range CO analyzer, 1500–2700 ppm for the high-range CO analyzer, and 12.5–22.5 percent O_2 for the O_2 analyzer.

2.1.4.3 Data Recorder Scale. The strip chart recorder, computer, or digital recorder must be capable of recording all readings within the CEMS's measurement range and shall have a resolution of 0.5 percent of span value, i.e., 1 ppm CO for low-range CO analyzer, 15 ppm CO for high-range CO analyzer, and 0.1 percent O_2 for the O_2 analyzer.

2.1.4.4 Response Time. The response time for the CO or O_2 monitor shall not exceed 2 minutes to achieve 95 percent of the final stable value.

2.1.4.5 Calibration Drift. The CEMS must allow the determination of CD at the zero and high-level values. The CD must be determined separately for CO and O_2 monitors in terms of concentration. The CO CEMS calibration response must not drift or deviate from the reference value of the calibration gas (or calibration filters for in-situ systems) by more than 3 percent of the span value after each 24-hour period of the 7-day test, i.e., 6 ppm CO for the low-range analyzer (Tier I) and 90 ppm for the high-range analyzer, at both zero and high levels. The O_2 monitor calibration response must not drift or deviate from the reference value by more than 0.5 percent O_2 at both zero and high levels.

2.1.4.6 Relative Accuracy. The result of the PA test of the CO CEMS (which incorporates the O_2 monitor) must be no greater than 10 percent of the mean value of the PTM results or must be within 10 ppm CO of the PTM results, whichever is less restrictive. The ppm CO concentration shall be corrected to 7 percent O_2 before calculating the RA.

2.1.4.7 Calibration Error. The mean difference between the CEMS and reference values at all three test points (see Table 2.1–3) must be no greater than 5 percent of span value for CO monitors (i.e., 10 ppm CO for low range Tier I CO analyzers and 150 ppm CO for high range CO analyzers) and 0.5 percent for O_2 analyzers.

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

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

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

2.1.5 *Test Periods*

2.1.5.1 Pretest Preparation Period. Install the CEMS, prepare the PTM test site according to the specifications in section 2.1.3, and prepare the CEMS for operation and calibration according to the manufacturer's written instructions. A pretest conditioning period similar to that of the 7-day CD test is recommended to verify the operational status of the CEMS.

2.1.5.2 Calibration Drift Test Period. While the facility is operating under normal conditions, determine the CD at 24-hour intervals for seven consecutive days according to the procedure given in section 2.1.6.1. All CD determinations must be made following a 24-hour period during which no unscheduled maintenance, repair, or adjustment takes place. If the combustion unit is taken out of service during the test period, record the onset and duration of the downtime and continue the calibration drift test when the unit resumes operation.

2.1.5.3 Relative Accuracy Test Period. Conduct the RA test according to the procedure in section 2.1.6.4 while the facility is operating under normal conditions. RA testing for CO and O_2 shall be conducted simultaneously so that the results can be calculated for CO corrected to 7 percent O_2. The RA test shall be conducted during the CD test period. It is emphasized that during the CD test period, no adjustments or repairs may be made to the CEMS other than routine calibration adjustments performed immediately following the daily CD determination.

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

2.1.6 *Performance Specification Test Procedures*

2.1.6.1 Calibration Drift Test.

2.1.6.1.1 Sampling Strategy. Conduct the CD test for all monitors at 24-hour intervals for seven consecutive days using calibration gases at the two (or three, if applicable) concentration levels specified in section 2.1.4.2. Introduce the calibration gases into the sampling system as close to the sampling probe outlet as practical. The gas shall pass through all filters, scrubbers, conditioners, and other CEMS components used during normal sampling. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Record the CEMS response and subtract this value from the reference (calibration gas) value. To meet the specification, none of the differences shall exceed the limits specified in Table 2.1-1.

2.1.6.1.2 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2.1-1. Calculate the differences between the CEMS responses and the reference values.

2.1.6.2 Response Time. Check the entire CEMS including sample extraction and transport, sample conditioning, gas analyses, and the data recording.

2.1.6.2.1 Introduce zero gas into the system. For extractive systems, introduce the calibration gases at the probe as near to the sample location as possible. For in-situ system, introduce the zero gas at a point such that all components active in the analysis are tested. When the system output has stabilized (no change greater than 1 percent of full scale for 30 seconds), switch to monitor stack effluent and wait for a stable value. Record the time (upscale response time) required to reach 95 percent of the final stable value.

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

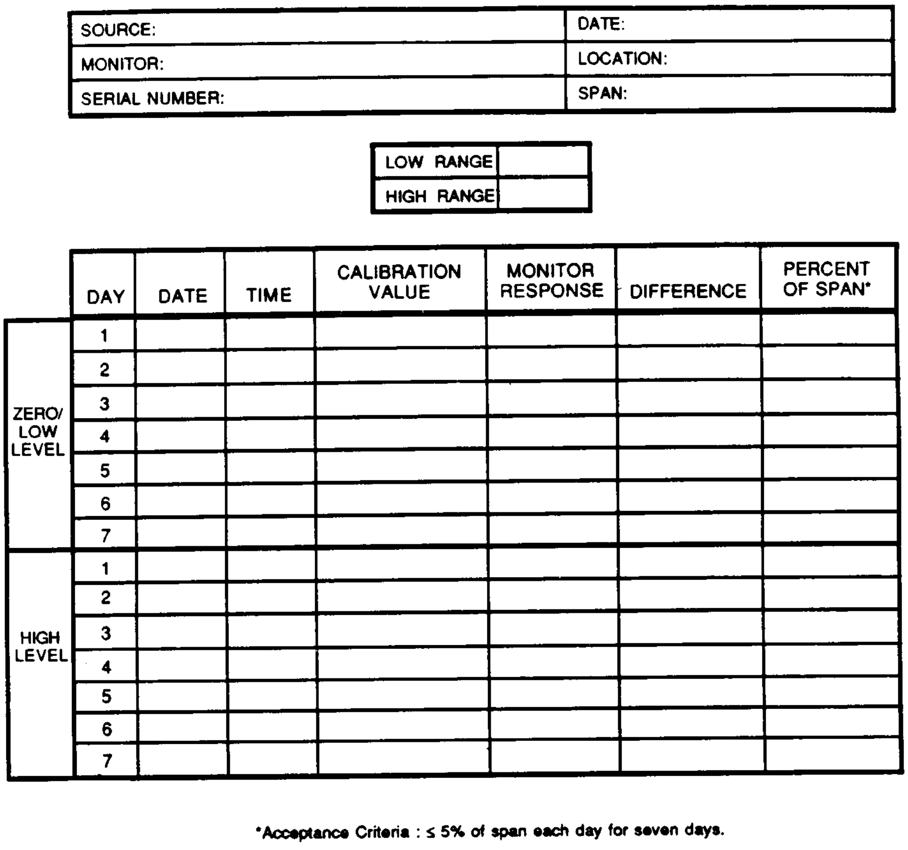
2.1.6.3 Calibration Error Test Procedure.

2.1.6.3.1 Sampling Strategy. Challenge each monitor (both low- and high-range CO and O_2) with zero gas and EPA Protocol 1 cylinder gases at three measurement points within the ranges specified in Table 2.1-3.

TABLE 2.1–3—CALIBRATION ERROR CONCENTRATION RANGES FOR TIER I

Measurement point	GAS Concentration Ranges		
	CO, ppm		O_2, percent
	Low range[1]	High range	
1	0–40	0–600	0–2
2	60–80	900–1200	8–10
3	140–160	2100–2400	14–16

[1] For Tier II, the CE specifications for the low-range CO CEMS are 0–20%, 30–40%, and 70–80% of twice the permit limit.



SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

LOW RANGE	
HIGH RANGE	

	DAY	DATE	TIME	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE	PERCENT OF SPAN*
ZERO/ LOW LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						
HIGH LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						

*Acceptance Criteria : ≤ 5% of span each day for seven days.

Figure 2.1–1 *Calibration Drift Determination*

2.1.6.3.1.1 If a single measurement range is used, the calibration gases used in the daily CD checks (if they are Protocol 1 cylinder gases and meet the criteria in section 2.1.6.3.1) may be used for determining CE.

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

2.1.6.3.2 Calculations. Summarize the results on a data sheet. An example data sheet is shown in Figure 2.1–2. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate three CE results (five CE results for a single-range CO CEMS) according to Equation 5 (section 2.1.7.5). No confidence coefficient is used in CE calculations.

2.1.6.4 Relative Accuracy Test Procedure.

2.1.6.4.1 Sampling Strategy for PTM tests. Conduct the PTM tests in such a way that they will yield measurements representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the CO, diluent, and moisture (if needed) simultaneously, moisture measurements that are taken within a 60-minute period which includes the simultaneous CO and O_2 measurements may be used to calculate the dry CO concentration.

NOTE: At times, CEMS RA tests may be conducted during incinerator performance tests. In these cases, PTM results obtained during CEMS RA tests may be used to determine compliance with incinerator emissions limits as long as the source and test conditions are consistent with the applicable regulations.

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

LOW RANGE	
HIGH RANGE	

RUN NUMBER	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE		
			Zero/Low	Mid	High
1 - Zero				▨	▨
2 - Mid			▨		▨
3 - High			▨	▨	
4 - Mid			▨		▨
5 - Zero				▨	▨
6 - High			▨	▨	
7- Zero				▨	▨
8 - Mid			▨		▨
9 - High			▨	▨	
		MEAN DIFFERENCE =			
		CALIBRATION ERROR =	%	%	%

Figure 2.1–2 *Calibration Error Determination*

2.1.6.4.2 Performance Test Methods.

2.1.6.4.2.1 Unless otherwise specified in the regulations, method 3 or 3A and method 10, 10A, or 10B (40 CFR part 60, appendix A) are the test methods for O_2 and CO, respectively. Make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of three traverse points (see section 3.2).

2.1.6.4.2.2 When the installed CEMS uses a nondispersive infrared (NDIR) analyzer, method 10 shall use the alternative interference trap specified in section 10.1 of the method. An option, which may be approved by the Administrator in certain cases, would allow the test to be conducted using method 10 without the interference trap. Under this option, a laboratory interference test is performed for the analyzer prior to the field test. The laboratory interference test includes the analysis of SO_2, NO, and CO_2 calibration gases over the range of expected effluent concentrations. Acceptable performance is indicated if the CO analyzer response to each of the gases is less than 1 percent of the applicable measurement range of the analyzer.

2.1.6.4.3 Number of PTM Tests. Conduct a minimum of nine sets of all necessary PTM tests. If more than nine sets are conducted, a maximum of three sets may be rejected at the tester's discretion. The total number of sets used to determine the RA must be greater than or equal to nine. All data, including the rejected data, must be reported.

2.1.6.4.4 Correlation of PTM and CEMS Data. The time and duration of each PTM test run and the CEMS response time should be considered in correlating the data. Use the CEMS final output (the one used for reporting) to determine an integrated average CO concentration for each PTM test run. Confirm that the pair of results are on a consistent moisture and O_2 concentration basis. Each integrated CEMS value should then be compared against the corresponding average PTM value. If the CO concentration measured by the CEMS is normalized to a specified diluent concentration, the PTM results shall be normalized to the same value.

2.1.6.4.5 Calculations. Summarize the results on a data sheet. Calculate the mean of the PTM values and calculate the arithmetic differences between the PTM and the CEMS data sets. The mean of the differences, standard deviation, confidence coefficient, and CEMS RA should be calculated using Equations 1 through 4.

2.1.7 *Equations*

2.1.7.1 Arithmetic Mean ($\bar{d}$). Calculate d of the difference of a data set using Equation 1.

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

where:

n=Number of data points.

$$\sum_{i=1}^{n} d_i = \text{Algebraic sum of the individual differences } d_i.$$

When the mean of the differences of pairs of data is calculated, correct the data for moisture, if applicable.

2.1.7.2 Standard Deviation (S_d). Calculate S_d using Equation 2.

$$s_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \frac{\sum_{i=1}^{n} d_i^2}{n}}{n-1}} \qquad \text{(Eq. 2)}$$

2.1.7.3 Confidence Coefficient (CC). Calculate the 2.5 percent error CC (one-tailed) using Equation 3.

$$CC = t_{0.975}\frac{S_d}{\sqrt{n}} \qquad \text{(Eq. 3)}$$

where:

$t_{0.975}$=t-value (see Table 2.1–4).

TABLE 2.1–4—t-Values

n[a]	$t_{0.975}$	n[a]	$t_{0.975}$	n[a]	$t_{0.975}$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.662	15	2.145
6	2.571	11	2.228	16	2.131

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

2.1.7.4 Relative Accuracy. Calculate the RA of a set of data using Equation 4.

$$RA = \frac{|\bar{d}| + |CC|}{\overline{PTM}} \times 100 \qquad \text{(Eq. 4)}$$

where:

$|\bar{d}|$=Absolute value of the mean of the differences (Equation 1).

|CC|=Absolute value of the confidence coefficient (Equation 3).

$\overline{PTM}$=Average reference value.

2.1.7.5 Calibration Error. Calculate CE using Equation 5.

$$CE = \left|\frac{\bar{d}}{FS}\right| \times 100 \qquad \text{(Eq. 5)}$$

where:

$\bar{d}$=Mean difference between CEMS response and the known reference concentration.

2.1.8 *Reporting*

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

2.1.9 *Alternative Procedure*

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

2.1.9.2 Alternative RA Procedure. Conduct a complete CEMS status check following the manufacturer's written instructions. The check should include operation of the light source, signal receiver, timing mechanism functions, data acquisition and data reduction functions, data recorders, mechanically operated functions (mirror movements, calibration gas valve operations, etc.), sample filters, sample line heaters, moisture traps, and other related functions of the CEMS, as applicable. All parts of the CEMS must be functioning properly before the RA requirement can be waived. The instruments must also have successfully passed the CE and CD requirements of the performance specifications. Substitution of the alternative procedure requires approval of the Regional Administrator.

2.1.10 *Quality Assurance (QA)*

Proper calibration, maintenance, and operation of the CEMS is the responsibility of the owner or operator. The owner or operator must establish a QA program to evaluate and monitor CEMS performance. As a minimum, the QA program must include:

2.1.10.1 A daily calibration check for each monitor. The calibration must be adjusted if the check indicates the instrument's CD exceeds the specification established in section 2.1.4.5. The gases shall be injected as close to the probe as possible to provide a check of the entire sampling system. If an alternative calibration procedure is desired (e.g., direct injections or gas cells), subject to Administrator approval, the adequacy of this alternative procedure may be demonstrated during the initial 7-day CD test. Periodic comparisons of the two procedures are suggested.

2.1.10.2 A daily system audit. The audit must include a review of the calibration check data, an inspection of the recording system, an inspection of the control panel warning lights, and an inspection of the sample transport and interface system (e.g., flowmeters, filters), as appropriate.

2.1.10.3 A quarterly calibration error (CE) test. Quarterly RA tests may be substituted for the CE test when approved by the Director on a case-by-case basis.

2.1.10.4 An annual performance specification test.

2.1.11 *References*

1. Jahnke, James A. and G.J. Aldina, ''Handbook: Continuous Air Pollution Source Monitoring Systems,'' U.S. Environmental Protection Agency Technology Transfer, Cincinnati, Ohio 45268, EPA–625/6–79–005, June 1979.

2. ''Gaseous Continuous Emissions Monitoring Systems-Performance Specification Guidelines for SO_2, NO_x, CO_2, O_2, and TRS.'' U.S. Environmental Protection Agency OAQPS, ESED, Research Triangle Park, North Carolina 27711, EPA–450/3–82–026, October 1982.

3. ''Quality Assurance Handbook for Air Pollution Measurement Systems: Volume I. Principles.'' U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, EPA–600/9–76–006, December 1984.

4. Michie, Raymond, M. Jr., et. al., ''Performance Test Results and Comparative Data for Designated Reference Methods for Carbon Monoxide,'' U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, EPA–600/S4–83–013, September 1982.

5. Ferguson, B.B., R.E. Lester, and W.J. Mitchell, ''Field Evaluation of Carbon Monoxide and Hydrogen Sulfide Continuous Emission Monitors at an Oil Refinery,'' U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711, EPA–600/4–82–054, August 1982.

2.2 *Performance Specifications for Continuous Emission Monitoring of Hydrocarbons for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste*

2.2.1 *Applicability and Principle*

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

2.2.1.2 Principle. A gas sample is extracted from the source through a heated sample line and heated filter (except as provided by section 2.2.10) to a flame ionization detector (FID). Results are reported as volume concentration equivalents of propane. Installation and measurement location specifications, performance and equipment specifications, test and data reduction procedures, and brief quality assurance guidelines are included in the specifications. Calibration drift, calibration error, and response time tests are conducted to determine conformance of the CEMS with the specifications.

2.2.2 *Definitions*

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

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

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

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

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

2.2.2.3 Span or Span Value. Full scale instrument measurement range.

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

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

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

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

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

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

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

2.2.3 *Installation and Measurement Location Specifications*

2.2.3.1 CEMS Installation and Measurement Locations. The CEMS shall be installed in a location in which measurements representative of the source's emissions can be obtained. The optimum location of the sample interface for the CEMS is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, the degree to which it represents total emissions, and the degree to which it represents the combustion situation in the firebox. The location should be as free from in-leakage influences as possible and reasonably free from severe flow disturbances. The sample location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs and at least 0.5 diameter upstream from the exhaust or control device. The equivalent duct diameter is calculated as per 40 CFR part 60, appendix A, method 1, section 2.1. If these criteria are not achievable or if the location is otherwise less than optimum, the possibility of stratification should be investigated as described in section 2.2.3.2. The measurement point shall be within the centroidal area of the stack or duct cross section.

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

2.2.4 *CEMS Performance and Equipment Specifications*

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

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

NOTE: As specified in the regulations, unheated HC CEMs may be considered an acceptable interim alternative monitoring technique. For additional notes, see section 2.2.10. The essential components of the measurement system are described below:

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

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

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

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

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

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

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

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

2.2.4.2 CEMS Span Value. 100 ppm propane.

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

2.2.4.3.1 The zero level may be between 0 and 20 ppm (zero and 20 percent of the span value).

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

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

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

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

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

2.2.4.7.1 Zero Level. Zero to 20 ppm (0 to 20 percent of span value).

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

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

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

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

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

2.2.5 *Performance Specification Test (PST) Periods*

2.2.5.1 Pretest Preparation Period. Install the CEMS, prepare the PTM test site according to the specifications in section 2.2.3, and prepare the CEMS for operation and calibration according to the manufacturer's written instructions. A pretest conditioning period similar to that of the 7-day CD test is recommended to verify the operational status of the CEMS.

