

WEST VIRGINIA
SECRETARY OF STATE
KEN HECHLER
ADMINISTRATIVE LAW DIVISION

Form #1

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JUN 14 4 00 PM '95

OFFICE OF WEST VIRGINIA
SECRETARY OF STATE

NOTICE OF PUBLIC HEARING ON A PROPOSED RULE

DIVISION OF ENVIRONMENTAL PROTECTION
AGENCY: OFFICE OF AIR QUALITY

TITLE NUMBER: 45CSR25

RULE TYPE: LEGISLATIVE; CITE AUTHORITY WV CODE §§22-5-1 et seq. &

§§22-18-1

AMENDMENT TO AN EXISTING RULE: YES X NO

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 45CSR25

TITLE OF RULE BEING AMENDED: "TO PREVENT AND CONTROL AIR POLLUTION
FROM HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES"

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED:

TITLE OF RULE BEING PROPOSED:

DATE OF PUBLIC HEARING: JULY 19, 1995 TIME: 6:00 P.M.

LOCATION OF PUBLIC HEARING: WV OFFICE OF AIR QUALITY
CONFERENCE ROOM
1558 WASHINGTON STREET, EAST
CHARLESTON, WV 25311

COMMENTS LIMITED TO: ORAL , WRITTEN , BOTH X

COMMENTS MAY ALSO BE MAILED TO THE FOLLOWING ADDRESS: SAME AS ABOVE.

The Department requests that persons wishing to make
comments at the hearing make an effort to submit written
comments in order to facilitate the review of these comments.

The issues to be heard shall be limited to the proposed rule.

ATTACH A **BRIEF** SUMMARY OF YOUR PROPOSAL


G. DALE FARLEY
CHIEF

WEST VIRGINIA
SECRETARY OF STATE
KEN HECHLER
ADMINISTRATIVE LAW DIVISION

Form #2

FILED
JUN 14 4 01 PM '95
OFFICE OF WEST VIRGINIA
SECRETARY OF STATE

NOTICE OF A COMMENT PERIOD ON A PROPOSED RULE

DIVISION OF ENVIRONMENTAL PROTECTION
AGENCY: OFFICE OF AIR QUALITY TITLE NUMBER: 45CSR25
RULE TYPE: LEGISLATIVE; CITE AUTHORITY WV CODE §§22-5-1 et seq. &
§§22-18-1
AMENDMENT TO AN EXISTING RULE: YES X NO
IF YES, SERIES NUMBER OF RULE BEING AMENDED: 45CSR25

TITLE OF RULE BEING AMENDED: "TO PREVENT AND CONTROL AIR POLLUTION
FROM HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES"

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED:

TITLE OF RULE BEING PROPOSED:

IN LIEU OF A PUBLIC HEARING, A COMMENT PERIOD HAS BEEN ESTABLISHED DURING WHICH
ANY INTERESTED PERSON MAY SEND COMMENTS CONCERNING THESE PROPOSED RULES. THIS
COMMENT PERIOD WILL END ON JULY 19, 1995 AT 5:00 P.M.
ONLY WRITTEN COMMENTS WILL BE ACCEPTED AND ARE TO BE MAILED TO THE FOLLOWING
ADDRESS.

G. DALE FARLEY, CHIEF

OFFICE OF AIR QUALITY

1558 WASHINGTON STREET, EAST

CHARLESTON, WV 25311

THE ISSUES TO BE HEARD SHALL BE
LIMITED TO THIS PROPOSED RULE.

G. DALE FARLEY, CHIEF

ATTACH A BRIEF SUMMARY OF YOUR PROPOSAL



BUREAU OF ENVIRONMENT
10 McJunkin Road
Nitro, WV 25143-2506

GASTON CAPERTON
GOVERNOR

LAIDLEY ELI MCCOY, PH.D.
COMMISSIONER

June 19, 1995

Ms. Judy Cooper
Director, Administrative Law Division
Secretary of State's Office
Building 1, Suite 157K
Charleston, West Virginia 25305

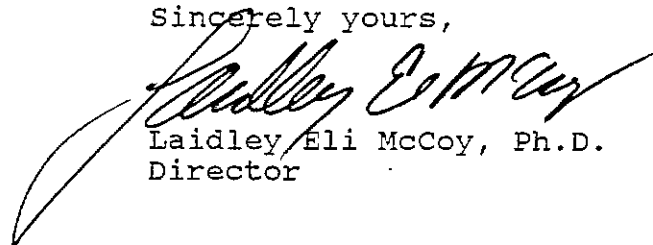
RE: 45 CSR 25 - "To Prevent and Control Air Pollution
From Hazardous Waste Treatment,
Storage, or Disposal Facilities"

Dear Ms. Cooper:

This is to advise you that I am giving approval for the filing of the above-captioned rule as a proposed amendment to an existing legislative rule.

Your cooperation in this regard is very much appreciated. If you have any questions or require additional information, please feel free to contact Roger T. Hall at 759-0515.

Sincerely yours,



Laidley Eli McCoy, Ph.D.
Director

LEM;RTH:cc

Attachment

**TO PREVENT AND CONTROL AIR POLLUTION FROM
HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES**

SUMMARY

The purpose of this rule is to establish a program of regulation over the treatment, storage, and disposal of hazardous wastes in order to achieve and maintain such levels of air quality as will protect the public health and safety and the environment from the effects of improper, inadequate, or unsound treatment, storage, or disposal of hazardous wastes.

The proposed rule changes will update references to the counterpart federal regulations. EPA promulgates air standards that will further reduce organic emissions from hazardous waste management activities. The air standards apply to owners and operators of hazardous waste treatment, storage and disposal facilities (TSDF) subject to RCRA subtitle C permitting requirements and to certain hazardous waste generators accumulating waste on-site in RCRA permit-exempt tanks and containers. Air emission controls must be used for hazardous waste tanks, surface impoundments and containers.

Changes are indicated by ~~strikeout~~ and underlines.

45CSR25

**TO PREVENT AND CONTROL AIR POLLUTION FROM
HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES**

STATEMENT OF CIRCUMSTANCES

The rule being proposed updates certain sections of the federal counterpart regulations which are referenced in the rule. This rule establishes additional air standards for treatment, storage and disposal facilities (TSDF) owners and operators subject to RCRA subtitle C permitting requirements. In addition, this rule amends the conditions for hazardous waste generators accumulating waste on-site in RCRA permit-exempt tanks and containers to include air emission control requirements.

**TO PREVENT AND CONTROL AIR POLLUTION
FROM HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES**

Determination of Stringency

W. Va. Code §22-1-3 in conjunction with W. Va. Code §22-1-3a requires, in part, the Director of the Division of Environmental Protection, to determine if a new or amended environmental provision should be the same in substance as a counterpart federal regulation. If the new rule should be the same in substance, as the counterpart federal regulation, then the Director shall incorporate by reference, to the greatest extent possible, the federal counterpart rule. If the Director determines the rule should not be the same in substance as the federal counterpart rule, then the Director shall file a statement setting forth the difference between the proposed rule and the counterpart federal regulation. W. Va. Code §22-1-3a requires the Director to conduct the "stringency" determination and provide specific reasons for deviation of the proposed state rule from the federal counterpart regulation.

This rule was developed as a part of the State's RCRA Implementation Plan (RIP) pursuant to the federal Resource Conservation Recovery Act (RCRA), as amended. The Implementation Plan has as its purpose, to promote waste minimization, ensure environmentally sound waste management, and reduce risks posed by releases of hazardous materials/wastes to the environment.

This rule has been determined to incorporate necessary provisions of the federal counterpart regulations which are referenced in the rule for the Hazardous Waste Treatment, Storage, and Disposal Facilities and Hazardous Waste Generators; Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers. Therefore no stringency determination is required.

**TO PREVENT AND CONTROL AIR POLLUTION FROM
HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES**

PRIVATE REAL PROPERTY PROTECTION ACT ASSESSMENT

The Division of Environmental Protection is required to perform a "constitutional takings determination" or assessment in only limited circumstances (See "Private Real Property Protection Act", W. Va. Code §§22-1A-1 et seq.). Under W. Va. Code §22-1A-3(a), such an assessment is not required, unless the action being contemplated by the Division is reasonably likely to deprive a private real property owner of his or her property in fee simple or to deprive an owner of all productive use of his or her property.

W. Va. Code §22-1A-3(c) expressly exempts rulemaking which simply limits uses pursuant to statute from the assessment requirement. In pertinent part, Section 3(c) provides that the following actions do not require an assessment:

- (1) Licensing or permitting conditions, requirements or limitations to the use of private real property pursuant to any applicable state or federal statutes, rules or regulations; or
- (2) Rules and emergency rules of the division that are reasonably likely to limit the use of private real property pursuant to any applicable state or federal statutes, rules or regulations;

See W. Va. Code §22-1A-3(c)(1) and (2).

Therefore, since this is a rulemaking pursuant to statute, an assessment is not required.

45CSR25

**TO PREVENT AND CONTROL AIR POLLUTION FROM
HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES**

Consultation with the Environmental Protection Advisory Council

West Virginia Code §22-1-3(c) requires, in part, the Director of the Division of Environmental Protection to consult with the Environmental Protection Advisory Council prior to proposing any new rule. This rule was filed prior to the appointment of the Environmental Protection Advisory Council, therefore, no consultation with the Environmental Protection Advisory Council has been possible.

APPENDIX B

FISCAL NOTE FOR PROPOSED RULES

Rule Title: 45CSR25 - To Prevent and Control Air Pollution from Hazardous Waste Treatment, Storage, or Disposal Facilities

Type of Rule: X Legislative Interpretive Procedural

Agency: Office of Air Quality

Address: 1558 Washington Street, East
Charleston, WV 25311-2599

1. Effect of Proposed Rule	Annual		Fiscal Year		
	Increase	Decrease	Current	Next	Thereafter
Estimated Total Cost	\$ 33,000	\$ -0-	\$ -0-	\$30,000	\$33,000
Personal Services	27,300	-0-	-0-	26,000	27,300
Current Expense	3,150	-0-	-0-	3,000	3,150
Repairs and Alterations	-0-	-0-	-0-	-0-	-0-
Equipment	1,800	-0-	-0-	1,800	1,800
Other	-0-	-0-	-0-	-0-	-0-

2. Explanation of above estimates: The above estimates represent new or additional expenditures for implementation of new or revised federal RCRA standards. Costs anticipated to be incurred in the implementation of new federal requirements promulgated under 45CSR25 as of June 1, 1995 will be covered under budget estimates for implementing the U.S. EPA's new combustion/waste minimization strategy and organic air emission standards for hazardous waste tanks, surface impoundments, and containers. Emission standards must be implemented and enforced. The cost for such implementation must be paid from federal grant award which must in turn be matched with the state funds from general and/or special revenue (24% state/74% federal ratio). Staff time representing approximately 1.0 FTE is

Appendix B
Fiscal Note for Proposed Rules
Page Two

anticipated for the regulation of approximately 6 incinerator facilities, 4 boilers and industrial furnaces facilities and 10 small quantity burners facilities.

3. Objectives of these rules: To adopt by reference new or revised federal rules.
4. Explanation of overall economic impact of proposed rule.

A. Economic impact on state government.

Costs to administer new Federal hazardous waste provisions would increase in the FY'96 to FY'97 period by \$30,000 - \$33,000 per year. Seventy-four percent (74%) of these costs are funded by a federal grant award. Approximately \$7,200 to \$8,000 per year in state funds from general and/or special revenue would be required to match the federal grant.

B. Economic impact on political subdivisions; specific industries; specific groups of citizens.

No impact above that resulting from the currently applicable federal requirements.

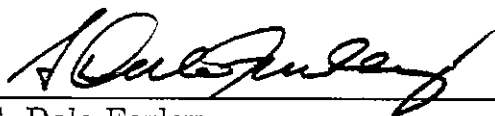
C. Economic impact on citizens/public at large.

No impact above that resulting from the currently applicable federal requirements.

Date: _____

June 14, 1995

Signature of agency head or authorized representative:



G. Dale Farley
Chief, Office of Air Quality

45CSR25

TITLE 45
LEGISLATIVE RULES

BUREAU OF ENVIRONMENT
DIVISION OF ENVIRONMENTAL PROTECTION
OFFICE OF AIR QUALITY

SERIES 25

TO PREVENT AND CONTROL AIR POLLUTION FROM HAZARDOUS WASTE
TREATMENT, STORAGE, OR DISPOSAL FACILITIES

§45-25-1. General.

1.1. Scope.

a. The intent and purpose of this rule is to establish a program of regulation over air emissions from the treatment, storage and disposal of hazardous wastes in order to achieve and maintain such levels of air quality as will protect the public health and safety and the environment from the effects of improper, inadequate, or unsound treatment, storage, or disposal of hazardous wastes. Further, all persons engaged in the treatment, storage, or disposal of hazardous waste shall give careful consideration to the effects of the resultant emissions on the air quality or the areas affected by such any hazardous waste or constituent thereof in such quantities as to cause ambient air concentrations which may be injurious to human health or welfare which would interfere with the enjoyment of life or property.

b. The requirements of this rule apply to all owners and operators of hazardous waste treatment, storage, and disposal facilities, including but not limited to:

A. Generators accumulating hazardous waste on-site for periods of less than ninety (90) days;

B. Owners and operators of wastewater treatment units as defined in this rule; and

C. Owners and operators which burn hazardous wastes in incinerator, boilers and industrial furnaces in order to destroy the wastes.

c. Neither compliance with the provisions of this rule nor the absence of specific language to cover particular situations constitutes approval or implies consent or condonement of any emission which is released in any locality in such manner or amount as to cause or contribute to statutory air pollution. Neither does it exempt nor excuse anyone from complying with other applicable laws, ordinances, regulations, or orders of governmental entities having jurisdiction over hazardous waste treatment, storage or disposal facilities.

d. This rule is promulgated pursuant to W.Va. Code §§22-18-1 et seq., and §§22-5-1 et seq. Recognizing that each Chapter has its own enforcement sections, it is the intent of the Director that enforcement shall be implemented in accordance with W. Va. Code §§22-18-1 et seq., where practicable.

e. Permit applications filed pursuant to this rule shall be processed in accordance with the permitting procedures as set forth in W. Va. Code §§22-18-1 et seq., and this rule.

1.2. Authority. -- W.Va. Code §§22-5-1 et seq. and §§22-18-1 et seq.

1.3. Filing Date. --

1.4. Effective Date. --

1.5. Incorporation By Reference.

a. This rule incorporates by reference the provisions contained in the Code of Federal Regulations as listed in Table 25-A. Unless otherwise indicated, where reference to a federal regulation or standard appears in this rule, such regulation or standard will for purposes of this rule, be construed as that version which was in effect as of July~~June~~ 1, 19945.

b. This rule also incorporates by reference the provisions contained in 47 CSR 35, effective July~~June~~ 1, 19945.

§45-25-2. Definitions.

2.1. "Air Pollutants" means solids, liquids, or gases which, if discharged into the air, may result in statutory air pollution.

2.2. "Air Pollution", 'statutory air pollution' shall have the meaning ascribed to it in W. Va. Code §22-5-2.

2.3. "Air Pollution Control Equipment" means any equipment used for collecting or converting hazardous waste emissions for the purpose of preventing or reducing emissions of these materials into the open air from hazardous waste treatment, storage, or disposal facilities.

2.4. "BACT", 'Best Available Control Technology' means an emissions limitation based on the maximum degree of reduction for each pollutant which would be emitted from any hazardous waste treatment, storage or disposal facility which the Director, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such facility through application of production processes or available methods, systems, or techniques. If the Director determines that technological or economic

limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

2.5. "CAA" means the federal Clean Air Act, as amended; 42 U.S.C. §7401 et seq.

2.6. "CFR" means the Code of Federal Regulations published by the Office of the Federal Register, National Archives and Records Service, General Services Administration.

2.7. "Chief" means the Chief of the West Virginia Office of Air Quality, Division of Environmental Protection.