2.2.5.2 Calibration Drift Test Period. While the facility is operating under normal conditions, determine the magnitude of the CD at 24-hour intervals for seven consecutive days according to the procedure given in section 2.2.6.1. All CD determinations must be made following a 24-hour period during which no unscheduled maintenance, repair, or adjustment takes place. If the combustion unit is taken out of service during the test period, record the onset and duration of the downtime and continue the CD test when the unit resumes operation.

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

2.2.6 *Performance Specification Test Procedures*

2.2.6.1 Calibration Drift Test.

2.2.6.1.1 Sampling Strategy. Conduct the CD test at 24-hour intervals for seven consecutive days using calibration gases at the two daily concentration levels specified in section 2.2.4.3. Introduce the two calibration gases into the sampling system as close to the sampling probe outlet as practical. The gas shall pass through all CEM components used during normal sampling. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Record the CEMS response and subtract this value from the reference (calibration gas) value. To meet the specification, none of the differences shall exceed 3 ppm.

2.2.6.1.2 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2.2–1. Calculate the differences between the CEMS responses and the reference values.

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

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

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

2.2.6.3 Calibration Error Test Procedure.

2.2.6.3.1 Sampling Strategy. Challenge the CEMS with zero gas and EPA Protocol 1 cylinder gases at measurement points within the ranges specified in section 2.2.4.7.

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

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

	DAY	DATE	TIME	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE	PERCENT OF SPAN*
ZERO/ LOW LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						
HIGH LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						

*Acceptance Criteria : ≤ 3% of span each day for seven days.

Figure 2.2-1 Calibration Drift Determination

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

2.2.6.3.2 Calculations. Summarize the results on a data sheet. An example data sheet is shown in Figure 2.2-2. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate three CE results according to Equation 1. No confidence coefficient is used in CE calculations.

2.2.7 Equations

2.2.7.1 Calibration Error. Calculate CE using Equation 1.

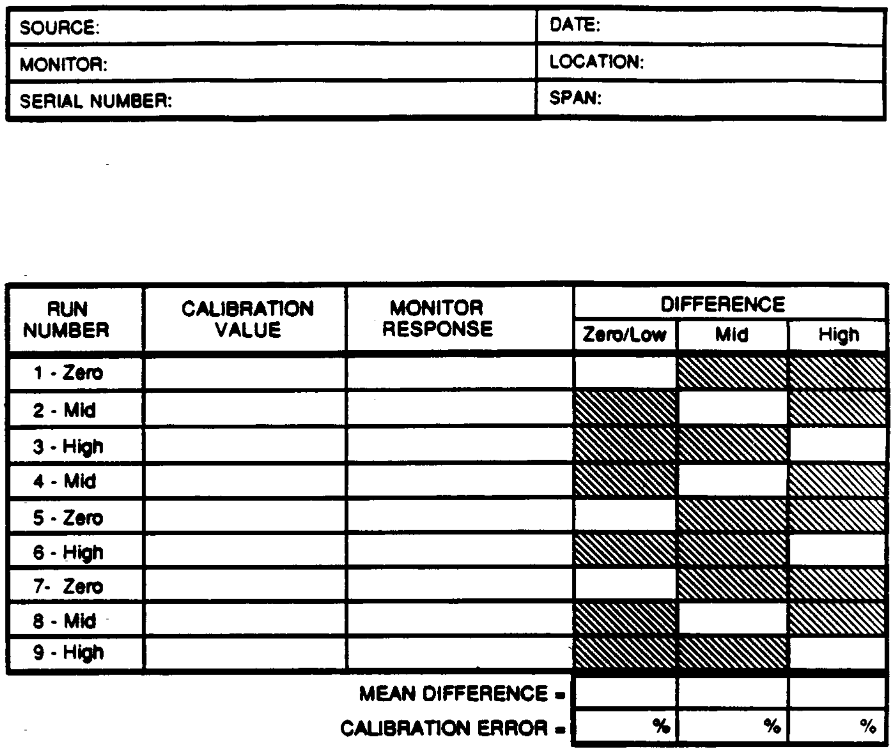
$$CE = \left| \frac{\bar{d}}{FS} \right| \times 100 \qquad \text{(Eq. 1)}$$

where:

$\bar{d}$ = Mean difference between CEMS response and the known reference concentration.

2.2.8 Reporting

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



SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

RUN NUMBER	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE		
			Zero/Low	Mid	High
1 - Zero				▨	▨
2 - Mid			▨		▨
3 - High			▨	▨	
4 - Mid			▨		▨
5 - Zero				▨	▨
6 - High			▨	▨	
7- Zero				▨	▨
8 - Mid			▨		▨
9 - High			▨	▨	
		MEAN DIFFERENCE =			
		CALIBRATION ERROR =	%	%	%

Figure 2.2-2 Calibration Error Determination

2.2.9 *Quality Assurance (QA)*

Proper calibration, maintenance, and operation of the CEMS is the responsibility of the owner or operator. The owner or operator must establish a QA program to evaluate and monitor CEMS performance. As a minimum, the QA program must include:

2.2.9.1 A daily calibration check for each monitor. The calibration must be adjusted if the check indicates the instrument's CD exceeds 3 ppm. The gases shall be injected as close to the probe as possible to provide a check of the entire sampling system. If an alternative calibration procedure is desired (e.g., direct injections or gas cells), subject to Administrator approval, the adequacy of this alternative procedure may be demonstrated during the initial 7-day CD test. Periodic comparisons of the two procedures are suggested.

2.2.9.2 A daily system audit. The audit must include a review of the calibration check data, an inspection of the recording system, an inspection of the control panel warning lights, and an inspection of the sample transport and interface system (e.g., flowmeters, filters), as appropriate.

2.2.9.3 A quarterly CE test. Quarterly RA tests may be substituted for the CE test when approved by the Director on a case-by-case basis.

2.2.9.4 An annual performance specification test.

2.2.10 *Alternative Measurement Technique*

The regulations allow gas conditioning systems to be used In conjunction with unheated HC CEMs during an interim period. This gas conditioning may include cooling to not less than 40 ° F and the use of condensate traps to reduce the moisture content of sample gas entering the FID to less than 2 percent. The gas conditioning system, however, must not allow the sample gas to bubble through the condensate as this would remove water soluble organic compounds. All components upstream of the conditioning system should be heated as described in section 2.2.4 to minimize operating and maintenance problems.

2.2.11 *References*

1. Measurement of Volatile Organic Compounds-Guideline Series. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711, EPA–450/2–78–041, June 1978.
2. Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol No. 1). U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, June 1978.
3. Gasoline Vapor Emission Laboratory Evaluation-Part 2. U.S. Environmental Protection Agency, OAQPS, Research Triangle Park, North Carolina, 27711, EMB Report No. 76–GAS–6, August 1975.

3.0 SAMPLING AND ANALYTICAL METHODS

NOTE: The sampling and analytical methods to the BIF manual are published in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication SW–846, as incorporated by reference in §260.11 of this chapter.

SECTION 4.0 PROCEDURE FOR ESTIMATING THE TOXICITY EQUIVALENCY OF CHLORINATED DIBENZO-P-DIOXIN AND DIBENZOFURAN CONGENERS

PCDDs and PCDFs must be determined using the method given in section 3.4 of this document. In this method, individual congeners or homologues[1] are measured and then summed to yield a total PCDD/PCDF value. No toxicity factors are specified in the method to compute risks from such emissions.

For the purpose of estimating risks posed by emissions from boilers and industrial furnaces, however, specific congeners and homologues must be measured using the specified method and then multiplied by the assigned toxicity equivalence factors (TEFs), using procedures described in ''Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs) and 1989 Update,'' EPA/625/3–89/016, March 1989. The resulting 2,3,7,8–TCDD equivalents value is used in the subsequent risk calculations and modeling efforts as discussed in the BIF final rule.

The procedure for calculating the 2,3,7,8–TCDD equivalent is as follows:

1. Using method 23, determine the concentrations of 2,7,3,8-congeners of various PCDDs and PCDFs in the sample.
2. Multiply the congener concentrations in the sample by the TEF listed in Table 4.0–1 to express the congener concentrations in terms of 2,3,7,8–TCDD equivalent. Note that congeners not chlorinated at 2,3,7, and 8 positions have a zero toxicity factor in this table.
3. Add the products obtained in step 2, to obtain the total 2,3,7,8–TCDD equivalent in the sample.

Sample calculations are provided in EPA document No. EPA/625/3–89/016, March 1989, which can be obtained from the EPA, ORD Publications Office, Cincinnati, Ohio (Phone no. 513–569–7562).

TABLE 4.0–1.—2,3,7,8–TCDD TOXICITY EQUIVALENCE FACTORS (TEFS)[1]

Compound	I–TEFs, 89
Mono-, Di-, and TriCDDs	0
2,3,7,8–TCDD	1
Other TCDDs	0
2,3,7,8–PeCDD	0.5
Other PeCDDs	0

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[1] The term ''congener'' refers to any one particular member of the same chemical family; e.g., there are 75 congeners of chlorinated dibenzo-p-dioxins. The term ''homologue'' refers to a group of structurally related chemicals that have the same degree of chlorination. For example, there are eight homologues of CDs, monochlorinated through octachlorinated. Dibenzo-p-dioxins and dibenzofurans that are chlorinated at the 2,3,7, and 8 positions are denoted as ''2378'' congeners, except when 2,3,7,8–TCDD is uniquely referred to: e.g., 1,2,3,7,8–PeCDF and 2,3,4,7,8–PeCDF are both referred to as ''2378–PeCDFs.''

TABLE 4.0–1.—2,3,7,8–TCDD TOXICITY EQUIVALENCE FACTORS (TEFS) [1]—Continued

Compound	I–TEFs, 89
2,3,7,8–HxCDD	0.1
Other HxCDDs	0
2,3,7,8–HpCDD	0.01
Other HpCDDs	0
OCDD	0.001
Mono-, Di-, and TriCDFs	0
2,3,7,8–TCDF	0.1
Other TCDFs	0
1,2,3,7,8–PeCDF	0.05
2,3,4,7,8–PeCDF	0.5
Other PeCDFs	0
2378–HxCDFs	0.1
Other HxCDFs	0
2378–HpCDFs	0.01
Other HpCDFs	0
OCDF	0.001

Reference: Adapted from NATO/CCMS, 1988a.

[1] Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs) 1989 Update EPA/625/3–89/016, March 1989.

SECTION 5.0 HAZARDOUS WASTE COMBUSTION AIR QUALITY SCREENING PROCEDURE

The HWCAQSP is a combined calculation/reference table approach for conservatively estimating short-term and annual average facility impacts for stack emissions. The procedure is based on extensive short-term modeling of 11 generic source types and on a set of adjustment factors for estimating annual average concentrations from short-term concentrations. Facility impacts may be determined based on the selected worst-case stack or on multiple stacks, in which the impacts from each stack are estimated separately and then added to produce the total facility impact.

This procedure is most useful for facilities with multiple stacks, large source-to-property boundary distances, and complex terrain between 1 and 5 km from the facility. To ensure a sufficient degree of conservatism, the HWCAQSP may not be used if any of the five screening procedure limitations listed below are true:

- The facility is located in a narrow valley less than 1 km wide;
- The facility has a stack taller than 20 m and is located such that the terrain rises to the stack height within 1 km of the facility;
- The facility has a stack taller than 20 m and is located within 5 km of the shoreline of a large body of water;
- The facility property line is within 200 m of the stack and the physical stack height is less than 10 m; or
- On-site receptors are of concern, and stack height is less than 10 m.

If any of these criteria are met or the Director determines that this procedure is not appropriate, then detailed site-specific modeling or modeling using the ‘‘Screening Procedures for Estimating the Air Quality Impact of Stationary Sources,’’ EPA –450/4–88–010, Office of Air Quality Planning and Standards, August 1988, is required. Detailed site-specific dispersion modeling must conform to the EPA ‘‘Guidance on Air Quality Models (Revised)’’, EPA 450/2–78–027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July 1986. This document provides guidance on both the proper selection and regulatory application of air quality models.

Introduction

The Hazardous Waste Combustion Air Quality Screening Procedure (HWCAQSP) (also referred to hereafter as ‘‘the screening procedure’’ or ‘‘the procedure’’) provides a quick, easy method for estimating maximum (hourly) and annual average ambient air impacts associated with the combustion of hazardous waste. The methodology is conservative in nature and estimates dispersion coefficients[1] based on facility-specific information.

The screening procedure can be used to determine emissions limits at sites where the nearest meteorological (STAR) station is not representative of the meteorology at the site. If the screen shows that emissions from the site are adequately protective, then the need to collect site-specific meteorological data can be eliminated.

The screening procedure is generally most helpful for facilities meeting one or more of the following conditions:

- Multiple stacks with substantially different release specifications (e.g., stack heights differ by >50 percent, exit temperatures differ by >50 °K, or the exit flow rates differ by more than a factor of 2),
- Terrain located between 1 km and 5 km from the site increases in elevation by more than the physical height of the shortest stack (i.e., the facility is located in complex terrain), or
- Significant distance between the facility’s stacks and the site boundary [guidance on determining whether a distance is ‘‘significant’’ is provided in Step 6(B) of the procedure].

Steps 1 through 9 of the screening procedure present a simplified method for determining emissions based on the use of the ‘‘worst-case’’ stack. If the simplified method shows that desired feed rates result in emissions that exceed allowable limits for one or more pollutants, a refined analysis to examine the emissions from each stack can be conducted. This multiple-stack method is presented in Step 10.

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[1] The term dispersion coefficient refers to the change in ambient air concentration (µg/m^3) resulting from a source with an emission rate of 1 g/sec.

The steps involved in screening methodology are as follows:

Step 1. Define Source Characteristics
Step 2. Determine the Applicability of the Screening Procedure
Step 3. Select the Worst-Case Stack
Step 4. Verify Good Engineering Practice (GEP) Criteria
Step 5. Determine the Effective Stack Height and Terrain-Adjusted Effective Stack Height
Step 6. Classify the Site as Urban or Rural
Step 7. Determine Maximum Dispersion Coefficients
Step 8. Estimate Maximum Ambient Air Concentrations
Step 9. Determine Compliance With Regulatory Limits
Step 10. Multiple Stack Method

Step 1: Define Source Characteristics

Provide the following source data:[2]

Stack Data:	Stack No. 1	Stack No. 2	Stack No. 3
Physical stack height (m)	________	________	________
Exhaust temperature (°K)	________	________	________
Flow rate (m^3/sec)	________	________	________

Nearby Building Dimensions

Consider all buildings within five building heights or five maximum projected widths of the stack(s). For the building with the greatest height, fill in the spaces below.

Building Height (m) ______________
Maximum projected building width (m) ______

Nearby Terrain Data

Determine maximum terrain rise for the following three distance ranges from the facility (not required if the highest stack is less than 10 m in height):

________(m)	________(m)	________(m)
0–0.5 km	0–2.5 km	0–5 km

Distance from facility to nearest shoreline (km) ______________

Valley width (km) ______________

Step 2: Determine the Applicability of the Screening Procedure

Fill in the following data:

	Yes	No
Is the facility in a valley < km in width?	_____	_____
Is the terrain rise within 1 km of the facility greater than the physical stack height of the tallest stack? (Only applies to stacks ≤20 meters in height)	_____	_____
Is the distance to the nearest shoreline <5 km? (Only applies to facilities with stacks ≤20 meters in height)	_____	_____
For the building listed in Step 1, is the closest property boundary <5 times the building height or <5 times the maximum projected building width? (Only applies to facilities with a stack height <2.5 times the building height)	_____	_____

If the answer is ‘‘no’’ to all the preceding questions, then the HWCAQSP is acceptable. If the answer to any question is ‘‘yes’’, the procedure is not acceptable.

Step 3: Select the Worst-Case Stack

If the facility has several stacks, a worst-case stack must be chosen to conservatively represent release conditions at the facility. Follow the steps below to identify the worst-case stack.

Apply the following equation to each stack:

$$K=HVT$$

where:

K=an arbitrary parameter accounting for the relative influence of the stack height and plume rise.
H=Physical stack height (m)
V=Flow rate (m^3/sec)
T=Exhaust temperature (°K)

Complete the following table to compute the ‘‘K’’ value for each stack:

---

[2] Worksheet space is provided for three stacks. If the facility has additional stacks, copy the form and revise stack identification numbers for 4, 5, etc.

Stack No.	Stack height (m)	×	Flow rate (m^3/sec)	×	Exit temp (°K)	=	K
1		×		×		=	
2		×		×		=	
3		×		×		=	

Select the stack with the lowest ‘‘K’’ value. This is the worst-case stack that will be used for Steps 4 through 9.

Worst-Case Stack is identified as Stack No. ______

Step 4: Verify Good Engineering Practice (GEP) Criteria

Confirm that the selected worst-case stack meets Good Engineering Practice (GEP) criteria. The stack height to be used in the subsequent steps of this procedure must not be greater than the maximum GEP. Maximum and minimum GEP stack heights are defined as follows:

CEP (minimum)=$H+(1.5\times L)$
GEP (maximum)=greater of 65 m or $H+(1.5\times L)$
where:

H=height of the building selected in Step 1 measured from ground level elevation at the base of the stack
L=the lesser dimension of the height or projected width of the building selected in Step 1

Record the following data for the worst-case stack:

Stack height (m)=_________
H(m)=_________
L(m)=_________

Then compute the following:

GEP (minimum) (m)=_________
GEP (maximum) (m)=_________

- If the physical height of the worst-case stack exceeds the maximum GEP, then use the maximum GEP stack height for the subsequent steps of this analysis;
- If the physical height of the worst-case stack is less than the minimum GEP, then use generic source number 11 as the selected source for further analysis and proceed directly to Step 6;
- If the physical height of the worst-case stack is between the minimum and maximum GEP, then use the actual physical stack height for the subsequent steps of this analysis.

Step 5: Determine the Effective Stack Height and the Terrain-Adjusted Effective Stack Height (TAESH)

The effective stack height is an important factor in dispersion modeling. The effective stack height is the physical height of the stack plus plume rise. As specified in Step 4, the stack height used to estimate the effective stack height must not exceed GEP requirements. Plume rise is a function of the stack exit gas temperature and flow rate.