2.7.8. "CWA" means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act), Public Law 92-500, as amended by Public Law 95-217 and Public Law 95-576; 33 U.S. C. §1251 et seq.

2.8.9. "Director" means the Director of the West Virginia Division of Environmental Protection or his or her designated representative.

2.9.10 "Division of Environmental Protection or DEP" means that Division of the which is created by the provisions of W. Va. Code §§22-1-1 et seq.

2.10.11. "EPA" means the United States Environmental Protection Agency.

2.11.12. "Infectious Medical Waste" shall have the meaning ascribed to it in 64 CSR 56 "Infectious Medical Waste", (June 11, 1993), promulgated by the Division of Health.

2.13. "Major Facility" means a disposal or treatment facility which disposes of or treats an amount of hazardous waste exceeding or equal to one thousand (1000) tons during a calendar year and any storage facility having a storage capacity of one thousand (1000) tons or more of hazardous waste.

2.14.14. "Particulate Matter" means any material, except uncombined water, that exists in a finely divided form as a liquid or solid.

2.15.15. "Pathological Incinerator" means an incinerator used to thermally treat infectious medical waste. Note: The owner or operator of a pathological waste incinerator is not subject to the requirements of this regulation. However, such mixtures of infectious medical waste and hazardous waste listed in 40 CFR 261 subpart D are subject to the requirements of this rule. Pathological waste incinerators must be designed, constructed, and operated to meet all other

applicable regulations promulgated by the Director including, but not limited to, 45 CSR 6 and 45 CSR 13.

2.4416. "RCRA" means the federal Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act, as amended; 42 U.S.C. §6901 et seq.

2.17. "Small Quantity Generators" means a generator of hazardous waste that generates more than 100 kilograms but less than 1000 kilograms of hazardous waste per calendar month.

2.1518. "Steady State" means that all conditions at all points in the thermal treatment process are in stable, normal operating conditions.

2.1619. All other words or phrases not herein defined and used in this rule shall have the meaning as ascribed in W. Va. Code §§22-5-1 et seq., or W. Va. Code §§22-18-1 et seq., or 47 CSR 35 "Hazardous Waste Management Regulations" governing the State Hazardous Waste Management Act.

§45-25-3. Adoption By Reference.

3.1. Definitions, lists, tables, appendices, conditions, or requirements from 47 CSR 35 "Hazardous Waste Management Regulations", effective JulyJune 1, 19945 are hereby adopted by reference.

a. In case of a conflict between the Office of Air Quality and the Office of Waste Management as to whether a material is a waste and if so, whether the material is a hazardous waste, the Director has final administrative authority to resolve the conflict.

3.2. The provisions contained in the Code of Federal Regulations (JulyJune 1, 19945), as listed in Table 25-A, are hereby adopted by reference, with the following modifications:

a. Whenever the term "United States" is used it shall also mean the State of West Virginia.

b. Whenever the terms "Administrator" or "Regional Administrator", "The Assistant Administrator for Solid Waste and Emergency Response" or "Director" is used, the term means the Director of the West Virginia Division of Environmental Protection.

c. Whenever the term "Environmental Protection Agency" is used in 40 CFR 266, the term also means the West Virginia Division of Environmental Protection.

d. The distance provisions of 40 CFR 265.382 apply only to the open burning or open detonation of military explosives in a manner that presents an uncontrolled fragment release hazard. The applicable distance provisions of the American Table of Distances for

Commercial Explosives, effective June 19, 1991, and of the Department of Defense Contractors Safety Manual for Ammunition and Explosives (DOD 4145.26-M), as amended April 11, 1988, apply otherwise.

§45-25-4. Facility Requirements.

4.1. Owners and operators of hazardous waste treatment, storage, and disposal facilities regulated by the provisions of this rule shall maintain a listing of all permits or construction approvals received or applied for under any of the following programs and their counterpart programs administered by the State, where appropriate:

- a. Hazardous Waste Management Program under RCRA and 47 CSR 35;
- b. Prevention of Significant Deterioration (PSD) Program under 45 CSR 14 or the Federal Clean Air Act;
- c. Nonattainment program under West Virginia DEP, Office of Air Quality or the Federal Clean Air Act and 45 CSR 19;
- d. National Emission Standards for Hazardous Pollutants (NESHAP) preconstruction approval under 45 CSR 15 or the Federal Clean Air Act;
- e. Standards of Performance for New Stationary Sources under 45 CSR 16 or the Federal Clean Air Act; and
- f. Other relevant air pollution control permits including local permits.

4.2. Owners and operators of hazardous waste treatment, storage and disposal facilities covered under this rule shall comply with the personnel training requirements as specified by 40 CFR 264.16. An outline of the training program and a description of how the training program is designed to meet actual job tasks must be submitted to the Director with Part B of the permit application.

4.3. Owners and operators of hazardous waste tanks, containers, surface impoundments, landfills, waste piles, land treatment, miscellaneous units, thermal treatment units, incinerators, and boiler and industrial furnace facilities must design, construct, maintain, and operate such facilities to minimize the possibility of a fire, explosion, or any unplanned, sudden, or non-sudden release of hazardous waste constituents to the air which could threaten human health or the environment.

4.4. Owners and operators of hazardous waste management facilities that treat, store, or dispose of ignitable or reactive wastes, or mix incompatible waste or incompatible wastes and other materials, must prevent reactions which:

a. Produce uncontrolled toxic mists, fumes, dust or gases in sufficient quantities to threaten human health or the environment, and

b. Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion.

~~4.5. Owners and operators of all hazardous waste tanks shall have treatment process controls, emission controls, and safety or emergency procedures as are necessary to protect human health and the environment from toxic or otherwise harmful fumes, mists, or gases resulting from:~~

~~a. Volatilization of wastes stored or treated in the tank;~~

~~b. Chemical reactions in the tank, either routine or resulting from process upsets; and~~

~~c. Physical agitation or other forms of treatment in the tank.~~

~~4.6. Tanks used to treat or store hazardous waste containing liquid waste whose true vapor pressure is greater than 10.5 kilopascals (1.52 psia) at 25°C and 760 mmHg shall be equipped with an emission control system meeting the following requirements:~~

~~a. Storage or treatment in open (uncovered) tanks is prohibited.~~

~~b. External floating roofs shall be equipped with double mechanical seals.~~

~~c. Fixed roof tanks shall be equipped with an internal floating roof with appropriate seals, a vapor recovery system, or an equally effective alternative emission control system approved by the Director.~~

~~4.7. Emissions of hazardous waste whose true vapor pressure is greater than 10.5 kilopascals (1.52 psia) at 25°C, 760 mmHg shall be controlled during loading or unloading of tank trucks, railroad tank cars, and barges by the methods listed as follows:~~

~~a. Venting all displaced vapors and gases to a vapor recovery system or an alternative emission control system approved by the Director;~~

~~b. Providing a means to prevent liquid drainage from the loading (unloading) device when it is not in use or to accomplish complete drainage before the loading device is disconnected; and~~

~~c. Equipping all loading and vapor lines with fittings which make vapor-tight connections that close automatically when disconnected.~~

4.5. The owners and operators of the hazardous waste treatment, storage and disposal facilities shall manage all hazardous waste placed in a container in accordance with the air emission standard requirements of 40 CFR 264 and 265 including but not limited to subpart CC.

4.6. The owners and operators of the hazardous waste treatment, storage and disposal facilities shall manage all hazardous waste placed in a tank in accordance with the air emission standard requirements of 40 CFR 264 and 265 including but not limited to subparts AA, BB and CC.

4.7. The owners and operators of the hazardous waste treatment, storage and disposal facilities shall manage all hazardous waste placed in a surface impoundment in accordance with air emission standard requirements of 40 CFR 264 and 265 including but not limited to subpart CC.

4.8. The owners and operators of the hazardous waste treatment, storage and disposal facilities shall manage all hazardous waste placed in a miscellaneous unit in accordance with air pollution standard requirements of 40 CFR 264 including but not limited to subparts AA, BB, and CC.