In this analysis, the effective stack height is used to select the generic source that represents the dispersion characteristics of the facility. For facilities located in flat terrain and for all facilities with worst-case stacks less than or equal to 10 meters in height, generic source numbers are selected strictly on the basis of effective stack height. In all other cases, the effective stack height is further adjusted to take into account the terrain rise near the facility. This ‘‘terrain-adjusted effective stack height’’ (TAESH) is then used to select the generic source number that represents the dispersion characteristics of the facility. Follow the steps below to identify the effective stack height, the TAESH (where applicable), and the corresponding generic source number.

(A) Go to Table 5.0–1 and find the plume rise value corresponding to the stack temperature and exit flow rate for the worst-case stack determined in Step 3.

Plume rise=_______(m)

(B) Add the plume rise to the GEP stack height of the worst-case stack determined in Steps 3 and 4.

GEP stack height (m)	+	Plume rise (m)	=	Effective stack height (m)
_______	+	_______	=	_______

(C) Go to the first column of Table 5.0–2 and identify the range of effective stack heights that includes the effective stack height estimated in Step 5(B). Record the generic source number that corresponds to this range.

Generic source number=_________

(D) If the source is located in flat terrain[3], or if the generic source number identified in Step 5(C) above is 1 or 11 (regardless of terrain classification), use the generic source number determined in Step 5(C) and proceed directly to Step 6. Otherwise, continue to Step 5(E).

(E) For those situations where the conditions in Step 5(D) do not apply, the effective stack height must be adjusted for terrain. The TAESH for each distance range is computed by subtracting the terrain rise within the distance range from the effective stack height.[4]

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[3] The terrain is considered flat and terrain adjustment factors are not used if the maximum terrain rise within 5 km of the facility (see Step 1) is less than 10 percent of the physical stack height of the worst-case stack.

[4] Refer to Step 1 for terrain adjustment data. Note that the distance from the source to the outer radii of each range is used. For example, for the range >0.5–2.5 km, the maximum terrain rise in the range 0.0–2.5 km is used.

TABLE 5.0–1.—ESTIMATED PLUME RISE (IN METERS) BASED ON STACK EXIT FLOW RATE AND GAS TEMPERATURE

	Exhaust Temperature (°K)										
Flow rate (m^3/s)	<325	325–349	350–399	400–449	450–499	500–599	600–699	700–799	800–999	1000–1499	>1499
<0.5	0	0	0	0	0	0	0	0	0	0	0
0.5–0.9	0	0	0	0	0	0	0	0	1	1	1
1.0–1.9	0	0	0	0	1	1	2	3	3	3	4
2.0–2.9	0	0	1	3	4	4	6	6	7	8	9
3.0–3.9	0	1	2	5	6	7	9	10	11	12	13
4.0–4.9	1	2	4	6	8	10	12	13	14	15	17
5.0–7.4	2	3	5	8	10	12	14	16	17	19	21
7.5–9.9	3	5	8	12	15	17	20	22	22	23	24
10.0–12.4	4	6	10	15	19	21	23	24	25	26	27
12.5–14.9	4	7	12	18	22	23	25	26	27	28	29
15.0–19.9	5	8	13	20	23	24	26	27	28	29	31
20.0–24.9	6	10	17	23	25	27	29	30	31	32	34
25.0–29.9	7	12	20	25	27	29	31	32	33	35	36
30.0–34.9	8	14	22	26	29	31	33	35	36	37	39
35.0–39.9	9	16	23	28	30	32	35	36	37	39	41
40.0–49.9	10	17	24	29	32	34	36	38	39	41	42
50.0–59.9	12	21	26	31	34	36	39	41	42	44	46
60.0–69.9	14	22	27	33	36	39	42	43	45	47	49
70.0–79.9	16	23	29	35	38	41	44	46	47	49	51
80.0–89.9	17	25	30	36	40	42	46	48	49	51	54
90.0–99.9	19	26	31	38	42	44	48	50	51	53	56
100.0–119.9	21	26	32	39	43	46	49	52	53	55	58
120.0–139.9	22	28	35	42	46	49	52	55	56	59	61
140.0–159.9	23	30	36	44	48	51	55	58	59	62	65
160.0–179.9	25	31	38	46	50	54	58	60	62	65	67
180.0–199.9	26	32	40	48	52	56	60	63	65	67	70
>199.9	26	33	41	49	54	58	62	65	67	69	73

TABLE 5.0–2—Selection of Generic Source Number

Effective stack height (m)	Generic source No.
<10.0	1
10.0–14.9	2
15.0–19.9	3
20.0–24.9	4
25.0–30.9	5
31.0–41.9	6
42.0–52.9	7
53.0–64.9	8
65.0–122.9	9
113.0+	10
Downwash	11

TABLE 5.0–3.—Classification of Land Use Types

Type[1]	Description	Urban or rural designation[2]
I1	Heavy Industrial	Urban
I2	Light/Moderate Industrial	Urban
CI	Commercial	Urban
R1	Common Residential (Normal Easements).	Rural
R2	Compact Residential (Single Family).	Urban
R3	Compact Residential (Multi-Family).	Rural
R4	Estate Residential (Multi-Acre Plots).	Rural
A1	Metropolitan Natural	Rural
A2	Agricultural	Rural
A3	Undeveloped (Grasses/Weeds)	Rural
A4	Undeveloped (Heavily Wooded)	Rural
A5	Water Surfaces	Rural

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[1] EPA, Guideline on Air Quality Models (Revised), EPA–450/2–78–027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July, 1986.

[2] Auer, August H. Jr., ''Correlation of Land Use and Cover with meteorological Anomalies,'' *Journal of Applied Meteorology,* pp. 636–643, 1978.

Distance range (km)	Effective stack—height (m) [see step 5(B)]	–	Maximum terrain—rise (m) (see step 1)	=	TAESH(m)
0.0–0.5	_______	–	_______	=	_______
>0.5–2.5	_______	–	_______	=	_______
>2.5–5.0	_______	–	_______	=	_______

If the terrain rise for any of the distance ranges is greater than the effective stack height, set the TAESH equal to zero and use generic source number 1 for that distance range.

Record the generic source numbers from Table 5.0–2 based on each of the TAESH values.

Distance range (km)	Generic source No. (after terrain adjustment)
0.0–0.5	______
>0.5–2.5	______
>2.5–5.0	______

Step 6: Classify the Site as Urban or Rural

(A) Classify the land use near the facility as either urban or rural by determining the percentage of urban land use types (as defined in Table 3; for further guidance see the footnoted references) that fall within 3 km of the facility.[5]

Method Used to Estimate Percent Urban Land Use:	Visual ______	Planimeter ______
Estimated Percentages.	Urban ______	Rural ______

If the urban land use percentage is less than or equal to 30 percent based on a visual estimate, or 50 percent based on a planimeter, the local land use is considered rural. Otherwise, the local land use is considered urban.

Classification. (check applicable space).	Urban ______	Rural ______

(B) Based on the TAESH and the urban/rural classification of surrounding land use, use the following table to determine the threshold distance between any stack and the nearest facility boundary.

Terrain adjusted effective stack height range (m)	Distance (m)	
	Urban	Rural
1–9.9	200	200
10–14.9	200	250
15–19.9	200	250
20–24.9	200	350
25–30.9	200	450
31–41.9	200	550
42–52.9	250	800
53–64.9	300	1000
65–112.9	400	1200
113+	700	2500

Record the following information:

Threshold distance from the table (m): ____

Minimum distance from any stack to property boundary (m): ____

If the minimum distance between any stack and the nearest facility boundary is greater than the threshold distance, the surrounding buffer distance is considered significant and the facility is likely to benefit from use of the HWCAQSP relative to the Tier I and II limits (see discussion of benefits from using HWCAQSP in Introduction section).

Step 7: Determine Maximum Dispersion Coefficients

(A) Determine maximum average hourly dispersion coefficients. Based on the results of Step 6(A), select either Table 5.0–4 (urban) or Table 5.0–5 (rural) to determine the maximum average hourly dispersion coefficient.[6] For flat terrain [defined in Step 5(D)] and for all sites with generic source numbers 1 or 11, use Step 7(A) (1). For rolling or complex terrain (excluding generic sources numbers 1 and 11), use Step 7(A) (2).

(1) Search down the appropriate generic source number column [based on Step 5(C)], beginning at the minimum fenceline distance listed in Step 6(B).[7] Record the maximum average hourly dispersion coefficient encountered.

Maximum Average Hourly Dispersion Coefficient=____(µg/m^3/g/sec)

(2) For each of the three distance-based generic source numbers listed in Step 5(E), search down the appropriate generic source

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[5] The delineation of urban and rural areas, can be difficult for the residential-type areas listed in Table 5.0–3. The degree of resolution in Table 5.0–3 for residential areas often cannot be identified without conducting site area inspections. This process can require extensive analysis, which, for many applications, can be greatly streamlined without sacrificing confidence in selecting the appropriate urban or rural classification. The fundamental simplifying assumption is based on the premise that many applications will have clear-cut urban/rural designations, i.e., most will be in rural settings that can be definitively characterized through a review of aerial photographs, zoning maps, or U.S. Geological Survey topographical maps.

[6] For the distance range 6 to 20 kilometers, generic source number 1 is used to conservatively represent the maximum dispersion coefficient.

[7] Exclude all distances that are closer to the facility than the property boundary. For example, if the actual distance to the nearest property boundary is 265 meters, begin at the 300 meter distance in Tables 5.0–4 and 5.0–5.

number columns, beginning at the minimum fenceline distance listed in Step 6(B). Note that different columns may be used for each of the three distance ranges if there is a need for terrain adjustment. Record the maximum dispersion coefficient for each generic source number.

Distance range (km)	Generic source No. [from Step 5(E)]	Maximum dispersion coefficient (µg/m³/m/sec)
0.0–0.5	______	______
>0.5–2.5.	______	______
>2.5–5.0.	______	______
>5.0–20.0.	______	______

TABLE 5.0–4.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (µ g/m^3)[a] FOR HAZARDOUS WASTE COMBUSTORS USING URBAN CONDITIONS

Distance (KM)	Generic Source #1 (<10M)	Generic Source #2 (10M)	Generic Source #3 (15M)	Generic Source #4 (20M)	Generic Source #5 (25M)	Generic Source #6 (31M)	Generic Source #7 (42M)	Generic Source #8 (53M)	Generic Source #9 (65M)	Generic Source #10 (113M)	Generic Source #11 (Downwash)
0.20	680.1	517.5	368.7	268.7	168.5	129.8	63.4	30.1	18.4	1.6	662.3
0.25	521.9	418.2	303.7	232.6	163.0	124.2	67.6	38.5	19.8	3.2	500.0
0.30	407.7	351.7	256.2	199.0	147.0	118.3	63.5	41.5	25.0	4.2	389.3
0.35	326.2	304.2	221.6	172.7	130.2	107.9	60.0	40.5	27.3	5.4	311.9
0.40	268.5	268.5	195.6	152.5	115.7	97.1	59.6	37.8	27.4	5.8	268.5
0.45	240.8	240.7	175.4	136.7	103.9	87.6	56.6	37.2	26.3	5.8	240.8
0.50	218.5	218.5	159.2	124.1	94.4	79.7	52.9	36.7	24.7	5.8	218.5
0.55	200.3	200.3	145.9	113.8	86.5	73.1	49.2	35.4	24.5	6.6	200.3
0.60	185.1	185.1	134.9	105.1	80.0	67.6	45.8	33.8	24.3	7.1	185.1
0.65	172.2	172.2	125.5	97.8	74.4	62.9	42.7	32.0	23.7	7.4	172.2
0.70	161.2	161.2	117.4	91.6	69.6	58.9	40.1	30.2	22.9	7.5	161.2
0.75	151.6	151.6	110.5	86.1	65.5	55.4	37.7	28.6	22.0	7.5	151.6
0.80	143.2	143.2	104.4	81.4	61.9	52.3	35.6	27.1	21.1	7.4	143.2
0.85	135.8	135.8	99.0	77.2	58.7	49.6	33.8	25.7	20.2	7.2	135.8
0.90	129.2	129.2	94.2	73.4	55.8	47.2	32.1	24.5	19.3	7.0	129.2
0.95	123.3	123.3	89.9	70.1	53.3	45.0	30.7	23.4	18.5	6.8	123.3
1.00	118.0	118.0	86.0	67.0	51.0	43.1	29.4	22.4	17.7	6.5	118.0
1.10	108.8	108.0	79.3	61.8	47.0	39.7	27.1	20.6	16.4	6.5	108.8
1.20	101.1	101.1	73.7	57.4	43.7	36.9	25.2	19.2	15.2	6.4	101.1
1.30	94.6	94.6	68.9	53.7	40.9	34.5	23.5	18.0	14.2	6.3	94.6
1.40	89.0	89.0	64.8	50.6	38.5	32.5	22.1	16.9	13.4	6.1	89.0
1.50	84.1	84.1	61.3	47.8	36.3	30.7	20.9	16.0	12.7	5.9	84.1
1.60	79.8	79.8	58.2	45.4	34.5	29.2	19.9	15.2	12.0	5.6	79.8
1.70	76.0	76.0	55.4	43.2	32.9	27.8	18.9	14.4	11.4	5.4	76.0
1.80	72.7	72.7	53.0	41.3	31.4	26.5	18.1	13.8	10.9	5.2	72.7
1.90	69.6	69.6	50.7	39.6	30.1	25.4	17.3	13.2	10.5	5.0	69.6
2.00	66.9	66.9	48.8	38.0	28.9	24.4	16.7	12.7	10.1	4.8	66.9
2.25	61.1	61.1	44.5	34.7	26.4	22.3	15.2	11.6	9.2	4.4	61.1
2.50	56.4	56.4	41.1	32.1	24.4	20.6	14.0	10.7	8.5	4.1	56.4
2.75	52.6	52.6	38.3	29.9	22.7	19.2	10.0	10.0	7.9	3.8	52.6
3.00	49.3	49.3	35.9	28.0	21.3	18.0	9.4	9.4	7.4	3.6	49.3
4.00	40.2	40.2	29.3	22.8	17.4	14.7	7.6	7.6	6.1	2.9	40.2
5.00	34.5	34.5	25.2	19.6	14.9	12.6	6.6	6.6	5.2	2.5	34.5
6.00	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7
7.00	27.8	27.8	27.8	37.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8
8.00	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
9.00	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
10.00	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
15.00	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6

TABLE 5.0–4.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (μ g/m^3)[a] FOR HAZARDOUS WASTE COMBUSTORS USING URBAN CONDITIONS—Continued

Distance (KM)	Generic Source #1 (<10M)	Generic Source #2 (10M)	Generic Source #3 (15M)	Generic Source #4 (20M)	Generic Source #5 (25M)	Generic Source #6 (31M)	Generic Source #7 (42M)	Generic Source #8 (53M)	Generic Source #9 (65M)	Generic Source #10 (113M)	Generic Source #11 (Downwash)
20.00	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.01	15.0

[a] Based on a 1 Gram/Second Emission Rate

TABLE 5.0–5.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (μ g/m^3)[a] FOR HAZARDOUS WASTE COMBUSTORS USING RURAL CONDITIONS

Distance (KM)	Generic source #1 (<10M)	Generic source #2 (10M)	Generic source #3 (15M)	Generic source #4 (20M)	Generic source #5 (25M)	Generic source #6 (31M)	Generic source #7 (42M)	Generic source #8 (53M)	Generic source #9 (65M)	Generic source #10 (113M)	Generic source #11 (Downwash)
0.20	1771.1	670.3	308.6	176.8	102.8	76.5	28.0	10.1	3.5	0.0	1350.8
0.25	1310.6	678.4	316.9	183.6	104.6	71.8	38.0	17.6	7.9	0.2	1227.3
0.30	1002.3	629.2	303.4	199.1	100.4	75.0	39.7	24.0	12.6	0.8	1119.3
0.35	798.4	569.6	282.3	200.7	117.0	71.1	36.3	25.9	16.8	1.9	1023.8
0.40	656.9	516.5	278.7	194.4	125.2	82.7	25.3	24.6	18.1	3.1	938.9
0.45	621.5	471.1	277.6	184.3	127.5	89.7	35.6	21.7	17.6	4.3	851.8
0.50	633.5	432.4	272.0	172.7	125.7	92.9	34.4	21.6	15.9	5.5	787.8
0.55	630.1	399.2	263.8	168.0	121.6	93.3	38.6	22.1	13.6	6.5	730.6
0.60	616.6	370.4	254.0	169.1	116.2	91.8	42.6	21.7	14.3	6.7	676.4
0.65	596.7	345.4	243.6	168.1	110.3	89.2	45.3	20.9	14.7	6.4	633.4
0.70	573.2	323.4	232.9	165.6	104.5	85.8	47.0	23.3	14.6	5.9	592.0
0.75	546.9	304.0	222.3	162.0	98.8	82.2	47.7	25.5	14.3	5.5	554.6
0.80	520.9	286.8	212.1	157.7	98.8	78.5	47.8	27.1	13.8	5.1	522.1
0.85	495.7	271.5	202.4	153.0	99.0	74.9	47.4	28.3	15.0	4.7	491.8
0.90	471.5	257.8	193.3	148.1	98.6	71.4	46.6	29.1	16.3	4.5	464.2
0.95	448.5	245.4	184.7	143.1	97.6	72.3	45.6	29.6	17.3	4.2	438.9
1.00	426.8	234.2	176.8	138.1	96.3	72.6	44.4	29.8	18.2	4.0	415.8
1.10	387.5	214.7	162.5	128.2	91.9	71.1	41.8	29.5	19.3	3.9	375.0
1.20	353.5	198.4	150.3	119.3	87.4	69.1	39.1	28.6	19.8	4.1	340.3
1.30	323.0	189.6	139.9	111.5	82.9	66.7	36.6	27.5	19.8	4.2	310.4
1.40	296.6	182.2	130.8	104.5	78.7	64.2	34.3	26.2	19.5	4.2	284.6
1.50	273.3	174.6	122.9	98.3	74.7	61.6	32.3	24.9	19.0	4.2	262.0
1.60	252.7	167.0	115.9	92.8	71.0	59.1	31.8	23.6	18.4	4.2	242.2
1.70	234.5	159.6	109.7	87.9	67.6	56.7	31.6	22.5	17.7	4.3	224.7
1.80	218.3	152.4	104.1	83.5	64.4	54.3	31.3	21.4	17.0	4.5	211.9
1.90	203.7	145.6	99.1	79.5	61.5	52.1	30.9	20.4	16.3	4.8	198.4
2.00	190.7	139.1	94.6	75.9	58.8	50.0	30.4	19.5	15.7	5.1	186.3
2.25	164.4	124.5	85.1	68.3	53.0	45.4	28.9	18.1	14.2	5.4	160.8
2.50	143.7	112.1	77.3	62.1	48.2	41.4	27.2	17.9	12.9	5.5	140.7
2.75	127.0	101.5	70.9	56.9	38.1	38.1	25.6	17.5	11.8	5.4	124.5
3.00	113.4	92.4	65.6	52.6	35.2	35.2	24.0	17.0	11.2	5.2	112.5

4.00	78.8	67.3	50.6	40.6	27.2	27.2	29.0	14.3	10.4	4.3	78.3
5.00	59.1	54.6	41.4	33.2	22.2	22.2	15.6	12.0	9.3	3.5	58.8
6.00	56.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7
7.00	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4
8.00	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
9.00	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
10.00	9.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
15.00	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
20.00	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9

[a] Based on a 1 Gram/Second Emission Rate

(B) Determine annual/hourly ratio for rural analysis. The maximum average annual dispersion coefficient is approximated by multiplying the maximum hourly dispersion coefficient (identified in Step 7(A) by the appropriate ratio selection from Table 5.0–6. The generic source number(s) [from Steps 5(C) or 5(E)], urban/rural designation (from Step 6), and the terrain type are used to select the appropriate scaling factor. Use the noncomplex terrain designation for all sources located in flat terrain, for all sources where the physical stack height of the worst-case stack is less than or equal to 10 m, for all sources where the worst-case stack is less than the minimum GEP, and for those sources where all of the TAESH values in Step 5(E) are greater than zero. Use the complex terrain designation in all other situations.

(C) Determine maximum average annual dispersion coefficient. The maximum average annual dispersion coefficient is determined by multiplying the maximum hourly dispersion coefficient (Step 7(A)) by its corresponding annual/hourly ratio (Step 7(B)).

Terrain	Distance from stack (m)	Generic source No.	Maximum hourly dispersion coefficient (⩾g/m ^{3}/g/sec)	Annual hourly ratio	Maximum annual dispersion coefficient (⩾g/m ^{3}/g/sec)[1]
Flat	0–20.0 0–0.5 ≤0.5–2.5				
Rolling or Complex	≤2.5–5.0 ≤5.0–20.0				

[1] Maximum hourly dispersion coefficient times annual/hourly ratio.

Step 8: Estimate Maximum Ambient Air Concentrations—see procedures prescribed in subpart H of 40 CFR part 266.

Step 9: Determine Compliance with Regulatory Limits—see procedures prescribed in subpart H of 40 CFR part 266.

Step 10: Multiple Stack Method (Optional)

This option is a special case procedure that may be helpful when (1) the facility exceeded the regulatory limits for one or more pollutants, as detailed in Step 9, and (2) the facility has multiple stacks with substantially different emission rates and effective release heights. Only those pollutants that fail the Step 9 screening limits need to be addressed in this exercise.

This procedure assesses the environmental impacts from each stack and then sums the results to estimate total impacts. This option is conceptually the same as the basic approach (Steps 1 through 9) and does not involve complex calculations. However, it is more time-consuming and is recommended only if the basic approach fails to meet the risk criteria. The procedure is outlined below.

(A) Compute effective stack heights for each stack.[8]

Stack No.	GEP stack height (m)	Flow rate (m ^{3}/sec)	Exit temp (°K)	Plume rise (m)	Effective stack height (m)
1	______	______	______	______	______
2	______	______	______	______	______
3	______	______	______	______	______

Add an additional page if more than three stacks are involved. Circle the maximum and minimum effective stack heights.

(B) Determine if this multiple-stack screening procedure will likely produce less conservative results than the procedure in Steps 1 through 9. To do this, compute the ratio of maximum-to-minimum effective stack height:

$$\frac{\text{Maximum Effective Stack Height}}{\text{Minimum Effective Stack Height}} = \underline{\qquad\qquad}$$

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[8] Follow the procedure outlined in Step 4 of the basic screening procedure to determine the GEP for each stack. If a stack's physical height exceeds the maximum GEP, use the maximum GEP values. If a stack's physical height is less than the minimum GEP, use generic source number 11 in the subsequent steps of this analysis. Follow the procedure in Steps 5(A) and 5(B) to determine the effective height of each stack.

If the above ratio is greater than 1.25, proceed with the remaining steps. Otherwise, this option is less likely to significantly reduce the degree of conservatism in the screening method.

(C) Determine if terrain adjustment is needed and select generic source numbers. Select the shortest stack height and maximum terrain rise out to 5 km from Step 1 and determine if the facility is in flat terrain.

Shortest stack height (m)= ________

Maximum terrain rise in meters out to 5 km= ________

$$\frac{\text{Terrain Rise (m)}}{\text{Shortest Stack Height (m)}} \times 100 = \underline{\qquad\quad}\,\%$$

If the value above is greater than 10 percent, the terrain is considered nonflat; proceed to Step 10(D). If the ratio is less than or equal to 10 percent, the terrain is considered flat. Identify the generic source numbers based on effective stack heights computed in Step 10(A). Refer to Table 5.0–2 provided earlier to identify generic source numbers. Record the generic source numbers identified and proceed to Step 10(F).

	Stack No.		
	1	2	3
Generic Source Numbers	___	___	___

(D) Compute the TAESH and select generic source numbers (four sources located in nonflat terrain).

1. Compute the TAESH for all remaining stacks using the following equation:

HE–TR=TAESH

where:

HE=effective stack height (m)

TR=maximum terrain rise for each distance range (m)

TAESH=terrain-adjusted effective stack height (m)

USE THE TABLE BELOW TO CALCULATE THE TAESH FOR EACH STACK[9]

Distance Range (km)	Stack No.														
	0–0.5					>0,5–2.5					>2.5–5.0				
	HE	–	TR	=	TAESH	HE	–	TR	=	TAESH	HE	–	TR	=	TAESH
1	......	–	......	=	....	......	–	......	=	....	......	–	......	=	....
2	......	–	......	=	....	......	–	......	=	....	......	–	......	=	....
3	......	–	......	=	....	......	–	......	=	....	......	–	......	=	....

[9] Refer to Step 1 for terrain adjustment data. Note that the distance from the source to the outer radii of each range is used. For example, for the range >0.5–2.5 km, the maximum terrain rise in the range 0.0–2.5 km is used.

For those stacks where the terrain rise within a distance range is greater than the effective stack height (i.e., HE–TR is less than zero), the TAESH for that distance range is set equal to zero, and generic source number 1 should be used for that distance range for *all* subsequent distance ranges. Additionally, for all stacks with a physical stack height of less than or equal to 10 meters, use generic source number 1 for all distance ranges.[10] For the remaining stacks, proceed to Step 10(D)(2).

2. For the remaining stacks, refer to Table 5.0–2 and, for each distance range, identify the generic source number that includes the TAESH. Use the values obtained from Steps 10(D)(1) and 10(D)(2) to complete the following summary worksheet;

GENERIC SOURCE NUMBER AFTER TERRAIN ADJUSTED (IF NEEDED)

Stack No.	0–0.5 km	>0.5–2.5 km	>2.5–5.0 km
1	....	....	....
2	....	....	....
3	....	....	....

(E) Identify maximum average hourly dispersion coefficients. Based on the land use classification of the site (e.g., urban or rural), use either Table 5.0–4 or Table 5.0–5 to determine the appropriate dispersion coefficient for each distance range for each stack. Begin at the minimum fenceline distance indicated in Step 7(B) and record on Worksheet 5.0–1 the dispersion coefficient for each stack/distance range. For stacks located in facilities in flat terrain, the generic source numbers were computed in Step 10(C). For stacks located in facilities in rolling and complex terrain, the generic source numbers were computed in Step 10(D). For flat terrain applications and for stacks with a physical height of less than or equal to 10 meters, only one generic source number is used per

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[10] This applies to all stacks less than or equal to 10 meters regardless of the terrain classification.

stack for all distance ranges. For other situations up to three generic source numbers may be needed per stack (i.e., a unique generic source number per distance range). In Tables 5.0–4 and 5.0–5, the dispersion coefficients for distances of 6 km to 20 km are the same for all generic source numbers in order to conservatively represent terrain beyond 5 km (past the limits of the terrain analysis).

Worksheet 5.0-1 **Dispersion Coefficient by Downwind Distance**[1]

Distance	Stack 1	Stack 2	Stack 3
0.20			
0.25			
0.30			
0.35			
0.40			
0.45			
0.50			
0.55			
0.60			
0.65			
0.70			
0.75			
0.80			
0.85			
0.90			
0.95			
1.00			
1.10			
1.20			
1.30			
1.40			
1.50			
1.60			
1.70			
1.80			
1.90			
2.00			
2.25			
2.50			
2.75			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			
9.00			
10.00			
15.00			
20.00			

[1] Note: This procedure places all stacks at the same point, but allows for consideration of different effective stack heights. The distance to the closest boundary (extracted from Step 1) should be the closest distance to any stack.

(F) Estimate maximum hourly ambient air concentrations. In this step, pollutant-specific emission rates are multiplied by appropriate dispersion coefficients to estimate ambient air concentrations. For each stack, emissions are multiplied by the dispersion coefficient selected in Step 10(E) and summed across all stacks to estimate ambient air concentrations at various distances from the facility. From these summed concentrations, the maximum hourly ambient air concentration is selected. First, select the maximum emission rate of the pollutant.[11] Record these data in the spaces provided below.[12]

MAXIMUM ANNUAL EMISSION RATES (G/SEC)

Pollutant	Stack 1	Stack 2	Stack 3
	....	....	....

Complete a separate copy of Worksheet 5.0–2 for each pollutant and select the highest hourly concentration from the summation column at the far right of the worksheet. Record the maximum hourly air concentration for each pollutant analyzed (add additional lines if needed):

Pollutant	Maximum hourly air concentration
	....

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[11] Recall that it is recommended that this analysis be performed for only one or two pollutants. The pollutants chosen for this analysis should be those that show the most significant exceedances of the risk threshold.

[12] Refer to Step 8 of the basic screening procedure. At this point in the screening procedure, annual emissions are used to represent hourly average emission rates. These values will be adjusted by the annual/hourly ratio to estimate annual average concentrations.

Worksheet 5.0-2 Maximum Hourly Ambient Air Concentration

Pollutant ________

Total Distance (km)	Stack 1 ER x DC = C	Stack 2 ER x DC = C	Stack 3 ER x DC = C	Summed Concentration from all Stacks
0.20	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.25	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.30	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.35	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.40	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.45	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.50	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.55	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.60	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.65	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.70	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.80	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.85	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.90	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
0.95	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.10	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.20	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.30	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.40	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.50	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____

ER= Annual Average Emission Rate
DC= Hourly Dispersion Coeffiecient (from Worksheet 5.0-1)
C= Estimated Maximum Hourly Ambient Air Concentration

Worksheet 5.0-2 Maximum Hourly Ambient Air Concentration

Pollutant ______________

Total Distance (km)	Stack 1 ER x DC = C	Stack 2 ER x DC = C	Stack 3 ER x DC = C	Summed Concentration from all Stacks
1.60	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.70	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.80	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.90	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.25	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.50	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.75	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
3.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
4.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
5.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
6.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
7.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
8.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
9.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
10.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
15.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
20.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____

ER=Annual Average Emission Rate
DC= Hourly Dispersion Coefficient (from Worksheet 5.0-1)
C= Estimated Maximum Hourly Ambient Air Concentration

Worksheet 5.0-2 Maximum Ambient Air Concentration

Pollutant ______________

Total Distance (km)	Stack 1 ER x DC = C	Stack 2 ER x DC = C	Stack 3 ER x DC = C	Summed Concentration from all Stacks
1.60	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.70	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.80	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
1.90	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.25	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.50	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
2.75	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
3.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
4.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
5.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
6.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
7.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
8.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
9.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
10.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
15.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____
20.00	____ x ____ = ____	____ x ____ = ____	____ x ____ = ____	____

ER = Annual average emission rate
DC = Hourly dispersion coefficient (from Worksheet 1)
C = Estimated maximum hourly ambient air concentration

(G) Determine the complex/noncomplex designation for each stack. For each stack, subtract the maximum terrain rise within 5 km of the site from the physical stack height and designate the stack as either complex or noncomplex. If the stack height minus the maximum terrain rise (within 5 km) is greater than zero or if the stack is less than 10 meters in physical height, then assign the stack a noncomplex designation. If the stack height minus the maximum terrain rise (within 5 km) is less than or equal to zero, then assign the stack a complex designation.

Perform the following computation for each stack and record the information in the spaces provided. Check in the spaces provided whether the stack designation is complex or noncomplex.

Stack No.	Stack height (m)		Maximum terrain rise (m)			Complex	Noncomplex
1		–		=	(m)		
2		–		=	(m)		
3		–		=	(m)		

(H) Identify annual/hourly ratios. Extract the annual/hourly ratios for each stack by referring to Table 5.0–6. Generic source numbers (from Steps 10(C) or 10(D), urban/rural designation (from Step 6)), and complex or noncomplex terrain designations (from Step 10(G)) are used to select the appropriate scaling factor needed to convert hourly maximum concentrations to estimates of annual average concentrations.

Complete the following table:[13]

Stack No.	Generic source No. steps 10 (C or D)			Annual/hourly ratio (from table 5.0–6)		
	Distance ranges (km)			Distance ranges (km)		
	0–0.5	>0.5–2.5	>2.5–5.0	0–0.5	>0.5–2.5	>2.5–5.0
1						
2						
3						

(I) Select the highest annual/hourly ratio among all of the stacks,[14] and then estimate the maximum annual average ambient air concentrations for each pollutant by completing the following table, where:

C=Maximum total hourly ambient air concentration (µg/m³) for pollutant ''N'' from Step 10(F),

C_a=Maximum annual average air concentration for pollutant ''N'' (µg/m³),

R=Annual/hourly ratio.

TABLE 5.0–6.—95TH PERCENTILE OF ANNUAL/HOURLY RATIOS

Noncomplex Terrain			Complex Terrain		
Source	Urban	Rural	Source	Urban	Rural
1	0.019	0.014	1	0.020	0.053
2	0.033	0.019	2	0.020	0.053
3	0.031	0.018	3	0.030	0.057
4	0.029	0.017	4	0.051	0.047
5	0.028	0.017	5	0.067	0.039
6	0.028	0.017	6	0.059	0.034
7	0.031	0.015	7	0.036	0.031
8	0.030	0.013	8	0.026	0.024
9	0.029	0.011	9	0.026	0.024
10	0.029	0.008	10	0.017	0.013
11	0.018	0.015	11	0.020	0.053

Pollutant	C^a (µg/m³)	×	R	=	$C_{A(\geqslant G/M\&thnsp\geqq^{3})}$
______	___	×	___	=	___
______	___	×	___	=	___

(J) Use the maximum annual average concentrations from Step 10(I) to determine compliance with regulatory requirements.

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[13] If any stack (excluding generic stack number 1 and 11) in Step 10(D) shows a negative terrain adjusted stack height, use the complex terrain annual/hourly ratios.

[14] As an option, the user can identify the stack with the highest ratio for each distance range (rather than the absolute highest). In this case, extra sheets would be needed to show estimated annual average concentrations from each stack by multiplying emission rate times maximum hourly dispersion coefficient times maximum annual/hourly ratio for applicable distance range. Then sum across all stacks for each downwind distance.

SECTION 6.0—SIMPLIFIED LAND USE CLASSIFICATION PROCEDURE FOR COMPLIANCE WITH TIER I AND TIER II LIMITS

6.1 *Introduction*

This section provides a simplified procedure to classify areas in the vicinity of boilers and industrial furnace sites as urban or rural in order to set risk-based emission limits under subpart H of 40 CFR part 266. Urban/rural classification is needed because dispersion rates differ between urban and rural areas and thus, the risk per unit emission rate differs accordingly. The combination of greater surface roughness (more buildings/structures to generate turbulent mixing) and the greater amount of heat released from the surface in an urban area (generates buoyancy-induced mixing) produces greater rates of dispersion. The emission limit tables in the regulation, therefore, distinguish between urban and rural areas.

EPA guidance (EPA 1986) [1] provides two alternative procedures to determine whether the character of an area is predominantly urban or rural. One procedure is based on land use typing and the other is based on population density. Both procedures require consideration of characteristics within a 3-km radius from a source, in this case the facility stack(s). The land use typing method is preferred because it more directly relates to the surface characteristics that affect dispersion rates. The remainder of this discussion is, therefore, focused on the land use method.

While the land use method is more direct, it can also be labor-intensive to apply. For this discussion, the land use method has been simplified so that it is consistent with EPA guidance (EPA 1986; Auer 1978), while streamlining the process for the majority of applications so that a clear-cut decision can be made without the need for detailed analysis. Table 6.0–1 summarizes the simplified approach for classifying areas as urban or rural. As shown, the applicant always has the option of applying standard (i.e., more detailed) analyses to more accurately distinguish between urban and rural areas. However, the procedure presented here allows for simplified determinations, where appropriate, to expedite the permitting process.

TABLE 6.0–1.—CLASSIFICATION OF LAND USE TYPES

Type[1]	Description	Urban or rural designation[2]
I1	Heavy Industrial	Urban.
I2	Light/Moderate Industrial	Urban.
C1	Commercial	Urban.
R1	Common Residential (Normal Easements).	Rural.
R2	Compact Residential (Single Family).	Urban.
R3	Compact Residential (Multi-Family).	Urban.
R4	Estate Residential (Multi-Acre Plots).	Rural.
A1	Metropolitan Natural	Rural.
A2	Agricultural	Rural.
A3	Undeveloped (Grasses/Weeds).	Rural.
A4	Undeveloped (Heavily Wooded).	Rural.
A5	Water Surfaces	Rural.

[1] EPA, Guideline on Air Quality Models (Revised), EPA–450/2–78–027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July, 1986.