4.8.9. A hazardous waste pile must be fully enclosed or otherwise designed to prevent dispersal of the waste by wind.

4.9-10. Hazardous waste landfills must be covered or otherwise managed to prevent wind dispersal of the waste.

4.10-11. All landfills, surface impoundments, and land treatment facilities shall be located, designed, constructed, operated, maintained, and closed in a manner that will assure protection of human health and the environment. Protection of human health and the environment shall include prevention of adverse effects on air quality considering:

a. The volume and physical and chemical characteristics of the waste in the facility, including its potential for volatilization and wind dispersal;

b. The existing quality of the air, including other sources of contamination and their cumulative impact on the air;

c. The potential for health risks caused by human exposure to waste constituents;

d. The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;

e. The potential for interference with the enjoyment of life or property; and

- f. The persistence and permanence of such potential adverse effects.

4.11-12. Owners and operators of hazardous waste treatment, storage, or disposal facilities shall utilize best available control technology ("BACT") to limit the discharge of hazardous waste constituents to the atmosphere during:

- a. Process turn-arounds;
- b. Cleaning of process equipment;
- c. Planned process shutdowns; and
- d. Tank truck, railroad tank car, and barge cleaning.

4.12-13. a. The Director may, on a case-by-case basis, establish performance standards for hazardous waste incinerators for control of emissions of metals, hydrogen halides, and elemental halogen, based on a finding that such standards are necessary to limit the emission rates of these constituents to levels which do not pose an unacceptable risk to human health and environment. The Director may require the following data from the permit applicant:

A. Emissions of POHCs, hazardous combustion by-products, metals and hydrogen halides, including:

- (a) Mass emission rates from the stack, and
- (b) Concentration in the gas stream exiting the stack; and

B. Air dispersion estimates for those substances, including:

- (a) Meteorological data, and
- (b) Description of the air dispersion models, and
- (c) Assumptions underlying the air dispersion models used; and

C. Expected human and environmental exposure, including:

- (a) Topographic considerations,
- (b) Population distributions,
- (c) Population activities, and
- (d) Modes, intensity, and duration of exposure; and

D. Consequences of exposure, including:

- (a) Dose-response curves for carcinogens,

- constituents,
- (b) Health effects based on human or animal studies for other toxic
 - (c) Potential for accumulation of toxic constituents in the human body, and
 - (d) Statements of expected risk to individuals or populations.

~~4.13.14.~~ 4.13.14. Emergency Permit. Notwithstanding any other provision in 40 CFR 270.61, in the event the Director finds an imminent and substantial danger to human health or the environment, the Director may issue a temporary permit to a facility to allow treatment, storage, or disposal of hazardous waste at a non-permitted facility, or hazardous waste not covered by the permit for a facility with an effective permit. This emergency permit:

a. May be oral or written. If oral, it shall be followed within five (5) days by written emergency permit;

b. Shall not exceed ninety (90) days in duration;

c. Shall clearly specify the hazardous wastes to be received, and the manner and location of the treatment, storage, or disposal;

d. May be terminated by the Director at any time without prior notice if it is determined that termination is appropriate to protect human health or the environment; and

e. Shall be accompanied by public notice as described under Section 7 of this rule and shall include the following:

A. Name and address of the office granting the emergency authorization,

B. Name and location of the permitted hazardous waste management facility,

C. A brief description of the wastes involved,

D. A brief description of the action authorized and reasons for authorizing it,

E. Duration of the emergency permit; and

f. Shall incorporate, to the extent possible and not inconsistent with the emergency situation, all applicable requirements of this rule.

§45-25-5. Exclusion and Exemptions.

5.1. Wastes and/or materials excluded in 47 CSR 35, are also excluded from the requirements of this rule, except that mixtures of domestic or industrial sewage and hazardous wastes which pass through a sewer system to a privately owned or publicly owned treatment works are subject to the requirements of this rule.

5.2. Except for recyclable materials exempt pursuant to Section 3 of 47 CSR 35, hazardous wastes that are stored prior to recycling are subject to all applicable provisions of Section 4 of this rule.

§45-25-6. Confidential Information.

6.1. Any records, reports, or information and any permit, permit applications, and related documents within the Director's possession shall be available to the public for inspection and copying; provided, however, that upon satisfactory showing to the Director that such records, reports, permit documentation, or information, or any part thereof would, if made public, divulge methods or processes, or activities, entitled to protection as trade secrets, the Director shall consider, treat, and protect such records as confidential pursuant to W. Va. Code §22-18-1 et seq., and §22-5-1 et seq.

§45-25-7. Public Notice.

Public notice of the preparation of a draft permit shall be given by the methods contained in 47 CSR 35 Section 1211, except that the owner or operator shall place a Class 1 legal advertisement in a newspaper of general circulation where the source is or will be located. In addition, the applicant shall have such notice broadcast over local radio stations. The advertisement shall contain the name of the applicant, the type and location of the source and the nature of the permit sought and provide notice to the public that written comments may be submitted to the Chief regarding the application. Upon publication and broadcasting, the applicant shall send the Chief a copy of the certificate of publication and confirmation of broadcasting.

§45-25-8. Application Fees.

8.1. Any person who applies for a permit for the construction and/or operation of a hazardous waste treatment, storage, or disposal facility shall submit as part of said application a money order or cashier's check payable to the "Hazardous Waste Management Fund" of the State Treasury. Such fee shall be determined by the schedule set forth below:

ACTIVITY	FEES
a. Hazardous Waste Management Facilities	
Treatment design capacity more than 1,000 ton/yr	\$5,000
Treatment design capacity less than 1,000 ton/yr	\$2,500
b. Major Modifications or Renewals of Permits for Hazardous Waste Management Facilities	\$1,000

All fees required under this section shall be in addition to fees required under any other rule of the West Virginia Division of Environmental Protection.

§45-25-9. Inconsistency Between Rules.

In the event of any inconsistency between this rule and any other rule of the West Virginia Division of Environmental Protection, such inconsistency shall be resolved by the determination of the Director and such determination shall be based upon the application of the more stringent provision, term, condition, method and rule.

45CSR25

TABLE 25-A

<u>Item No.</u>	<u>CFR No.</u>	<u>Part No.</u>	<u>Subpart No.</u>	<u>Title</u>
<u>1.</u>	40 CFR	- 264, 265	- O -	Incinerator
<u>2.</u>		- 270.19	- B -	Specific Requirements for Incinerators
<u>3.</u>		- 270.62	- F -	Hazardous Waste Incinerator Permits
<u>4.</u>	40 CFR	- 264	- X -	Miscellaneous Units
<u>5.</u>		- 270.23	- B -	Specific Requirements for Miscellaneous Units
<u>6.</u>	40 CFR	- 264, 265	- AA -	Air Emission Standards for Process Vents
<u>7.</u>		- 270.24	- B -	Specific Requirements for Process Vents
<u>8.</u>	40 CFR	- 264, 265	- BB -	Air Emission Standards for Equipment Leaks
<u>9.</u>		- 270.25	- B -	Specific Requirements for Equipments Leaks
<u>10.</u>	40 CFR	- 264, 265, 270-	CC -	<u>Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers</u>
<u>11.</u>	40 CFR	- 265	- P -	Thermal Treatment
<u>12.</u>	40 CFR	- 266	- H -	Hazardous Waste Burned in Boilers and Industrial Furnaces
<u>13.</u>		- 270.22	- B -	Specific Requirements for Boilers and Industrial Furnaces Burning Hazardous Wastes
<u>14.</u>		- 270.66	- F -	Permits for Boiler and Industrial Furnaces Burning Hazardous Waste
<u>15.</u>	40 CFR	- 279.23	- C -	On-site Burning In Space Heater
<u>16.</u>		- 279.60	- G -	Standards for Used Oil Burners
<u>17.</u>		- 279.61		Who Burn Off-Specification Used
<u>18.</u>		- 279.62		Oil for Energy Recovery
<u>19.</u>		- 279.63		

7/6/93

TITLE 47
LEGISLATIVE RULES
BUREAU OF ENVIRONMENT
DIVISION OF ENVIRONMENTAL PROTECTION

SERIES 35
HAZARDOUS WASTE MANAGEMENT RULE

§ 47-35-1. SCOPE AND AUTHORITY.