[2] Auer, August H. Jr., ''Correlation of Land Use and Cover with Meteorological Anomalies,'' Journal of Applied Meteorology, pp. 636–643, 1978.

6.2 *Simplified Land Use Process*

The land use approach considers four primary land use types: industrial (I), commercial (C), residential (R), and agricultural (A). Within These primary classes, subclasses are identified, as shown in table 6.0–1. The goal is to estimate the percentage of the area within a 3-km radius that is urban type and the percentage that is rural type. Industrial and commercial areas are classified as urban; agricultural areas are classified as rural.

The delineation of urban and rural areas, however, can be more difficult for the residential type areas shown in table 6.0–1. The degree of resolution shown in table 6.0–1 for residential areas often cannot be identified without conducting site area inspections and/or referring to zoning maps. This process can require extensive analysis, which, for many applications, can be greatly streamlined without sacrificing confidence in selecting the appropriate urban or rural classification.

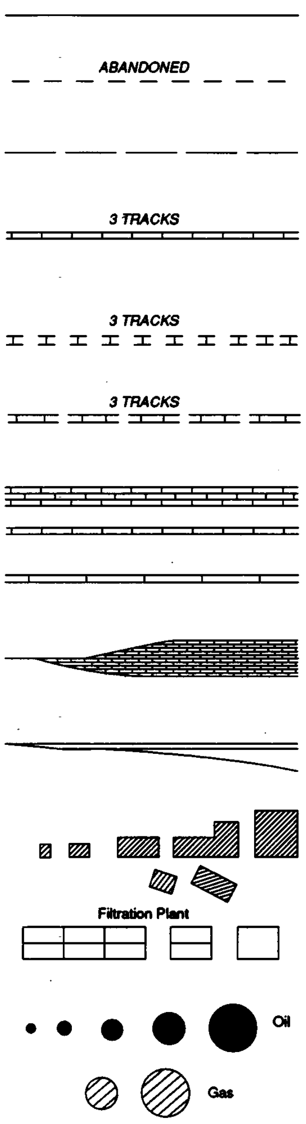
The fundamental simplifying assumption is based on the premise that many applications will have clear-cut urban/rural designations, i.e., most will be in rural settings that can be definitively characterized through a brief review of topographical maps. The color coding on USGS topographical maps provides the most effective means of simplifying the typing scheme. The suggested typing designations for the color codes found on topographical maps are as follows:

Green Wooded areas (rural).

White White areas generally will be treated as rural. This code applies to areas that are unwooded and do not have densely packed structures which would require the pink code (house omission tint). Parks, industrial areas, and unforested rural land will appear as white on the topographical maps. Of these categories, only the industrial areas could potentially be classified as urban based on EPA 1986 or Auer 1978. Industrial areas can be easily identified in most cases by the characteristics shown in Figure 6.0–1. For this simplified procedure, white areas that have an industrial classification will be treated as urban areas.

Figure 6.0-1
Supplementary Publication Symbols

117	Single track	*Line weight .005". Tie weight .003", length .04", spaced .20" center to center.*
118	Single track abandoned	*Same as existing track with space .02", dash .18". Label.*
119	Single track under construction	*Same as existing track with space .02", dash .38". Label UNDER CONSTRUCTION.*
120	Multiple main line track	*Overall width .017". Line weight .003". Tie length .052", spaced .20" center to center. If more than two tracks label, with double cross tie at point of change. Double cross tie .017" overall width.*
121	Multiple track abandoned	*Same as existing track with space .02", dash .18". Label ABANDONED.*
122	Multiple track under construction	*Same as existing track with space .02", dash .38". Label UNDER CONSTRUCTION.*
123	Juxtaposition	*Alternate ties, spaced .20" center to center. Minimum space between tracks .011". Line weight for single tracks .005", multiple tracks .003".*
124	Railroad in street	*Ties spaced .20" center to center. Label if narrow gage. Tie weight .003".*
125	Yards	*Line weight .003". Space between tracks .011". Ties spaced .20" center to center, maximum length to touch 6 tracks.*
126	Sidings	*Line weight .003". Scribe to scale with minimum space between tracks .011". Ties spaced .20" center to center, length .04" for single track.*
176	Large buildings	*Outline weight .003". When width exceeds .06", hatch at 45° angle to building in NE direction, lines .002" spaced .02" center to center.*
178	Sewage disposal or filtration plant	*Line weight .003". See symbol 700 for blue hatching. Label.*
196	Tanks: oil, gas, water, etc.	*Circle .03" minimum, 10" maximum. Label as to content.*
197	Tanks: oil, gas, water, etc.	*Exceeding 10" diameter. Outline weight .003". Hatch SW-NE with .002" lines spaced .02" center to center. Label as to content.*



Section 7.0—Statistical Methodology for Bevill Residue Determinations

This section describes the statistical comparison of waste-derived residue to normal residue for use in determining eligibility for the Bevill exemption under 40 CFR 266.112.

7.1 Comparison of Waste-Derived Residue to Normal Residue

To be eligible for the Bevill exclusion from the definition of hazardous waste under 40 CFR 266.112(b)(1), waste-derived residue must not contain Appendix VIII, Part 261, constituents that could reasonably be attributable to the hazardous waste (toxic constituents) at concentrations significantly higher than in residue generated without burning or processing hazardous waste (normal residue). Concentrations of toxic constituents in normal residue are determined based on analysis of a minimum of 10 samples representing a minimum of 10 days of operation. The statistically-derived concentrations in normal residue are determined as the upper tolerance limit (95% confidence with a 95% proportion of the sample distribution) of the normal residue concentrations. The upper tolerance limit is to be determined as described in Section 7.2 below. If changes in raw materials or fuels could lower the statistically-derived concentrations of toxic constituents of concern, the statistically-derived baseline must be reestablished for any such mode of operation with the new raw material or fuel.

Concentrations of toxic constituents in waste-derived residue are determined based on the analysis of one or more samples collected over a compositing period of not more than 24 hours. Mulitple samples of the waste-derived residue may be analyzed or subsamples may be composited for analysis, provided that the sampling period does not exceed 24 hours. If more than one sample is analyzed to characterize the waste-derived residue generated over a 24-hour period, the arithmetic mean of the concentrations must be used as the waste-derived concentration for each constituent.

The concentration of a toxic constituent in the waste-derived residue is not considered to be significantly higher than in the normal residue (i.e., the residue passes the Bevill test for that constituent) if the concentration in the waste-derived residue does not exceed the statistically-derived concentration.

7.2 Calculation of the Upper Tolerance Limit

The 95% confidence with 95% proportion of the sample distribution (upper tolerance limit) is calculated for a set of values assuming that the values are normally distributed. The upper tolerance limit is a one-sided calculation and is an appropriate statistical test for cases in which a single value (the waste-derived residue concentration) is compared to the distribution of a range of values (the minimum of 10 measurements of normal residue concentrations). The upper tolerance limit value is determined as follows:

$UTL = X + (K)(S)$

where X = mean of the normal residue concentrations, $X = X_i/n$,
K = coefficient for sample size n, 95% confidence and 95% proportion,
S = standard deviation of the normal residue concentrations,
$S = (\Sigma(X_i - X)^2/(n - 1))^{0.5}$, and
n = sample size.

The values of K at the 95% confidence and 95% proportion, and sample size n are given in Table 7.0-1.

For example, a normal residue test results in 10 samples with the following analytical results for toxic constituent A:

Sample No.	Concentration of constituent A (ppm)
1	10
2	10
3	15
4	10
5	7
6	12
7	10
8	16
9	15
10	10

The mean and the standard deviation of these measurements, calculated using the above equations, are 11.5 and 2.9, respectively. Assuming that the values are normally distributed, the upper tolerance limit (UTL) is given by:

$UTL=11.5+(2.911)(2.9)=19.9$ ppm

This, if the concentration of constituent A in the waste-derived residue is below 19.9 ppm, then the waste-derived residue is eligible for the Bevill exclusion for constituent A.

7.3 Normal Distribution Assumption

As noted in Section 7.2 above, this statistical approach (use of the upper tolerance limit) for calculation of the concentration in normal residue is based on the assumption that the concentration data are distributed normally. The Agency is aware that concentration data of this type may not always be distributed normally, particularly when concentrations are near the detection limits. There are a number of procedures that can be used to test the distribution of a data set. For example, the Shapiro-Wilk test, examination of a histogram or plot of the data on normal probability paper, and examination of the coefficient of skewness are methods that may be applicable, depending on the nature of the data (References 1 and 2).

If the concentration data are not adequately represented by a normal distribution, the data may be transformed to attain a near normal distribution. The Agency has found that concentration data, especially when near detection levels, often exhibit a lognormal distribution. The assumption of a lognormal distribution has been used in various programs at EPA, such as in the Office of Solid Waste Land Disposal Restrictions program for determination of BDAT treatment standards. The transformed data may be tested for normality using the procedures identified above. If the transformed data are better represented by a normal distribution than the untransformed data, the transformed data should be used in determining the upper tolerance limit using the procedures in Section 7.2 above.

In all cases where the owner or operator wishes to use other than an assumption of normally distributed data or believes that use of an alternate statistical approach is appropriate to the specific data set, he/she must provide supporting rationale in the operating record that demonstrates that the data treatment is based upon sound statistical practice.

7.4 Nondetect Values

The Agency is developing guidance regarding the treatment of nondetect values (data where the concentration of the constituent being measured is below the lowest concentration for which the analytical method is valid) in carrying out the statistical determination described above. Until the guidance information is available, facilities may present their own approach to the handling of nondetect data points, but must provide supporting rationale in the operating record for consideration by the Director.

TABLE 7.0–1.—K VALUES FOR 95% CONFIDENCE AND 95% PROPORTION

Sample size (n)	K
10	2.911
11	2.815
12	2.736
13	2.670
14	2.614
15	2.566
16	2.523
17	2.486
18	2.458
19	2.423
20	2.396
21	2.371
22	2.350
23	2.329
24	2.303
25	2.292

7.5 References

1. Shapiro, S.S. and Wilk, M.B. (1965), ‘‘An Analysis of Variance Test for Normality (complete samples),’’ Biometrika, 52,591–611.

2. Bhattacharyya, G.K. and R.A. Johnson (1977), Statistical Concepts and Methods, John Wiley and Sons, New York.

SECTION 8.0—PROCEDURES FOR DETERMINING DEFAULT VALUES FOR AIR POLLUTION CONTROL SYSTEM REMOVAL EFFICIENCIES

During interim status, owners or operators of boilers and industrial furnaces burning hazardous waste must submit documentation to EPA that certifies that emissions of HCl, $C1_2$, metals, and particulate matter (PM) are not likely to exceed allowable emission rates. See certification of precompliance under 40 CFR 266.103(b). This documentation also establishes interim status feed rate and operating limits for the facility. For the initial certification, estimates of emissions and system removal efficiencies (SREs) can be made to establish the operating limits. Subsequently, owners or operators must use emissions testing to demonstrate that emissions do not exceed allowable levels, and to establish operating limits. See 40 CFR 266.103(c). However, initial estimates of emissions for certification of precompliance can be based on estimated or established SREs.

The SRE combines the effect of partitioning of the chorine, metals, or PM and the air pollution control system removal efficiency (APCS RE) for these pollutants. The SRE is defined as:

SRE=(species input—species emitted) / species input

The SRE can be calculated from the partitioning factor (PF) and APCS RE by the following formula:

SRE=1—[(PF/l00) X (1—APCS RE/100)]

where:

PF=percentage of the pollutant partitioned to the combustion gas

Estimates of the PF and/or the APCS RE can be based on either EPA's default values or engineering judgement. EPA's ‘default values for the APCS RE for metals, HCl, Cl_2, and PM are described in this section. EPA's default values for partitioning of these pollutants are described in section 9.0.

Guidelines for the use of engineering judgement to estimate APCS REs or PFs are described in section 9.4.

8.1 *APCS RE Default Values for Metals*

EPA's default assumptions for APCS RE for metals are shown in Table 8.1–1. The default values in the table are conservative estimates of the removal efficiencies for metals in BIFs, depending on the volatility of the metal and the type of APCS.

The volatility of a metal depends on the temperature, the thermal input, the chlorine content of the waste, and the identity and concentration of the metal. Metals that do not vaporize at combustion zone temperatures are classified as ''nonvolatile''. Such metals typically enter the APCS in the form of large particles that are removed relatively easily. Metals that vaporize in the combustion zone and condense before entering the APCS are classified as ''volatile''. Such metals typically enter the APCS in the form of very fine, submicron particles that are rather inefficiently removed in many APCSs. Metals that vaporize in the combustion zone and do not condense before entering the APCS are classified as ''very volatile''. Such metals enter the APCS in the form of a vapor that is very inefficiently removed in many APCSs.

Typically, BIFs have combustion zone temperatures high enough to vaporize any hazardous metal at concentrations sufficient to exceed risk-based emission limits. For this reason, the default assumption is that there are no nonvolatile metals. Tables 8.1–2 and 8.1–3 are used to determine whether metals are classified as ''volatile'' or ''very volatile'' depending on the temperature entering the APCS, the thermal input, and whether the waste is chlorinated or nonchlorinated.

TABLE 8.1–1.—AIR POLLUTION CONTROL SYSTEMS (APCS) AND THEIR CONSERVATIVELY ESTIMATED EFFICIENCIES FOR CONTROLLING TOXIC METALS (%)

APCS	Metal Volatility		
	Nonvolatile	Volatile	Very Volatile
WS	40	30	20
VS–20	80	75	20
VS–60	87	75	40
ESP–1	90	75	0
ESP–2	92	80	0
ESP–4	95	80	0
WESP	90	85	40
FF	90	80	0
SD/FF	97	90	0
DS/FF	95	90	0
IWS	90	87	75

WS=Wet Scrubber including: Sieve Tray Tower, Packed Tower, Bubble Cap Tower
VS–20=Venturi Scrubber, ca. 20–30 in W.G. Δ p
VS–60=Venturi Scrubber, ca. >60 in W.G. Δ p
ESP–l=Electrostatic Precipitator; 1 stage
ESP–2=Electrostatic Precipitator; 2 stage
ESP–4=Electrostatic Precipitator; 4 stage
IWS=Ionizing Wet Scrubber
DS=Dry Scrubber
FF=Fabric Filter (Baghouse)
SD=Spray Dryer (Wet/Dry Scrubber)
WESP=Wet Electrostatic Precipitator

TABLE 8.1–2.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF NONCHLORINATED WASTES

Metal		Thermal Input (MMBtu/hr)[1]				
Name	Symbol	1	10	100	1000	10000
Arsenic	As	320	280	240	200	160
Cadmium	Cd	1040	940	860	780	720
Chromium	Cr	2000	1760	1580	1420	1380
Beryllium	Be	1680	1440	1240	1080	980
Antimony	Sb	680	600	540	480	420
Barium	Ba	2240	1820	1540	1360	1240
Lead	Pb	1280	1180	1080	1000	920
Mercury	Hg	340	300	260	220	180
Silver	Ag	1820	1640	1480	1340	1220
Thallium	Tl	900	800	700	620	540

[1] Interpolation of thermal input is not allowed. If a BIF fires between two ranges, the APCS temperature under the higher thermal input must be used.

Example: For a BIF firing 10–100 MMBtu/hr, Mercury is considered very volatile at APCS temperatures above 260 F and volatile at APCS temperatures of 260 F and below.

TABLE 8.1–3.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF CHLORINATED WASTES

Metal		Thermal Input (MMBtu/hr)[1]				
Name	Symbol	1	10	100	1000	10000
Arsenic	As	320	280	240	200	160
Cadmium	Cd	1040	940	860	780	720
Chromium	Cr	>140	>140	>140	>140	>140
Beryllium	Be	1680	1440	1240	1080	980
Antimony	Sb	680	600	540	480	420
Barium	Ba	2060	1840	1680	1540	1420
Lead	Pb	>140	>140	>140	>140	>140
Mercury	Hg	340	300	260	220	180

TABLE 8.1–3.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF CHLORINATED WASTES—Continued

Metal		Thermal Input (MMBtu/hr)[1]				
Name	Symbol	1	10	100	1000	10000
Silver	Ag	1080	940	840	740	660
Thallium	Tl	900	800	700	620	540

[1] Interpolation of thermal input is not allowed. If a BIF fires between two ranges, the APCS temperature under the higher thermal input must be used.

Example: For a BIF firing 10–100 MMBtu/hr, Mercury is considered very volatile at APCS temperatures above 260 F and volatile at APCS temperatures of 260 F and below.

A waste is considered chlorinated if chlorine is present in concentrations greater than 0.1 percent by weight. In the EPA guidance document ‘‘Guidance for Metals and Hydrogen Chloride Controls for Hazardous Waste Incinerators, Volume IV of the Hazardous Waste Incineration Guidance Series,‘‘(1) one percent is used for the chlorinated/nonchlorinated cutoff. However, best engineering judgement, based on examination of pilot-scale data reported by Carroll et al. (2) on the effects of waste chlorine content on metals emissions, suggests that the 1 percent cutoff may not be sufficiently conservative.

Tables 8.1–2 and 8.1–3 were compiled based on equilibrium calculations. Metals are classified as very volatile at all temperatures above the temperature at which the vapor pressure of the metal is greater than 10 percent of the vapor pressure that results in emissions exceeding the most conservative risk-based emissions limits.

8.2 *APCS RE Default Values for HCl and Cl_2*

Default assumptions for APCS RE for HCl in BIFs are shown in Table 8.2–1. This table is identical to the column for other BIFs except that cement kilns have a minimum HCl removal efficiency of 83 percent. Because of the alkaline nature of the raw materials in cement kilns, most of the chlorine is converted to chloride salts. Thus, the minimum APCS RE for HCl for cement kilns is independent of the APCS train.

Removal efficiency of Cl_2 for most types of APCS is generally minimal. Therefore, the default assumption for APCS RE for Cl_2 for all APCSs is 0 percent. This is applicable to all BIFs, including cement kilns.

8.3 *APCS RE Default Values for Ash*

Default assumptions for APCS RE for PM are also shown in Table 8.1–4. These figures are conservative estimates of PM removal efficiencies for different types of APCSs. They are identical to the figures in the Nonvolatile APCS RE column for hazardous metals presented in Table 8.1–1 because the same collection mechanisms and collection efficiencies that apply to nonvolatile metals also apply to PM.

TABLE 8.2–1.—AIR POLLUTION CONTROL SYSTEMS (APCS) AND THEIR CONSERVATIVELY ESTIMATED EFFICIENCIES FOR REMOVING HYDROGEN CHLORIDE (HCL) AND PARTICULATE MATTER (PM) (%)

APCD	HCl		PM
	Cement kilns	Other BIFs	
WS	97	97	40
VS–20	97	97	80
VS–60	98	98	87
ESP–1	83	0	90
ESP–2	83	0	92
ESP–4	83	0	95
WESP	83	70	90
FF	83	0	90
SD/FF	98	98	97
DS/FF	98	98	95
WS/IWS	99	99	95
IWS	99	99	90

WS=Wet Scrubber including: Sieve Tray Tower, Packed Tower, Bubble Cap Tower

PS=Proprietary Wet Scrubber Design (A number of proprietary wet scrubbers have come on the market in recent years that are highly efficient on both particulates and corrosive gases. Two such units are offered by Calvert Environmental Equipment Co. and by Hydro-Sonic Systems, Inc.).

VS–20=Venturi Scrubber, ca. 20–30 in W.G. Δ p

VS–60=Venturi Scrubber, ca. >60 in W.G. Δ p

ESP–l=Electrostatic Precipitator; 1 stage

ESP–2=Electrostatic Precipitator; 2 stage

ESP–4=Electrostatic Precipitator; 4 stage

IWS=Ionizing Wet Scrubber

DS=Dry Scrubber

FF=Fabric Filter (Baghouse)

SD=Spray Dryer (Wet/Dry Scrubber)

8.4 *References*

1. U.S. Environmental Protection Agency. ‘‘Guidance on Metals and Hydrogen Chloride Controls for Hazardous Waste Incinerators,’’ Office of Solid Waste, Washington, DC, August 1989.
2. Carroll, G.J., R.C. Thurnau, R.E. Maurnighan, L.R. Waterland, J.W. Lee, and D.J. Fournier. The Partitioning of

Metals in Rotary Kiln Incineration. Proceedings of the Third International Conference on New Frontiers for Hazardous Waste Management. NTIS Document No. EPA/600/9–89/072, p. 555 (1989).

SECTION 9.0—PROCEDURES FOR DETERMINING DEFAULT VALUES FOR PARTITIONING OF METALS, ASH, AND TOTAL CHLORIDE/CHLORINE

Pollutant partitioning factor estimates can come from two sources: default assumptions or engineering judgement. EPA's default assumptions are discussed below for metals, HCl, Cl_2, and PM. The default assumptions are used to conservatively predict the partitioning factor for several types of BIFs. Engineering judgement-based partitioning factor estimates are discussed in section 9.4.

9.1 *Partitioning Default Value for Metals*

To be conservative, the Agency is assuming that 100 percent of each metal in each feed stream is partitioned to the combustion gas. Owners/operators may use this default value or a supportable, site-specific value developed following the general guidelines provided in section 9.4.

9.2 *Special Procedures for Chlorine, HCl, and Cl_2*

The Agency has established the special procedures presented below for chlorine because the emission limits are based on the pollutants HCl and Cl2 formed from chlorine fed to the combustor. Therefore, the owner/operator must estimate the controlled emission rate of both HCl and Cl_2 and show that they do not exceed allowable levels.

1. The default partitioning value for the fraction of chlorine in the total feed streams that is partitioned to combustion gas is 100 percent. Owners/operators may use this default value or a supportable, site-specific value developed following the general guidelines provided in section 9.4.

2. To determine the partitioning of chlorine in the combustion gas to HCl versus Cl_2, either use the default values below or use supportable site-specific values developed following the general guidelines provided in section 9.4.

- For BIFs excluding halogen acid furnaces (HAFs), with a total feed stream chlorine/hydrogen ratio ≤0.95, the default partitioning factor is 20 percent Cl_2, 80 percent HCl.
- For HAFs and for BIFs with a total feed stream chlorine/hydrogen ratio >0.95, the default partitioning factor is 100 percent Cl_2.

3. To determine the uncontrolled (i.e., prior to acid gas APCS) emission rate of HCl and Cl_2, multiply the feed rate of chlorine times the partitioning factor for each pollutant. Then, for HCl, convert the chlorine emission rate to HCl by multiplying it by the ratio of the molecular weight of HCl to the molecular weight of Cl (i.e., 36.5/35.5). No conversion is needed for Cl_2.

9.3 *Special Procedures for Ash*

This section: (1) Explains why ash feed rate limits are not applicable to cement and light-weight aggregate kilns; (2) presents the default partitioning values for ash; and (3) explains how to convert the 0.08 gr/dscf, corrected to 7% O_2, PM emission limit to a PM emission rate.

Waiver for Cement and Light-Weight Aggregate Kilns. For cement kilns and light-weight aggregate kilns, raw material feed streams contain the vast majority of the ash input, and a significant amount of the ash in the feed stream is entrained into the kiln exhaust gas. For these devices, the ash content of the hazardous waste stream is expected to have a negligible effect on total ash emissions. For this reason, there is no ash feed rate compliance limit for cement kilns or light-weight aggregate kilns. Nonetheless, cement kilns and light-weight aggregate kilns are required to initially certify that PM emissions are not likely to exceed the PM limit, and subsequently, certify through compliance testing that the PM limit is not exceeded.

Default Partitioning Value for Ash. The default assumption for partitioning of ash depends on the feed stream firing system. There are two methods by which materials may be fired into BIFs: Suspension-firing and bed-firing.

The suspension category includes atomized and lanced pumpable liquids and suspension-fired pulverized solids. The default partitioning assumption for materials fired by these systems is that 100 percent of the ash partitions to the combustion gas.

The bed-fired category consists principally of stoker boilers and raw materials (and in some cases containerized hazardous waste) fed into cement and light-weight aggregate kilns. The default partitioning assumption for materials fired on a bed is that 5 percent of the ash partitions to the combustion gas.

Converting the PM Concentration-Based Standard to a PM Mass Emission Rate. The emission limit for BIFs is 0.08 gr/dscf, corrected to 7% 0_2, unless a more stringent standard applies [e.g., a New Source Performance Standard (NSPS) or a State standard implemented under the State Implementation Plan (SIP)]. To convert the 0.08 gr/dscf standard to a PM mass emission rate:

1. Determine the flue gas 0_2 concentration (percent by volume, dry) and flue gas flow rate (dry standard cubic feet per minute); and

2. Calculate the allowable PM mass emission rate by multiplying the concentration-based PM emission standard times the flue

gas flow rate times a dilution correction factor equal to [(21–0_2 concentration from step 1)/(21–7)].

9.4 *Use of Engineering Judgement To Estimate Partitioning and APCS RE Values*

Engineering judgement may be used in place of EPA's conservative default assumptions to estimate partitioning and APCS RE values provided that the engineering judgement is defensible and properly documented. To properly document engineering judgement, the owner/operator must keep a written record of all assumptions and calculations necessary to justify the APCS RE used. The owner/operator must provide this record to the Director upon request and must be prepared to defend the assumptions and calculations used.

If the engineering judgement is based on emissions testing, the testing will often document the emission rate of a pollutant relative to the feed rate of that pollutant rather than the partitioning factor or APCS RE.

Examples of situations where the use of engineering judgement may be supportable to estimate a partitioning factor, APCS RE, or SRE include:

- Using emissions testing data from the facility to support an SRE, even though the testing may not meet full QA/QC procedures (e.g., triplicate test runs). The closer the test results conform with full QA/QC procedures and the closer the operating conditions during the test conform with the established operating conditions for the facility, the more supportable the engineering judgement will be.
- Applying emissions testing data documenting an SRE for one metal, including nonhazardous surrogate metals to another less volatile metal.
- Applying emissions testing data documenting an SRE from one facility to a similar facility.
- Using APCS vendor guarantees of removal efficiency.

9.5 *Restrictions on Use of Test Data*

The measurement of an SRE or an APCS RE may be limited by the detection limits of the measurement technique. If the emission of a pollutant is undetectable, then the calculation of SRE or APCS RE should be based on the lower limit of detectability. An SRE or APCS RE of 100 percent is not acceptable.

Further, mass balance data of facility inputs, emissions, and products/residues may not be used to support a partitioning factor, given the inherent uncertainties of such procedures. Partitioning factors other than the default values may be supported based on engineering judgement, considering, for example, process chemistry. Emissions test data may be used to support an engineering judgement-based SRE, which includes both partitioning and APCS RE.

9.5 *References*

1. Barton, R.G., W.D. Clark, and W.R. Seeker. (1990) ‘‘Fate of Metals in Waste Combustion Systems’’. Combustion Science and Technology. 74, 1–6, p. 327

SECTION 10.0—ALTERNATIVE METHODOLOGY FOR IMPLEMENTING METALS CONTROLS

10.1 *Applicability*

This method for controlling metals emissions applies to cement kilns and other industrial furnaces operating under interim status that recycle emission control residue back into the furnace.

10.2 *Introduction*

Under this method, cement kilns and other industrial furnaces that recycle emission control residue back into the furnace must comply with a kiln dust concentration limit (i.e., a collected particulate matter (PM) limit) for each metal, as well as limits on the maximum feedrates of each of the metals in: (1) pumpable hazardous waste; and (2) all hazardous waste.

The following subsections describe how this method for controlling metals emissions is to be implemented:

- Subsection 10.3 discusses the basis of the method and the assumptions upon which it is founded;
- Subsection 10.4 provides an overview of the implementation of the method;
- Subsection 10.5 is a step-by-step procedure for implementation of the method;
- Subsection 10.6 describes the compliance procedures for this method; and
- Appendix A describes the statistical calculations and tests to be used in the method.

10.3 *Basis*

The viability of this method depends on three fundamental assumptions:

(1) Variations in the ratio of the metal concentration in the emitted particulate to the metal concentration in the collected kiln dust (referred to as the enrichment factor or EF) for any given metal at any given facility will fall within a normal distribution that can be experimentally determined.

(2) The metal concentrations in the collected kiln dust can be accurately and representatively measured (using procedures specified in ‘‘Test Methods for Evaluating Solid Waste, Physical/Chemical Methods’’ (SW–846), incorporated by reference in 40 CFR 260.11).

(3) The facility will remain in compliance with the applicable particulate matter (PM) emission standard.

Given these assumptions. metal emissions can be related to the measured concentrations in the collected kiln dust by the following equation:

$$ME\left(\frac{1b\ \ Emitted\ Metal}{hr}\right)=$$

$$PME\left(\frac{1b\ PM}{hr}\right)DMC\left(\frac{1b\ Dust\ Metal}{1b\ Dust}\right)EF\left(\frac{1b\ Emitted\ Metal\,/\,1b\ PM}{1b\ Dust\ Metal\,/\,1b\ Dust}\right)\qquad(1)$$

Where:

ME is the metal emitted;

PME is the particulate matter emitted;

DMC is the metal concentration in the collected kiln dust; and

EF is the enrichment factor, which is the ratio of the metal concentration in the emitted particulate matter to the metal concentration in the collected kiln dust.

This equation can be rearranged to calculate a maximum allowable dust metal concentration limit (DMCL) by assuming worst-case conditions that: metal emissions are at the Tier III (or Tier II) limit (see 40 CFR 266.106), and that particulate emissions are at the particulate matter limit (PML):

$$DMCL\left(\frac{1b\ Dust\ Metal}{1b\ Dust}\right)=\frac{Tier\ III\ Limit\left(\frac{1b\ Emitted\ Metal}{hr}\right)}{PML\left(\frac{1b\ PM}{hr}\right)EF\left(\frac{1b\ Emitted\ Metal\,/\,1b\ PM}{1b\ Dust\ Metal\,/\,1b\ Dust}\right)}\qquad(2)$$

The enrichment factor used in the above equation must be determined experimentally from a minimum of 10 tests in which metal concentrations are measured in kiln dust and stack samples taken simultaneously. This approach provides a range of enrichment factors that can be inserted into a statistical distribution (t-distribution) to determine $EF_{95\bullet}$ and $EF_{99\bullet}$. $EF_{95\bullet}$ is the value at which there is a 95% confidence level that the enrichment factor is below this value at any given time. Similarly, $EF_{99\bullet}$ is the value at which there is a 99% confidence level that the enrichment factor is below this value at any given time. $EF_{95\bullet}$ is used to calculate the ‘‘violation’’ dust metal concentration limit ($DMCL_v$):

$$DMCL_v\left(\frac{1b\ Dust\ Metal}{1b\ Dust}\right)=\frac{Tier\ III\ Limit\left(\frac{1b\ Emitted\ Metal}{hr}\right)}{PML\left(\frac{1b\ PM}{hr}\right)EF_{95\bullet}\left(\frac{1b\ Emitted\ Metal/1b\ PM}{1b\ Dust\ Metal/1b\ Dust}\right)}\qquad(3)$$

If the kiln dust metal concentration is just above this ‘‘violation’’ limit, and the PM emissions are at the PM emissions limit, there is a 5% chance that the metal emissions are above the Tier III limit. In such a case, the facility would be in violation of the metals standard.

To provide a margin of safety, a second, more conservative kiln dust metal concentration limit is also used. This ‘‘conservative’’ dust metal concentration limit ($DMCL_c$) is calculated using a ‘‘safe’’ enrichment factor (SEF). If $EF_{99\bullet}$ is greater than two times the value of $EF_{95\bullet}$, the ‘‘safe’’ enrichment factor can be calculated using Equation 4a:

$SEF \geq 2\ EF_{95\bullet}$ (4a)Q02

If $EF_{99\bullet}$ is not greater than two times the value of $EF_{95\bullet}$, the ‘‘safe’’ enrichment factor can be calculated using Equation 4b:

$SEF \geq EF_{99\bullet}$ (4b)

In cases where the enrichment factor cannot be determined because the kiln dust metal concentration is nondetectable, the ‘‘safe’’ enrichment factor is as follows:

$SEF=100$ (4c)

For all cases, the ‘‘conservative’’ dust metal concentration limit is calculated using the following equation:

$$DMCL_c\left(\frac{1b\ Dust\ Metal}{1b\ Dust}\right)=\frac{Tier\ III\ Limit\left(\frac{1b\ Emitted\ Metal}{hr}\right)}{PML\left(\frac{1b\ PM}{hr}\right)SEF\left(\frac{1b\ Emitted\ Metal/1b\ PM}{1b\ Dust\ Metal/1b\ Dust}\right)} \qquad (5)$$

If the kiln dust metal concentration at a facility is just above the ‘‘conservative’’ limit based on that ‘‘safe’’ enrichment factor provided in Equation 4a, and the PM emissions are at the PM emissions limit, there is a 5% chance that the metal emissions are above one-half the Tier III limit. If the kiln dust metal concentration at the facility is just above the ‘‘conservative’’ limit based on the ‘‘safe’’ enrichment factor provided in Equation 4b, and the PM emissions are at the PM emissions limit, there is a 1% chance that the metal emissions are above the Tier III limit. In either case, the facility would be unacceptably close to a violation. If this situation occurs more than 5% of the time, the facility would be required to rerun the series of 10 tests to determine the enrichment factor. To avoid this expense. the facility would be advised to reduce its metals feedrates or to take other appropriate measures to maintain its kiln dust metal concentrations in compliance with the ‘‘conservative’’ dust metal concentration limits.

In cases where the enrichment factor cannot be determined because the kiln dust metal concentration is nondetectable, and thus no $EF_{95\ll}$ exists, the ‘‘violation’’ dust metal concentration limit is set at ten times the ‘‘conservative’’ limit:

$DMCL_v=10\times DMCL_c$ (6)

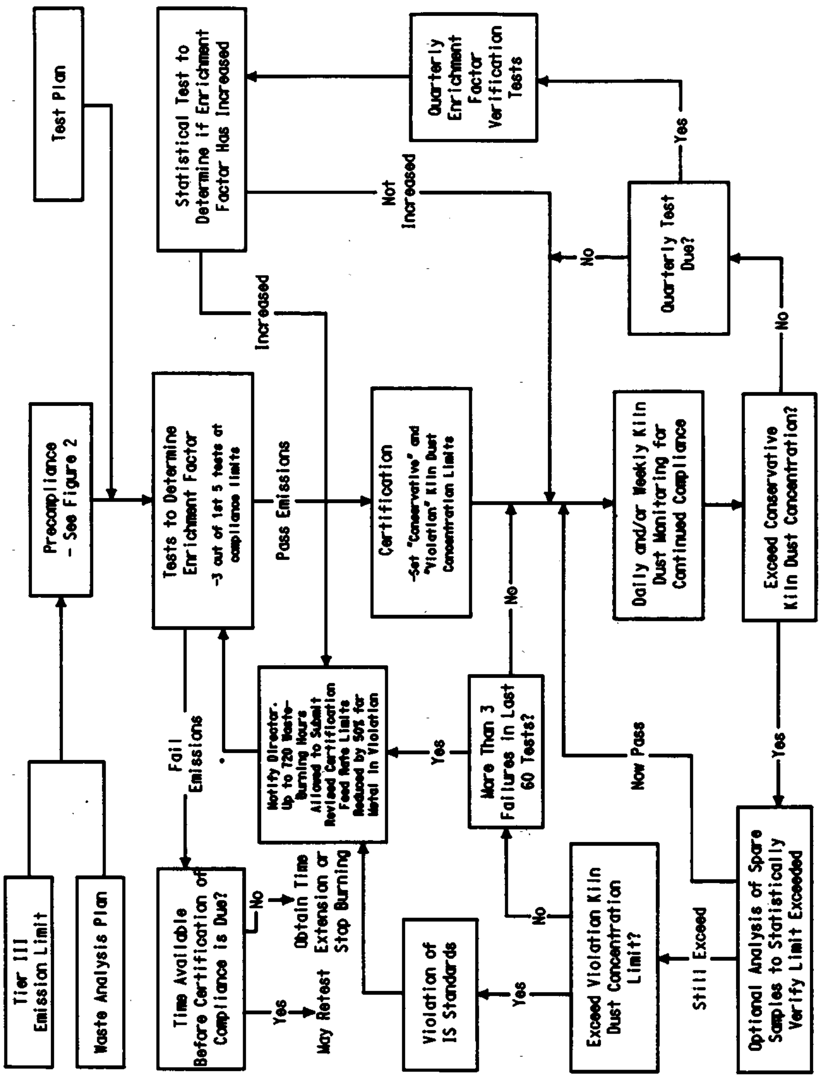
10.4 *Overview*

The flowchart for implementing the method is shown in Figure 10.4–1. The general procedure is as follows:

- Follow the certification of precompliance procedures described in subsection 10.6 (to comply with 40 CFR 266.103(b)).
- For each metal of concern, perform a series of tests to establish the relationship (enrichment factor) between the concentration of emitted metal and the metal concentration in the collected kiln dust.
- Use the demonstrated enrichment factor, in combination with the Tier III (or Tier II) metal emission limit and the most stringent applicable particulate emission limit, to calculate the ‘‘violation’’ and ‘‘conservative’’ dust metal concentration limits. Include this information with the certification of compliance under 40 CFR 266.103(c).