1.1 Scope and Purpose. -- The purpose of this rule is to provide for the regulation of the generation, treatment, storage, and disposal of hazardous waste to the extent necessary for the protection of the public health and safety and the environment.

1.2 Authority. -- This rule is promulgated pursuant to the West Virginia Hazardous Waste Management Act, W. Va. Code, § 22-18-1, et seq.

1.3 Filing Date. April 14, 1995

1.4 Effective Date. May 1, 1995

1.5 Amendment of Former Rule. -- This rule amends the Hazardous Waste Management Regulations, 47 CSR 35, in effect prior to the date this rule becomes effective.

1.6 Incorporation by Reference. -- Whenever either federal statutes or regulations or state statutes or rules are incorporated by reference into this rule, the reference is to that statute or regulation in effect on July 1, 1994, unless otherwise noted in the text of this rule...

1.6.1 In applying the federal requirements incorporated by reference throughout this rule, the following exceptions or substitutions apply, unless the context clearly requires otherwise:

1.6.1.a "Office of Waste Management, West Virginia Division of Environmental Protection" shall be substituted for "Environmental Protection Agency."

1.6.1.b "Chief of the Office of Waste Management, West Virginia Division of Environmental Protection" shall be substituted for "Administrator," "Regional Administrator," and "Director."

1.6.1.c Whenever the regulations require publication in the "Federal Register" compliance shall be accomplished by publication in the "West Virginia Register," a part of the "State Register" created pursuant to the provisions of W. Va. Code, § 29A-2-2.

1.6.1.d Whenever in the federal regulation reference is made to the Resource Conservation and Recovery Act of 1976 § 3010, as amended (42 U.S.C. § 6930), the reference should be to Section 4 of this rule.

1.7 Whenever a reference is cited in a provision incorporated by reference which cross reference was not incorporated by reference, the provisions of the applicable state law and rules, if any, control to the extent of any conflict or inconsistency. For example, cross reference to 40 CFR part 264 subpart O -- Incinerators, which was not incorporated by reference, would need to be referenced to the applicable West Virginia Air Quality Board rule on incineration of hazardous waste, 45 CSR 25.

1.8 In the event a provision of the Code of Federal Regulations incorporated by reference herein includes a section which is inconsistent with the West Virginia Code, the West Virginia Code controls to the extent federal law does not preempt the state law. In the event a provision of the Code of Federal Regulations incorporated by reference herein is beyond the scope of authority granted the Division of Environmental Protection pursuant to statute, or is in excess of the statutory authority, such provision shall be and remain effective only to the extent authorized by the West Virginia Code.

1.9 The provisions of this rule are to be applied prospectively. All orders, determinations, demonstrations, rules, permits, certificates, licenses, waivers, bonds, authorizations and privileges which have been issued, made, granted, approved or allowed to become effective by the Chief, and which are in effect on the date this rule becomes effective, shall continue in effect according to their terms unless modified, suspended or revoked in accordance with the law.

§ 47-35-2. HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL.

2.1 The provisions of 40 CFR part 260 are hereby adopted and incorporated by reference with the modifications, exceptions and additions set forth in this section.

2.1.1 The definitions of terms used in this rule shall have the meaning ascribed to them in 40 CFR parts 260, 261, 262, 263, 264, 265, 266, 267, 268, 270 and 279 with the exceptions, modifications and additions set forth in this section.

2.1.1.a "Major facility" means a disposal or treatment facility which disposes or treats an amount of hazardous waste exceeding or equal to one thousand (1000) tons during a calendar year, and any storage facility having a storage capacity for one thousand (1000) tons of hazardous waste or more.

2.1.1.b "Full regulation" means those rules applicable to generators of greater than one thousand (1000) kilograms of non-acutely hazardous waste in a calendar month.

2.2 The provisions of 40 CFR § 260.2 are excepted from incorporation by reference. Availability of information provided under these rules is controlled by the provisions of W. Va. Code, §22-18-12.

2.3 The provisions of 40 CFR § 260.21(d) are excepted from incorporation by reference.

2.4 Petitions for Waste Exclusions.

2.4.1 Persons desiring to exclude as waste at a particular generating facility from the lists set forth in 40 CFR part 261 may petition the chief for such an exclusion. The petition shall include:

2.4.1.a A copy of the petition submitted to the Administrator of the Environmental Protection Agency pursuant to 40 CFR § 260.22, including all demonstration information;

2.4.1.b A copy of the Administrator's approval granting the exclusion pursuant to 40 CFR § 260.20(d); and

2.4.1.c Any other additional information which may be required for the chief to evaluate the petition.

2.4.2 Within one hundred and twenty (120) days of the filing of the petition the chief shall decide whether to approve or to deny the petition and so advise the petitioner. Where a decision to deny a petition is made, the chief shall notify the petitioner of such action in writing, setting forth the reasons therefor.

2.4.3 The chief shall not deny a petition to exclude a waste at a particular facility that has been approved by the Administrator unless scientifically supportable reasons for such denial are advanced which had not been presented to the Administrator.

§ 47-35-3. IDENTIFICATION AND LISTING OF HAZARDOUS WASTE.

3.1 The provisions of 40 CFR part 261 are hereby adopted and incorporated by reference with the modifications, exceptions and additions set forth in this section.

3.1.1 In order for a mixture of a waste and one or more hazardous wastes identified in 40 CFR §§ 261.3(a)(2)(iv)(A), (B), or (C) to be exempt from the definition of hazardous waste, the owner or operator must comply with the following:

3.1.1.a Provide a certification in writing to the chief that groundwater monitoring complying with either 40 CFR part 265, subpart F or which is approved by the chief, is or will be in place at the wastewater treatment facility identified in 40 CFR §§ 261.3(a)(2)(iv)(A), (B), or (C). A time schedule for the installation of such groundwater monitoring must be included. This requirement does not apply to wastewater treatment units or containers.

3.1.1.b Before claiming an exemption, the owner or operator of each wastewater treatment facility receiving mixtures of wastes under 40 CFR §§ 261.3(a)(2)(iv)(A), (B), or (C) shall notify the chief of the receipt of such wastes on a form prescribed by the chief.

3.1.1.c Annually submit to the chief a list of hazardous wastes that are expected to be present in the mixture to be exempted.

3.2 The provisions of 40 CFR § 261.5 are excepted from incorporation by reference and in lieu thereof the language of this Section 3.2 is inserted. All references to 40 CFR § 261.5 and subparagraphs thereof, shall be deemed references to Section 3.2 and the subparagraphs herein, as appropriate. The provisions of this Section 3.2 are the exclusive requirements for small quantity generators and conditionally exempt small quantity generators notwithstanding any provision of the Code of Federal Regulations or these rules to the contrary.

3.2.1 Special Requirements for Hazardous Waste Generated by Small Quantity Generators and Conditionally Exempt Small Quantity Generators.

3.2.1.a. Small Quantity Generators.

3.2.1.a.A A Small Quantity Generator is a generator of hazardous waste that generates more than 100 kilograms but less than 1000 kilograms of hazardous waste per month.

3.2.1.a.B. Hazardous Waste Determination. A person who generates wastes must determine if that waste is hazardous by:

(a) Applying knowledge of the waste in light of the materials or processes used and knowledge of the characteristic and listed hazardous wastes contained in 40 CFR part 261.

(b) Testing the waste according to methods set forth in 40 CFR part 261.

(c) Voluntarily declaring the wastes as hazardous and subject to regulation.

3.2.1.a.C The Small Quantity Generator must notify the chief of hazardous waste generation activities in accordance with the provisions of Section 4 of this rule. A small quantity generator may not treat, store or dispose of, transport or offer for transportation hazardous waste without having received an EPA Identification number.

3.2.1.a.D The Small Quantity Generator may accumulate hazardous waste on site for 180 days unless the distance that waste must be shipped for proper treatment, storage or disposal is more than 200 miles in which case the generator may accumulate hazardous waste on site for 270 days provided that the quantity of waste accumulated on site does not exceed 6,000 kilograms.

(a) If, due to unforeseen, temporary and uncontrollable circumstances hazardous waste must remain on site for longer than 180 or 270 days, an extension of up to 30 days may be granted by the chief.

3.2.1.a.E Containers. The Small Quantity Generator must store hazardous waste in containers or tanks that must meet the following requirements.

(a) Containers must be in good condition as defined by Department of Transportation Regulations.

(b) Containers must be kept closed except when adding or removing waste.

(c) Containers must be handled in a way which will not cause them to rupture or leak.

(d) The owner or operator of a Small Quantity Generator facility must inspect hazardous waste container storage areas weekly for leaks and/or deterioration and must remediate these conditions, upon detection.

(e) Incompatible wastes (such as oxidizers and petroleum based degreasers) must not be placed in the same container. (Other examples of potentially incompatible wastes can be found at 40 CFR part 265, Appendix V).

(f) Storage containers for incompatible wastes must be separated by means of a dike, berm, wall or other device.

3.2.1.a.F Tanks. Small Quantity Generators who store hazardous waste in tanks must comply with 40 CFR § 265.201.

3.2.1.a.G If a Small Quantity Generator closes (permanently removes from service) a container or tank storage area 40 CFR § 265.114 must be followed to insure that no contamination exists or remains at the storage location.

3.2.1.a.H Labeling. Containers and Tanks storing hazardous waste must comply with the following labeling requirements:

(a) On containers, the date upon which each period of accumulation began must be clearly marked and visible for inspection on each container.

(b) Each container and tank must be clearly labeled or marked with the words "Hazardous Waste" while in use on site.

3.2.1.a.I Manifest. Small Quantity Generators that transport or offer for transportation, hazardous waste for off site treatment, storage or disposal must prepare a manifest on the currently approved EPA form according to the instructions that accompany that form unless the waste is reclaimed under a contractual agreement where:

(a) The type of waste and frequency of shipments are specified in the agreement;

(b) The vehicle used to transport the waste to the recycling facility and to deliver regenerated material back to the generator is owned and operated by the reclaimer of the waste; and

(c) The generator maintains a copy of the reclamation agreement on site for a period of at least three (3) years.

3.2.1.a.J Record Keeping. The Small Quantity Generator must comply with the following record keeping requirements:

(a) A copy of each properly completed manifest must be kept on site for at least three (3) years from the date that the waste was accepted by the initial transporter.

(b) Any test results, waste analyses or other record of a method used to make a hazardous waste determination must be kept on site for at least three (3) years from the date that the waste was sent to on site or off site treatment, storage or disposal.

(c) The three (3) year record retention time is automatically extended during the course of any unresolved enforcement action regarding regulated activity or as requested by the chief.

(d) If a copy of the manifest with the handwritten signature of the owner or operator of the designated facility has not been received by the generator within 60 days of the date the waste was accepted by the initial transporter, the generator must submit a legible copy of the manifest with some indication that the generator has not received confirmation of delivery to the chief.

(e) The chief, as he deems necessary, may require generators to furnish additional reports concerning the quantities and disposition of hazardous wastes.

3.2.1.a.K *Preparedness and prevention.* Facilities must be maintained and operated to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous wastes or hazardous waste constituents to air, soil or surface water which could threaten human health or the environment.

(a) Required Equipment - All facilities must be equipped with the following unless none of the hazards posed by the wastes handled at the facility could require a particular kind of equipment specified below:

(i) An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel.

(ii) A device such as a telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from local police departments, fire departments or State or local emergency response teams.

(iii) Portable fire extinguishers, fire control equipment (including special extinguishing equipment), spill control equipment and decontamination equipment.

(iv) Water at adequate volumes and pressure to supply water hose streams, or foam producing equipment or automatic sprinklers or water spray systems.

(b) All facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment where required must be tested and maintained as necessary to assure its proper operation in time of emergency.

(c) Whenever hazardous waste is being handled all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another unless such a device is not required by Section 3.2.1.a.K.(a) of these rules. If there is just one employee on the premises while the facility is operating, that employee must have immediate access to a device referenced by Section 3.2.1.a.K.(a) of these rules.

(d) The owner or operator must maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of facility operation in an emergency unless aisle space is not needed for any of these purposes.

(e) The owner or operator must attempt to make the following arrangements, as appropriate, for the type of waste handled at the facility and the potential need for these services of these organizations.

(i) Arrangements to familiarize police, fire departments, and emergency response teams with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places when facility personnel would normally be working, entrances to roads inside the facility and possible evacuation routes.

(ii) Arrangements designating primary emergency authority to a specific policy and a specific fire department where more than one police or fire department might respond and arrangements with any others to provide support to the primary emergency authority.

(iii) Agreements with State emergency response teams, emergency response contractors and equipment suppliers.

(iv) Arrangements to familiarize local hospitals with the properties of hazardous waste handled at the facility and the types of injuries or illnesses which could result from fires, explosions or releases at the facility.

(f) Where State or local authorities decline to enter into such agreements, the owner or operator must document the refusal in the operating record.

(g) At all times there must be at least one employee either on the premises or on call (i.e., available to respond to an emergency by reaching the facility in a short period of time) with the responsibility for coordinating all emergency response measures specified in these regulations. This employee is the emergency coordinator.

(h) The following information must be posted next to the telephone:

(i) The name and telephone number of the emergency coordinator.

(ii) The location of fire extinguishers and spill control equipment and, if present, the fire alarm.

(iii) The telephone number of the fire department unless the facility has a direct alarm.

(i) The generator must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures relevant to their responsibilities during normal facility operations and emergencies.

(j) The emergency coordinator or his designee must respond to any emergencies that arise and initiate the proper response to the emergency.

(k) In the event of a fire, explosion or other release that could threaten human health outside the facility or when the generator has knowledge that a spill has reached surface water, the generator must notify the National Response Center at 1-800-424-8802. The report must contain the following information:

(i) The name, address and EPA identification number of the generator.

(ii) The date, time and type of incident.

(iii) Type and quantity of hazardous waste involved in the incident.

(iv) Extent of injuries, if any.

(v) Estimated quantity and disposition of recovered materials, if any.

3.2.1.a.L If a Small Quantity Generator treats (other than elementary neutralization or other excluded methods), stores for longer than the time frames set forth in Section 3.2.1.a.D or disposes of hazardous waste on-site, the generator becomes subject to the permitting requirements of 40 CFR part 265, part 270 and all other applicable parts.

3.2.1.b Conditionally Exempt Small Quantity Generators.

3.2.1.b.A A Conditionally Exempt Small Quantity Generator is a generator of hazardous waste that produces no more than 100 kilograms of waste per month and that meets the requirements stipulated below.

(a) If the generator generates a total of one (1) kilogram or more of acute hazardous waste identified in 40 CFR part 261 in a calendar month, the waste shall be subject to full regulation.

3.2.1.b.B The Conditionally Exempt Small Quantity Generator must make a proper hazardous waste determination as

specified in Section 3.2.1.a.B of these rules. When determining the amount of hazardous waste generated, a generator need only include those wastes that are generated on site prior to reclamation, and are not excluded under 40 CFR part 261.

3.2.1.b.C The Conditionally Exempt Small Quantity Generator must notify the chief of its hazardous waste generation activity. No generator shall treat, store or dispose of, transport or offer for transportation hazardous waste without having received an EPA identification number.

3.2.1.b.D A Conditionally Exempt Small Quantity Generator may accumulate up to 1000 kilograms of hazardous waste on site before becoming subject to the requirements of Sections 3.2.1.a.D and 3.2.1.a.H of these rules.

(a) A total of 100 kilograms of any residue or contaminated soil, waste or other debris resulting from the clean-up of a spill into or on any land or water of any acute hazardous wastes listed in 40 CFR part 261 may be accumulated before becoming subject to full regulation.

3.2.1.b.E Record Keeping. The generator must establish and maintain on site a written record specifying the quantity and types hazardous wastes disposed of, the dates the wastes were transported off site and the final disposition of the wastes. The preferred method for this requirement is via the manifest.