Figure 10.4-1

Compliance Implementation Flow Chart



- Perform daily and/or weekly monitoring of the cement kiln dust metal concentration to ensure (with appropriate QA/QC) that the metal concentration does not exceed either limit.

—If the cement kiln dust metal concentration exceeds the ‘‘conservative’’ limit more than 5% of the time (i.e., more than three failures in last 60 tests), the series of tests to determine the enrichment factor must be repeated.

—If the cement kiln dust metal concentration exceeds the ‘‘violation’’ limit, a violation has occurred.

- Perform quarterly tests to verify that the enrichment factor has not increased significantly. If the enrichment factor has increased, the series of tests to determine the enrichment factor must be repeated.

10.5 *Implementation Procedures*

A step-by-step description for implementing the method is provided below:

(1) Prepare initial limits and test plans.

- Determine the Tier III metal emission limit. The Tier II metal emission limit may also be used (see 40 CFR 266.106).
- Determine the applicable PM emission standard. This standard is the most stringent particulate emission standard that applies to the facility. A facility may elect to restrict itself to an even more stringent self-imposed PM emission standard, particularly if the facility finds that it is easier to control particulate emissions than to reduce the kiln dust concentration of a certain metal (i.e., lead).
- Determine which metals need to be monitored (i.e., all hazardous metals for which Tier III emission limits are lower than PM emission limits—assuming PM is pure metal).
- Follow the compliance procedures described in Subsection 10.6.
- Follow the guidelines described in SW–846 for preparing test plans and waste analysis plans for the following tests:

—Compliance tests to determine limits on metal feedrates in pumpable hazardous wastes and in all hazardous wastes (as well as to determine other compliance parameters);

—Initial tests to determine enrichment factors;

—Quarterly tests to verify enrichment factors;

—Analysis of hazardous waste feedstreams; and

—Daily and/or weekly monitoring of kiln dust for continuing compliance.

(2) Conduct tests to determine the enrichment factor.

- These tests must be conducted within a 14-day period. No more than two tests may be conducted in any single day. If the tests are not completed within a 14-day period, they must be repeated.
- Simultaneous stack samples and kiln dust samples must be taken.

—Stack sampling must be conducted with the multiple metals train according to procedures provided in section 10.3 of this Methods Manual.

—Kiln dust sampling must be conducted as follows:

—Follow the sampling and analytical procedures described in SW–846 and the waste analysis plan as they pertain to the condition and accessibility of the dust.

—Samples should be representative of the last ESP or Fabric Filter in the APCS series.

- The feedrates of hazardous metals in all pumpable hazardous waste streams and in all hazardous waste streams must be monitored during these tests. It is recommended (but not required) that the feedrates of hazardous metals in all feedstreams also be monitored.
- At least ten single (noncomposited) runs are required during the tests.

—The facility must follow a normal schedule of kiln dust recharging for all of the tests.

—Three of the first five tests must be compliance tests in conformance with 40 CFR 266.103(c); i.e., they must be used to determine maximum allowable feedrates of metals in pumpable hazardous wastes. and in all hazardous wastes, as well as to determine other compliance limits (see 40 CFR 266.103(c)(1)).

—The remainder of the tests need not be conducted under full compliance test conditions; however, the facility must operate at its compliance test production rate, and it must burn hazardous waste during these tests such that the feedrate of each metal for pumpable and total hazardous wastes is at least 25% of the feedrate during compliance testing. If these criteria, and those discussed below, are not met for any parameter during a test, then either the test is not valid for determining enrichment factors under this method, or the compliance limits for that parameter must be established based on these test conditions rather than on the compliance test conditions.

- Verify that compliance emission limits are not exceeded.

—Metal emissions must not exceed Tier III (or Tier II) limits.

—PM emissions must not exceed the most stringent of applicable PM standards (or an optional self-imposed particulate standard).

- The facility must generate normal, marketable product using normal raw materials and fuels under normal operating conditions (for parameters other than those specified under this method) when these tests are conducted.
- Chromium must be treated as a special case:

—The enrichment factor for total chromium is calculated in the same way as the enrichment factor for other metals (i.e., the enrichment factor is the ratio of the concentration of total chromium in the emitted particulate matter to the concentration of total chromium in the collected kiln dust).

—The enrichment factor for hexavalent chromium (if measured) is defined as the ratio of the concentration of hexavalent chromium in the emitted particulate matter to the concentration of total chromium in the collected kiln dust.

(3) Use the enrichment factors measured in Step 2 to determine $EF_{95\leqslant}$, $EF_{99\leqslant}$, and SEF.

- Calculate $EF_{95\leqslant}$ and $EF_{99\leqslant}$ according to the t-distribution as described in Appendix A
- Calculate SEF by

—Equation 4a if $EF_{95\leqslant}$ is determinable and if $EF_{99\leqslant}$ is greater than two times $EF_{95\leqslant}$,
—Equation 4b if $EF_{95\leqslant}$ is determinable and if $EF_{99\leqslant}$ is not greater than two times $EF_{95\leqslant}$.
—Equation 4c if $EF_{95\leqslant}$ is not determinable.

The facility may choose to set an even more conservative SEF to give itself a larger margin of safety between the point where corrective action is necessary and the point where a violation occurs.

(4) Prepare certification of compliance.

- Calculate the ''conservative'' dust metal concentration limit ($DMCL_c$) using Equation 5.

—Chromium is treated as a special case. The ''conservative'' kiln dust chromium concentration limit is set for total chromium, not for hexavalent chromium. The limit for total chromium must be calculated using the Tier III (or Tier II) metal limit for hexavalent chromium.
—If the stack samples described in Step 2 were analyzed for hexavalent chromium, the SEF based on the hexavalent chromium enrichment factors (as defined in Step 2) must be used in this calculation.
—If the stack samples were not analyzed for hexavalent chromium, then the SEF based on the total chromium enrichment factor must be used in this calculation.

- Calculate the ''violation'' dust metal concentration limit ($DMCL_v$) using Equation 3 if $EF_{95\leqslant}$ is determinable, or using Equation 6 if $EF_{95\leqslant}$ is not determinable.

—Chromium is treated as a special case. The ''violation'' kiln dust chromium concentration limit is set for total chromium, not for hexavalent chromium. The limit for total chromium must be calculated using the Tier III (or Tier II) metal limit for hexavalent chromium.
—If the stack samples taken in Step 2 were analyzed for hexavalent chromium, the $EF_{95\leqslant}$ based on the hexavalent chromium enrichment factor (as defined in Step 2) should be used in this calculation.
—If the stack samples were not analyzed for hexavalent chromium, the $EF_{95\leqslant}$ based on the total chromium enrichment factor must be used in this calculation.

- Submit certification of compliance.
- Steps 2–4 must be repeated for recertification, which is required once every 3 years (see § 266.103(d)).

(5) Monitor metal concentrations in kiln dust for continuing compliance, and maintain compliance with all compliance limits for the duration of interim status.

- Metals to be monitored during compliance testing are classified as either ''critical'' or ''noncritical'' metals.

—All metals must initially be classified as ''critical'' metals and be monitored on a daily basis.
—A ''critical'' metal may be reclassified as a ''noncritical'' metal if its concentration in the kiln dust remains below 10% of its ''conservative'' kiln dust metal concentration limit for 30 consecutive daily samples. ''Noncritical'' metals must be monitored on a weekly basis.
—A ''noncritical'' metal must be reclassified as a ''critical'' metal if its concentration in the kiln dust is above 10% of its ''conservative'' kiln dust metal concentration limit for any single daily or weekly sample.

- Noncompliance with the sampling and analysis schedule prescribed by this method is a violation of the metals controls under § 266.103.
- Follow the sampling, compositing, and analytical procedures described in this method and in SW–846 as they pertain to the condition and accessibility of the kiln dust.
- Follow the same procedures and sample at the same locations as were used for kiln dust samples collected to determine the enrichment factors (as discussed in Step 2).
- Samples must be collected at least once every 8 hours, and a daily composite must be prepared according to SW–846 procedures.

—At least one composite sample is required. This sample is referred to as the ''required'' sample.
—For QA/QC purposes, a facility may elect to collect two or more additional samples. These samples are referred to as the ''spare'' samples. These additional samples must be collected over the same time period and according to the same procedures as those used for the ''required'' sample.
—Samples for ''critical'' metals must be daily composites.
—Samples for ''noncritical'' metals must be weekly composites. These samples can be composites of the original 8-hour samples, or they can be composites of daily composite samples.

- Analyze the ''required'' sample to determine the concentration of each metal.

—This analysis must be completed within 48 hours of the close of the sampling period. Failure to meet this schedule is a violation of the metals standards of § 266.103.

- If the ''conservative'' kiln dust metal concentration limit is exceeded for any metal, refer to Step 8.
- If the ''conservative'' kiln dust metal concentration limit is not exceeded, continue with the daily or weekly monitoring (Step 5) for the duration of interim status.
- Conduct quarterly enrichment factor verification tests, as described in Step 6.

(6) Conduct quarterly enrichment factor verification tests.

- After certification of compliance with the metals standards, a facility must conduct quarterly enrichment factor verification tests every three months for the duration of interim status. The first quarterly test must be completed within three months of certification (or recertification). Each subsequent quarterly test must be completed within three months of the preceding quarterly test. Failure to meet this schedule is a violation.

- Simultaneous stack samples and kiln dust samples must be collected.
- Follow the same procedures and sample at the same locations as were used for kiln dust samples and stack samples collected to determine the enrichment factors (as discussed in Step 2).
- At least three single (noncomposited) runs are required. These tests need not be conducted under the operating conditions of the initial compliance test; however, the facility must operate under the following conditions:

—It must operate at compliance test production rate.

—It must burn hazardous waste during the test, and for the 2-day period immediately preceding the test, such that the feedrate of each metal for pumpable and total hazardous wastes consist of at least 25% of the operating limits established during the compliance test.

—It must remain in compliance with all compliance parameters (see §266.103(c)(1)).

—It must follow a normal schedule of kiln dust recharging.

—It must generate normal marketable product from normal raw materials during the tests.

(7) Conduct a statistical test to determine if the enrichment factors measured in the quarterly verification tests have increased significantly from the enrichment factors determined in the tests conducted in Step 2. The enrichment factors have increased significantly if all three of the following criteria are met:

- By applying the t-test described in appendix A, it is determined that the enrichment factors measured in the quarterly tests are not taken from the same population as the enrichment factors measured in the Step 2 tests;
- The $EF_{95\approx}$ calculated for the combined data sets (i.e., the quarterly test data and the original Step 2 test data) according to the t-distribution (described in appendix A) is more than 10% higher than the $EF_{95\approx}$ based on the enrichment factors previously measured in Step 2; and
- The highest measured kiln dust metal concentration recorded in the previous quarter is more than 10% of the ''violation'' kiln dust concentration limit that would be calculated from the combined $EF_{95\%}$.

If the enrichment factors have increased significantly, the tests to determine the enrichment factors must be repeated (refer to Step 11). If the enrichment factors have not increased significantly, continue to use the kiln dust metal concentration limits based on the enrichment factors previously measured in Step 2, and continue with the daily and/or weekly monitoring described in Step 5.

(8) If the ''conservative'' kiln dust metal concentration limit was exceeded for any metal in any single analysis of the ''required'' kiln dust sample, the ''spare'' samples corresponding to the same period may be analyzed to determine if the exceedance was due to a sampling or analysis error.

- If no ''spare'' samples were taken, refer to Step 9.
- If the average of all the samples for a given day (or week, as applicable) (including the ''required'' sample and the ''spare'' samples) does not exceed the ''conservative'' kiln dust metal concentration limit, no corrective measures are necessary; continue with the daily and/or weekly monitoring as described in Step 5.
- If the average of all the samples for a given day (or week, as applicable) exceeds the ''conservative'' kiln dust metal concentration limit, but the average of the ''spare'' samples is below the ''conservative'' kiln dust metal concentration limit, apply the Q-test, described in appendix A, to determine whether the ''required'' sample concentration can be judged as an outlier.

—If the ''required'' sample concentration is judged an outlier, no corrective measures are necessary; continue with the daily and/or weekly monitoring described in Step 5.

—If the ''required'' sample concentration is not judged an outlier, refer to Step 9.

(9) Determine if the ''violation'' kiln dust metal concentration has been exceeded based on either the average of all the samples collected during the 24-hour period in question, or if discarding an outlier can be statistically justified by the Q-test described in appendix A, on the average of the remaining samples.

- If the ''violation'' kiln dust metal concentration limit has been exceeded, a violation of the metals controls under §266.103(c) has occurred. Notify the Director that a violation has occurred. Hazardous waste may be burned for testing purposes for up to 720 operating hours to support a revised certification of compliance. Note that the Director may grant an extension of the hours of hazardous waste burning under §266.103(c)(7) if additional burning time is needed to support a revised certification for reasons beyond the control of the owner or operator. Until a revised certification of compliance is submitted to the Director, the feedrate of the metals in violation in total and pumpable hazardous waste feeds is limited to 50% of the previous compliance test limits.
- If the ''violation'' kiln dust metal concentration has not been exceeded:

—If the exceedance occurred in a daily composite sample, refer to Step 10.

—If the exceedance occurred in a weekly composite sample, refer to Step 11.

(10) Determine if the ‘‘conservative’’ kiln dust metal concentration limit has been exceeded more than three times in the last 60 days.

- If not, log this exceedance and continue with the daily and/or weekly monitoring (Step 5).
- If so, the tests to determine the enrichment factors must be repeated (refer to Step 11).
- This determination is made separately for each metal. For example,

—Three exceedances for each of the ten hazardous metals are allowed within any 60-day period.
—Four exceedances of any single metal in any 60-day period is not allowed.

- This determination should be made daily, beginning on the first day of daily monitoring. For example, if four exceedances of any single metal occur in the first four days of daily monitoring, do not wait until the end of the 60-day period; refer immediately to Step 11.

(11) The tests to determine the enrichment factor must be repeated if: (1) More than three exceedances of the ‘‘conservative’’ kiln dust metal concentration limit occur within any 60 consecutive daily samples; (2) an excursion of the ‘‘conservative’’ kiln dust metal concentration limit occurs in any weekly sample; or (3) a quarterly test indicates that the enrichment factors have increased significantly.

- The facility must notify the Director if these tests must be repeated.
- The facility has up to 720 hazardous-waste-burning hours to redetermine the enrichment factors for the metal or metals in question and to recertify (beginning with a return to Step 2). During this period, the facility must reduce the feed rate of the metal in violation by 50%. If the facility has not completed the recertification process within this period, it must stop burning or obtain an extension. Hazardous waste burning may resume only when the recertification process (ending with Step 4) has been completed.
- Meanwhile, the facility must continue with daily kiln dust metals monitoring (Step 5) and must remain in compliance with the ‘‘violation’’ kiln dust metal concentration limits (Step 9).

10.6 *Precompliance Procedures*

Cement kilns and other industrial furnaces that recycle emission control residue back into the furnace must comply with the same certification schedules and procedures (with the few exceptions described below) that apply to other boilers and industrial furnaces. These schedules and procedures, as set forth in §266.103, require no later than the effective date of the rule, each facility submit a certification which establishes precompliance limits for a number of compliance parameters (see §266.103(b)(3)), and that each facility immediately begin to operate under these limits.

These precompliance limits must ensure that interim status emissions limits for hazardous metals, particulate matter, HCl, and Cl_2 are not likely to be exceeded. Determination of the values of the precompliance limits must be made based on either (1) conservative default assumptions provided in this Methods Manual, or (2) engineering judgement.

The flowchart for implementing the precompliance procedures is shown in Figure 10.6–1. The step-by-step precompliance implementation procedure is described below. The precompliance implementation procedures and numbering scheme are similar to those used for the compliance procedures described in Subsection 10.5.

(1) Prepare initial limits and test plans.

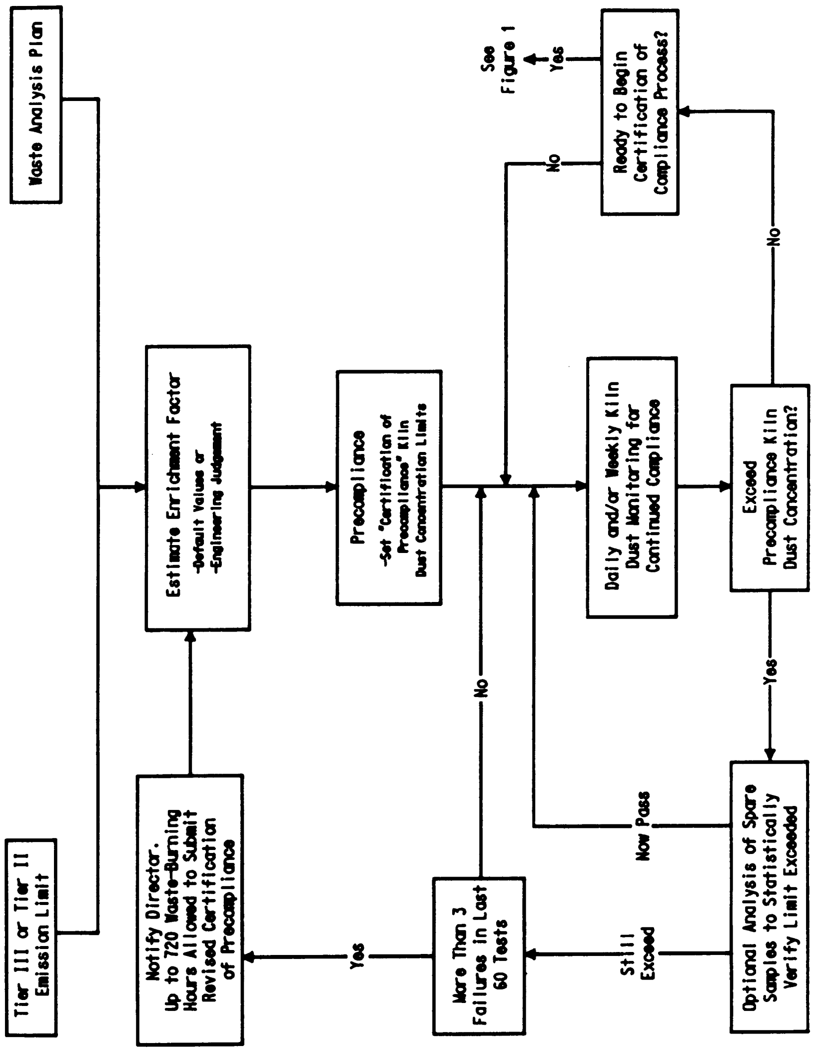
- Determine the Tier III metal emission limit. The Tier II metal emission limit may also be used (see 40 CFR 266.106).
- Determine the applicable PM emission standard. This standard is the most stringent particulate emission standard that applies to the facility. A facility may elect to restrict itself to an even more stringent self-imposed PM emission standard, particularly if the facility finds that it is easier to control particulate emissions than to reduce the kiln dust concentration of a certain metal (i.e., lead).
- Determine which metals need to be monitored (i.e., all hazardous metals for which Tier III emission limits are lower than PM emission limits, assuming PM is pure metal).
- Follow the procedures described in SW–846 for preparing waste analysis plans for the following tasks:

—Analysis of hazardous waste feedstreams.
—Daily and/or weekly monitoring of kiln dust concentrations for continuing compliance.