3.2.1.b.F The generator must either treat or dispose of hazardous waste in an on site facility or ensure delivery to an off site treatment, storage or disposal facility which:

(a) Is permitted, or under interim status, to treat, store or dispose of hazardous waste by a state or the federal government or both;

(b) Is permitted, licensed or registered by a state other than West Virginia to manage waste generated by conditionally exempt small quantity facilities;

(c) Beneficially uses or re-uses or legitimately recycles or reclaims the waste; or,

(d) Treats the waste prior to beneficial use or re-use of legitimate recycling or reclamation.

3.2.1.b.G Hazardous waste subject to the reduced requirements of Section 3.2.1.b may be mixed with non-hazardous

waste and remain subject to the reduced requirements even though the resultant mixture exceeds the quantity limitations in Section 3.2.1.b.D of these rules unless the mixture meets any of the characteristics of hazardous waste identified in 40 CFR part 261 with the following modifications:

(a) If any person mixes a waste with a hazardous waste that exceeds a quantity exclusion level of Section 3.2.1.b.D of these rules, the mixture is subject to full regulations.

(b) If a conditionally exempt small quantity generator's wastes are mixed with used oil, the mixture is subject to 40 CFR part 266, Subpart E if it is designated to be burned for energy recovery. Any material produced from such a mixture by processing, blending or other treatment is also so regulated if it is destined to be burned for energy recovery.

3.2.1.b.H If a Conditionally Exempt Small Quantity Generator does not meet all of the requirements set forth herein, the exemption does not apply and the generator will be subject to full regulation.

§ 47-35-4. NOTIFICATION OF HAZARDOUS WASTE ACTIVITY REGULATIONS.

4.1 *Applicability.* Any person that engages in a hazardous waste activity in the State of West Virginia shall notify the chief of these activities, unless such activities are exempted from the requirements of these rules.

4.1.1 Any person as described in Section 4.1 of these rules that has notified the EPA or is subject to the requirements to notify EPA as specified in Volume 45, Number 39 of the Federal Register, dated February 26, 1980, pages 12746 through 12754, is subject to the provision of Section 4 of these rules.

4.1.2 The purpose of Section 4 of these rules is to provide a means for the State of West Virginia to utilize the information provided by all who complied with the notification requirements of EPA as described in Section 4.1.1 of these rules or all who initiated hazardous waste activities subsequent to the requirements of EPA as referenced above in Section 4.1.1 of these rules to notify the chief of their hazardous waste activities.

4.2 *Notification.* Any person that notified EPA of hazardous waste activities as referenced above in Section 4.1 of these rules shall provide a copy of that notification to the chief.

4.2.1 Any person involved in hazardous waste activities that did not comply with the notification requirements of EPA, as referenced above in Section 4.1 of the rules, but is subject to those requirements shall notify the chief in writing of his hazardous waste activities within thirty (30) days of the effective date of these rules. Notification may be accomplished by the use of EPA Form 8700-12 or the provision of the same information in any other manner selected by the notifier.

4.2.2 Any person exempted from the federal notification requirements but subject to West Virginia notification requirements as specified in 40 CFR §§ 261.6(b) and 261.5 shall notify the chief in writing of his hazardous waste activities within ninety (90) days of the effective date of these rules or the date of initiation of such activities, whichever is later. Notification may be accomplished by use of EPA Form 8700-12 or the provision of the same information in any other manner selected by the notifier.

4.2.3 One notification form is required for each generator.

4.2.4 A notification form is required for each storage, treatment, disposal, or other facility. However, if one facility site includes more than one storage, treatment, or disposal activity, only one notification form for the entire facility site is required.

4.2.5 Generators that store, treat, or dispose of hazardous waste on-site shall file a notification form for generation activities as well as storage, treatment, and disposal activities, unless such activities are exempted from the requirements of these rules.

4.2.6 New generators and those initiating activities subsequent to the EPA notification period referenced in Section 4.1.1 of these rules shall comply with the EPA identification number requirements and shall provide a copy of their application for an EPA identification number to the Administrator.

§ 47-35-5. STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE.

5.1 The provisions of 40 CFR part 262 are hereby adopted and incorporated by reference with the modifications, exceptions and additions contained in this section.

5.2 The provisions of 40 CFR § 262.10(e) shall be excepted from incorporation.

5.2.1 A person who generates a hazardous waste as defined by 40 CFR part 261 is subject to the compliance requirements and penalties prescribed in W. Va. Code, §22-18-1 et seq. if he does not comply with the requirements of this rule.

5.2.2 All references to 40 CFR § 262.10(e) shall be deemed references to Section 5.2 and the subparagraphs herein, as appropriate.

5.3 The provisions of 40 CFR part 262, subpart E -- Exports of Hazardous Waste are excepted from incorporation by reference and in addition to the requirements contained therein, any person subject to the provisions of subpart E shall file with the chief copies of all documentation, manifests, exception reports, annual reports or records, inter alia, submitted to EPA, the administrator or the regional administrator as required by and within the timeframes set forth in subpart E.

5.4 The provisions of 40 CFR part 262, subpart F -- Imports of Hazardous Waste are excepted from incorporation by reference and in addition to the requirements contained therein, any person subject to the provisions of subpart F shall file with the chief copies of all documentation, manifests, exception reports, annual reports or records, inter alia, submitted to EPA, the administrator or the regional administrator as required by and within the timeframes set forth in subpart F.

§ 47-35-6. STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE.

6.1 The provisions of 40 CFR part 263 are hereby adopted and incorporated by reference insofar as said regulations relate to the transportation of hazardous waste by air and water.

6.2 Note -- The use of railroads for the transportation of hazardous waste is regulated by the West Virginia Public Service Commission rules, "Rules and Regulations Governing the Transportation of Hazardous Waste by Rail", 150 CSR 11. The use of the state highways for the transportation of hazardous waste is regulated under the West Virginia Division of Highways, "Transportation of Hazardous Wastes Upon the Roads and Highways", 157 CSR 7.

§ 47-35-7. STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES.

7.1 The standards in Section 7 of these regulations apply to owners and operators of all facilities which treat, store, or dispose of hazardous waste except as otherwise provided by law. In addition to the standards in Section 7 of these rules, the rules of the Air Quality Board, 45 CSR 25, apply to management facilities which may emit hazardous waste or the constituents thereof to the atmosphere including incineration facilities except as otherwise provided by law. For purposes of Section 7 of these rules, the following persons are considered to be incinerating hazardous waste:

7.1.1 Owners or operators of hazardous waste incinerators; and

7.1.2 Owners or operators of boilers or industrial furnaces used to destroy wastes.

7.2 The provisions of 40 CFR part 264 are hereby adopted and incorporated by reference with the modifications, exceptions and additions set forth in this section.

7.3 The provisions of 40 CFR part 264, subpart F -- Releases From Solid Waste Management Units are incorporated by reference with the following modifications, exceptions and additions.

7.3.1 For purposes of 40 CFR § 264.92, reference to the "Regional Administrator" shall be to the "Environmental Quality Board." The Environmental Quality Board establishes ground-water protection standards pursuant to the authority granted the Board in W. Va. Code, § 22-12-4.

7.3.2 For purposes of 40 CFR § 264.94 and subparagraphs thereof, the Environmental Quality Board rule on Groundwater Protection Standards, 46 CSR 12 and the subparagraphs therein, shall apply as required pursuant to the authority granted the Environmental Quality Board in W. Va. Code, § 22-12-4.

7.3.3 The provisions of 40 CFR § 264.99(g) are incorporated by reference with the following modifications:

7.3.3.a The chief will specify in the facility permit the frequencies for collecting samples required under 40 CFR § 264.99(g). This frequency shall not be less than once every five years.

7.4 The provisions of 40 CFR part 264, subpart H -- Financial Requirements are adopted and incorporated by reference with the following modifications:

7.4.1 The provisions of 40 CFR §§ 264.149 and 264.150 are excepted from incorporation by reference.

7.5 The provisions of 40 CFR §§ 264.343, 264.344, 264.345 and 264.347 relating to incinerators are excepted from incorporation by reference. Consult the regulations of the Air Quality Board regarding emissions from incinerators.

7.5.1 Consult the Air Quality Board regulations, 45 CSR 25, Regulations to Prevent & Control Air Pollution from Hazardous Waste Treatment, Storage, or Disposal Facilities.

7.6 The provisions of 40 CFR part 264, subparts AA and BB are excepted from incorporation by reference.

§ 47-35-8. INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES.

8.1 The provisions of 40 CFR part 265 are adopted and incorporated by reference with the modifications, exceptions and additions set forth in this section.

8.2 The provisions of 40 CFR §§ 265.149 and 265.150 are excepted from incorporation by reference.

8.3 The provisions of 40 CFR part 265, subpart J -- Tank Systems are adopted and incorporated by reference with the following modification:

8.3.1 The provisions of 40 CFR § 265.193(a)(4) is excepted from incorporation by reference and in lieu thereof the following language shall be inserted:

"(4) For those existing tank systems for which the age cannot be documented, within eight years of April 1, 1988; but if the age of the facility is greater than seven years, secondary containment must be provided by the time the facility reaches 15 years of age, or within two years of April 1, 1988, whichever comes later; and"

8.4 The provisions of 40 CFR §§ 265.345, 265.347 and 265.352 relating to incinerators are excepted from incorporation by

reference. Consult the rules of the Air Quality Board regarding emissions from incinerators.

8.5 The provisions of 40 CFR part 265, subpart P -- Thermal Treatment are incorporated by reference except for 40 CFR § 265.383 which is excepted from incorporation by reference. Consult the rules of the Air Quality Board regarding emissions from thermal treatment units.

8.6 The provisions of 40 CFR part 265, subparts AA and BB are excepted from incorporation by reference. Consult the rules of the Air Quality Board regarding air emission standards for process vents and air emissions standards for equipment leaks.

§ 47-35-9. STANDARDS FOR THE MANAGEMENT OF SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES.

9.1 The provisions of 40 CFR part 266 are hereby adopted and incorporated by reference.

§ 47-35-10. INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS WASTE LAND DISPOSAL FACILITIES.

10.1 The provisions of 40 CFR part 267 are hereby adopted and incorporated by reference with the modifications, exceptions and additions set forth in this section.

10.2 The provisions of 40 CFR part 267, subpart G -- Underground Injection are excepted to the extent the rules set forth therein conflict or are inconsistent with the provisions of West Virginia Water Resources Board, Underground Injection Control 46 CSR 9.

§ 47-35-11. LAND DISPOSAL RESTRICTIONS.

11.1 The provisions of 40 CFR part 268 are hereby adopted and incorporated by reference.

§ 47-35-12. THE HAZARDOUS WASTE PERMIT PROGRAM.

12.1 The provisions of 40 CFR part 270 are hereby adopted and incorporated by reference with the modifications, exceptions and additions set forth in this section.

12.2 For purposes of this section, the term "RCRA permit" means "West Virginia Hazardous Waste Management Permit." The following additional requirements shall apply to obtain a hazardous waste permit in West Virginia. All references in 40 CFR Part 124 to 40 CFR Part 270 shall be deemed to be references to the applicable provisions of Sections 12.2.2 through 12.2.9 of this rule. To the extent of any inconsistency with 40 CFR part 270, the specific provisions contained herein shall control.

12.2.1 Application Fees.

12.2.1.a Any person who applies for a permit for the construction or operation of a hazardous waste management facility, or both, shall submit as part of said application a money order or cashier's check payable to "The Hazardous Waste Management Fund" of the State Treasury. Persons required to obtain a permit-by-rule pursuant to these regulations are not required to pay a permit application fee.

12.2.1.b Such fee shall be determined by the schedule set forth in Table I of these rules.

12.2.1.c The chief reserves his right to promulgate rules establishing a permit renewal fee at a later date.

12.2.2 Draft Permits.

12.2.2.a Once an application is complete, the chief shall tentatively decide whether to prepare a draft permit or to deny the application.

12.2.2.b If the chief decides to prepare a draft permit, a draft permit shall be prepared that contains the following information:

12.2.2.b.A All conditions under 40 CFR §§ 270.30 and 270.32;

12.2.2.b.B All compliance schedules under 40 CFR § 270.33;

12.2.2.b.C All monitoring requirements under 40 CFR § 270.31; and

12.2.2.b.D Standards for treatment, storage, and disposal and other permit conditions under 40 CFR part 270.

12.2.2.c A fact sheet prepared in accordance with Section 12.2.3 of these rules shall accompany the draft permit.

12.2.3 Fact Sheet.

12.2.3.a A fact sheet shall be prepared by the chief for every draft permit for each hazardous waste management facility or activity. The fact sheet shall briefly set forth the principal facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit. The chief shall send this fact sheet to the applicant and, upon request, to any other person.

12.2.3.b The fact sheet shall include, when applicable:

12.2.3.b.A A brief description of the type of facility or activity which is the subject of the draft permit;

12.2.3.b.B The type and quantity of wastes, fluids, or pollutants which are proposed to be or are being treated, stored, disposed of, injected, emitted, or discharged. A description of the type of wastes, fluids, or pollutants shall include, but not limited to, the characteristics of the waste materials and the potential effects on public health and the environment;

12.2.3.b.C A brief summary of the basis for the draft permit conditions including references to applicable statutory or rule provisions;

12.2.3.b.D Reasons why any requested variances or alternatives to required standards do or do not appear justified;

12.2.3.b.E A description of the procedures for reaching a final decision on the draft permit including:

(a) The beginning and ending dates of the comment period and the address where comments will be received;

(b) Procedures for requesting a hearing and the nature of that hearing; and

(c) Any other procedures by which the public may participate in the final decision; and

12.2.3.b.F Name and telephone number of a person to contact for additional information.

12.2.4 Public Access to Information.

12.2.4.a Any records, reports, or information and any permit, permit applications, and related documentation within the chief's possession shall be available to the public for inspection and copying; provided, however, that upon a satisfactory showing to the chief that such records, reports, permit documentation, or information, or any part hereof would, if made public, divulge methods or processes or activities entitled to protection as trade secrets, the chief shall consider, treat, and protect such records as confidential.

12.2.4.b It shall be the responsibility of the person claiming any information as confidential under the provisions of Section 12.2.4 of these rules to clearly mark each page containing such information with the word "CONFIDENTIAL" and to submit an affidavit setting forth the reasons that said person believes that such information is entitled to protection.

12.2.4.c Any document submitted to the chief which contains information for which claim of confidential information is made shall be submitted in a sealed envelope marked "CONFIDENTIAL" and addressed to the chief. The document shall be submitted in two (2) separate parts. The first part shall contain all information which is not deemed by the person preparing the report as confidential and shall include appropriate cross-references to the second part which contains data, words, phrases, paragraphs, or pages and appropriate affidavits containing or relating to information which is claimed to be confidential.

12.2.4.d No information shall be protected as confidential information by the chief unless it is submitted in accordance with the provisions of Section 12.2.4.c of these rules and no information which is submitted in accordance with the provisions of Section 12.2.4.c of these rules shall be afforded protection as confidential information unless the chief finds that such protection is necessary to protect trade secrets. The person who submits information claimed to be confidential shall receive written notice from the chief as to whether the information has been accepted as confidential or not.

12.2.4.e All information which meets the tests of Section 12.2.4.d of these rules shall be marked with the term "ACCEPTED" and shall be protected as confidential information. If said person fails to satisfactorily demonstrate to the chief that such information in the form presented to him meets the criteria of Section 12.2.4.e of these rules, the chief shall mark the information "REJECTED" and promptly return such information to the

person submitting such information.

12.2.4.f Nothing contained herein shall be construed so as to restrict the release of relevant confidential information during situations declared to be emergencies by the chief or his designee.

12.2.4.g Nothing in Section 12.2.4 of these rules may be construed as limiting the disclosure of information by the division to any officer, employee, or authorized representative of the State or federal government concerned with effecting the purposes of Section 12.