(2) Determine the ‘‘safe’’ enrichment factor for precompliance. In this context, the ‘‘safe’’ enrichment factor is a conservatively high estimate of the enrichment factor (the ratio of the emitted metal concentration to the metal concentration in the collected kiln dust). The ‘‘safe’’ enrichment factor must be calculated from either conservative default values, or engineering judgement.

Figure 10.6-1

Precompliance Implementation Flow Chart



- Conservative default values for the "safe" enrichment factor are as follows:

—SEF=10 for all hazardous metals except mercury. SEF=10 for antimony, arsenic, barium, beryllium, cadmium, chromium, lead, silver, and thallium.

—SEF=100 for mercury.

- Engineering judgement may be used in place of conservative default assumptions provided that the engineering judgement is defensible and properly documented. The facility must keep a written record of all assumptions and calculations necessary to justify the SEF. The facility must provide this record to EPA upon request and must be prepared to defend these assumptions and calculations.

Examples of situations where the use of engineering judgement is appropriate include:

—Use of data from precompliance tests;

—Use of data from previous compliance tests; and

—Use of data from similar facilities.

(3) This step does not apply to precompliance procedures.

(4) Prepare certification of precompliance.

- Calculate the ''conservative'' dust metal concentration limit ($DMCL_c$) using Equation 5.
- Submit certification of precompliance. This certification must include precompliance limits for all compliance parameters that apply to other boilers and industrial furnaces (i.e., those that do not recycle emission control residue back into the furnace) as listed in §266.103(b)(3), except that it is not necessary to set precompliance limits on maximum feedrate of each hazardous metal in all combined feedstreams.
- Furnaces that recycle collected PM back into the furnace (and that elect to comply with this method (see §266.103(c)(3)(ii)) are subject to a special precompliance parameter, however. They must establish precompliance limits on the maximum concentration of each hazardous metal in collected kiln dust (which must be set according to the procedures described above).

(5) Monitor metal concentration in kiln dust for continuing compliance, and maintain compliance with all precompliance limits until certification of compliance has been submitted.

- Metals to be monitored during precompliance testing are classified as either ''critical'' or ''noncritical'' metals.

—All metals must initially be classified as ''critical'' metals and be monitored on a daily basis.

—A ''critical'' metal may be reclassified as a ''noncritical'' metal if its concentration in the kiln dust remains below 10% of its ''conservative'' kiln dust metal concentration limit for 30 consecutive daily samples. ''Noncritical'' metals must be monitored on a weekly basis, at a minimum.

—A ''noncritical'' metal must be reclassified as a ''critical'' metal if its concentration in the kiln dust is above 10% of its ''conservative'' kiln dust metal concentration limit for any single daily or weekly sample.

- It is a violation if the facility fails to analyze the kiln dust for any ''critical'' metal on any single day or for any ''noncritical'' metal during any single week, when hazardous waste is burned.
- Follow the sampling, compositing, and analytical procedures described in this method and in SW–846 as they pertain to the condition and accessibility of the kiln dust.
- Samples must be collected at least once every 8 hours, and a daily composite prepared according to SW–846 procedures.

—At least one composite sample is required. This sample is referred to as the ''required'' sample.

—For QA/QC purposes, a facility may elect to collect two or more additional samples. These samples are referred to as the ''spare'' samples. These additional samples must be collected over the same time period and according to the same procedures as those used for the ''required'' sample.

—Samples for ''critical'' metals must be daily composites.

—Samples for ''noncritical'' metals must be weekly composites, at a minimum. These samples can be composites of the original 8-hour samples, or they can be composites of daily composite samples.

- Analyze the ''required'' sample to determine the concentration of each metal.

—This analysis must be completed within 48 hours of the close of the sampling period. Failure to meet this schedule is a violation.

- If the ''conservative'' kiln dust metal concentration limit is exceeded for any metal, refer to Step 8.
- If the ''conservative'' kiln dust metal concentration limit is not exceeded, continue with the daily and/or weekly monitoring (Step 5) for the duration of interim status.

(6) This step does not apply to precompliance procedures.

(7) This step does not apply to precompliance procedures.

(8) If the ''conservative'' kiln dust metal concentration limit was exceeded for any metal in any single analysis of the ''required'' kiln dust sample, the ''spare'' samples corresponding to the same period may be analyzed to determine if the exceedance is due to a sampling or analysis error.

- If no ''spare'' samples were taken, refer to Step 9.
- If the average of all the samples for a given day (or week, as applicable) (including the ''required'' sample and the ''spare'' samples) does not exceed the ''conservative'' kiln dust metal concentration limit, no corrective measures are necessary; continue with the daily and/or weekly monitoring as described in Step 5.
- If the average of all the samples for a given day (or week, as applicable) exceeds the ''conservative'' kiln dust metal concentration limit, but the average of the ''spare'' samples is below the ''conservative'' kiln dust metal concentration limit, apply the Q-test, described in appendix A, to determine whether the ''required'' sample concentration can be judged as an outlier.

—If the ''required'' sample concentration is judged an outlier, no corrective measures are necessary; continue with the daily and/or weekly monitoring described in Step 5.

—If the ''required'' sample concentration is not judged an outlier, refer to Step 10.

(9) This step does not apply to precompliance procedures.

(10) Determine if the ''conservative'' kiln dust metal concentration limit has been exceeded more than three times in the last 60 days.

- If not, log this exceedance and continue with the daily and/or weekly monitoring (Step 5).
- If so, the tests to determine the enrichment factors must be repeated (refer to Step 11).
- This determination is made separately for each metal; for example:

—Three exceedances for each of the ten hazardous metals are allowed within any 60-day period.

—Four exceedances of any single metal in any 60-day period is not allowed.

- This determination should be made daily, beginning on the first day of daily monitoring. For example, if four exceedances of any single metal occur in the first four days of daily monitoring, do not wait until the end of the 60-day period; refer immediately to Step 11.

(11) A revised certification of precompliance must be submitted to the Director (or certification of compliance must be submitted) if: (1) More than three exceedances of the ‘‘conservative’’ kiln dust metal concentration limit occur within any 60 consecutive daily samples; or (2) an exceedance of the ‘‘conservative’’ kiln dust metal concentration limit occurs in any weekly sample.

- The facility must notify the Director if a revised certification of precompliance must be submitted.
- The facility has up to 720 waste-burning hours to submit a certification of compliance or a revised certification of precompliance. During this period, the feed rate of the metal in violation must be reduced by 50%. In the case of a revised certification of precompliance, engineering judgement must be used to ensure that the ‘‘conservative’’ kiln dust metal concentration will not be exceeded. Examples of how this goal might be accomplished include:

—Changing equipment or operating procedures to reduce the kiln dust metal concentration;

—Changing equipment or operating procedures, or using more detailed engineering judgement, to decrease the estimated SEF and thus increase the ‘‘conservative’’ kiln dust metal concentration limit;

—Increasing the ‘‘conservative’’ kiln dust metal concentration limit by imposing a stricter PM emissions standard; or

—Increasing the ‘‘conservative’’ kiln dust metal concentration limit by performing a more detailed risk assessment to increase the metal emission limits.

- Meanwhile, the facility must continue with daily kiln dust metals monitoring (Step 5).

APPENDIX A TO APPENDIX IX TO PART 266—STATISTICS

A.1 *Determination of Enrichment Factor*

After at least 10 initial emissions tests are performed, an enrichment factor for each metal must be determined. At the 95% confidence level, the enrichment factor, $EF_{95\leqslant}$ s, is based on the test results and is statistically determined so there is only a 5% chance that the enrichment factor at any given time will be larger than $EF_{95\leqslant}$. Similarly, at the 99% confidence level, the enrichment factor, $EF_{99\leqslant}$, is statistically determined so there is only a 1% chance that the enrichment factor at any given time will be larger than $EF_{99\leqslant}$.

For a large number of samples (n > 30), $EF_{95\leqslant}$ is based on a normal distribution, and is equal to:

$$EF_{95\leqslant}=EF+z_c\,\sigma \qquad (1)$$

where:

$$\overline{EF}=\frac{\sum_{i=1}^{n}EF_i}{n} \qquad (2)$$

$$\sigma=\left[\frac{\sum_{i=1}^{n}\left(EF_i=\overline{EF}\right)^2}{n}\right]^{\frac{1}{2}} \qquad (3)$$

For a 95% confidence level, z_c is equal to 1.645.

For a small number of samples (n<30), $EF_{95\leqslant}$ is based on the t-distribution and is equal to:

$$EF_{95\leqslant}=EF+t_c\,S \qquad (4)$$

where the standard deviation, S, is defined as:

$$S=\left[\frac{\sum_{i=1}^{n}\left(EF_i-\overline{EF}\right)^2}{n-1}\right]^{\frac{1}{2}} \qquad (5)$$

t_c is a function of the number of samples and the confidence level that is desired. It increases in value as the sample size decreases and the confidence level increases. The 95% confidence level is used in this method to calculate the ‘‘violation’’ kiln dust metal concentration limit; and the 99% confidence level is sometimes used to calculate the ‘‘conservative’’ kiln dust metal concentration limit. Values of t_c are shown in table A–

1 for various degrees of freedom (degrees of freedom=sample size−1) at the 95% and 99% confidence levels. As the sample size approaches infinity, the normal distribution is approached.

A.2 *Comparison of Enrichment Factor Groups*

To determine if the enrichment factors measured in the quarterly tests are significantly different from the enrichment factors determined in the initial Step 2 tests, the t-test is used. In this test, the value $t_{meas} \leqq$

$$t_{meas} = \frac{\overline{EF}_1 - \overline{EF}_2}{\sigma_t \left(\frac{1}{n_1} + \frac{1}{n_2} \right)^{\frac{1}{2}}} \qquad (6)$$

TABLE A–1.—T-DISTRIBUTION

$n–1$ or n_1+n_2-2	$t_{.95}$	$t_{.99}$
1	6.31	31.82
2	2.92	6.96
3	2.35	4.54
4	2.13	3.75
5	2.02	3.36
6	1.94	3.14
7	1.90	3.00
8	1.86	2.90
9	1.83	2.82
10	1.81	2.76
11	1.80	2.72
12	1.78	2.68
13	1.77	2.65
14	1.76	2.62
15	1.75	2.60
16	1.75	2.58
17	1.74	2.57
18	1.73	2.55
19	1.73	2.54
20	1.72	2.53
25	1.71	2.48
30	1.70	2.46
40	1.68	2.42
60	1.67	2.39
120	1.66	2.36
∞	1.645	2.33

$$\sigma_t = \left(\frac{(n_1 - 1)S_1^{\,2} + (n_2 - 1)S_2^{\,2}}{n_1 + n_2 - 2} \right) \tfrac{1}{2} \qquad (7)$$

is compared to t_{crit} at the desired confidence level. The 95% confidence level is used in this method. Values of t_{crit} are shown in table A–1 for various degrees of freedom (degrees of freedom n_1+n_2-2) at the 95% and 99% confidence levels. If t_{meas} is greater then t_{crit}, it can be concluded with 95% confidence that the two groups are not from the same population.

A.3 *Rejection of Data*

If the concentration of any hazardous metal in the ‘‘required’’ kiln dust sample exceeds the kiln dust metal concentration limit, the ‘‘spare’’ samples are analyzed. If the average of the combined ‘‘required’’ and ‘‘spare’’ values is still above the limit, a statistical test is used to decide if the upper value can be rejected.

The ‘‘Q-test’’ is used to determine if a data point can be rejected. The difference between the questionable result and its neighbor is divided by the spread of the entire data set. The resulting ratio, Q_{meas}, is then compared with rejection values that are critical for a particular degree of confidence, where Q_{meas} is:

$$\sigma^{meas} = \frac{DMC_{highest} - DMC_{next\ highest}}{DMC_{highest} - DMC_{lowest}} \qquad (8)$$

The 90% confidence level for data rejection is used in this method. Table A–2 provides the values of Q_{crit} at the 90% confidence level. If Q_{meas} is larger than Q_{crit}, the data point can be discarded. Only one data point from a sample group can be rejected using this method.

TABLE A–2.—CRITICAL VALUES FOR USE IN THE Q-TEST

n	Q_{crit}
3	0.94
4	0.76
5	0.64
6	0.56
7	0.51
8	0.47

TABLE A–2.—CRITICAL VALUES FOR USE IN THE Q-TEST—Continued

n	Q_{crit}
9	0.44
10	0.41

[56 FR 32692, July 17, 1991 as amended 56 FR 42512, 42516, Aug. 27, 1991; 57 FR 38566, Aug. 25, 1992; 57 FR 44999, Sept. 30, 1992; 62 FR 32463, June 13, 1997]

APPENDIX X [RESERVED]

APPENDIX XI TO PART 266—LEAD-BEARING MATERIALS THAT MAY BE PROCESSED IN EXEMPT LEAD SMELTERS

A. Exempt Lead-Bearing Materials When Generated or Originally Produced By Lead-Associated Industries[1]

Acid dump/fill solids
Sump mud
Materials from laboratory analyses
Acid filters
Baghouse bags
Clothing (e.g., coveralls, aprons, shoes, hats, gloves)
Sweepings
Air filter bags and cartridges
Respiratory cartridge filters
Shop abrasives
Stacking boards
Waste shipping containers (e.g., cartons, bags, drums, cardboard)
Paper hand towels
Wiping rags and sponges
Contaminated pallets
Water treatment sludges, filter cakes, residues, and solids
Emission control dusts, sludges, filter cakes, residues, and solids from lead-associated industries (e.g., K069 and D008 wastes)
Spent grids, posts, and separators
Spent batteries
Lead oxide and lead oxide residues
Lead plates and groups
Spent battery cases, covers, and vents
Pasting belts
Water filter media
Cheesecloth from pasting rollers
Pasting additive bags
Asphalt paving materials

B. Exempt Lead-Bearing Materials When Generated or Originally Produced By Any Industry

Charging jumpers and clips
Platen abrasive
Fluff from lead wire and cable casings
Lead-based pigments and compounding pigment dust

[56 FR 42517, Aug. 27, 1991]

APPENDIX XII TO PART 266—NICKEL OR CHROMIUM-BEARING MATERIALS THAT MAY BE PROCESSED IN EXEMPT NICKEL-CHROMIUM RECOVERY FURNACES

A. Exempt Nickel or Chromium-Bearing Materials when Generated by Manufacturers or Users of Nickel, Chromium, or Iron

Baghouse bags
Raney nickel catalyst
Floor sweepings
Air filters
Electroplating bath filters
Wastewater filter media
Wood pallets
Disposable clothing (coveralls, aprons, hats, and gloves)
Laboratory samples and spent chemicals
Shipping containers and plastic liners from containers or vehicles used to transport nickel or chromium-containing wastes
Respirator cartridge filters
Paper hand towels

B. Exempt Nickel or Chromium-Bearing Materials when Generated by Any Industry

Electroplating wastewater treatment sludges (F006)
Nickel and/or chromium-containing solutions
Nickel, chromium, and iron catalysts
Nickel-cadmium and nickel-iron batteries
Filter cake from wet scrubber system water treatment plants in the specialty steel industry[1]
Filter cake from nickel-chromium alloy pickling operations[1]

[56 FR 42517, Aug. 27, 1991]

APPENDIX XIII TO PART 266—MERCURY BEARING WASTES THAT MAY BE PROCESSED IN EXEMPT MERCURY RECOVERY UNITS

These are exempt mercury-bearing materials with less than 500 ppm of 40 CFR Part 261, appendix VIII organic constituents when generated by manufacturers or users of mercury or mercury products.

1. Activated carbon
2. Decomposer graphite
3. Wood
4. Paper
5. Protective clothing

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[1] Lead-associated industries are lead smelters, lead-acid battery manufacturing, and lead chemical manufacturing (e.g., manufacturing of lead oxide or other lead compounds).

[1] If a hazardous waste under an authorized State program.

6. Sweepings
7. Respiratory cartridge filters
8. Cleanup articles
9. Plastic bags and other contaminated containers
10. Laboratory and process control samples
11. K106 and other wastewater treatment plant sludge and filter cake
12. Mercury cell sump and tank sludge
13. Mercury cell process solids
14. Recoverable levels or mercury contained in soil

[59 FR 48042, Sept. 19, 1994]

PART 267 [Reserved]

PART 268—LAND DISPOSAL RESTRICTIONS

Subpart A—General

Subpart B—Schedule for Land Disposal Prohibition and Establishment of Treatment Standards

Subpart C—Prohibitions on Land Disposal

Subpart D—Treatment Standards

Subpart E—Prohibitions on Storage

AUTHORITY: 42 U.S.C. 6905, 6912(a), 6921, and 6924.

Subpart A—General

§268.1 Purpose, scope, and applicability.

(a) This part identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise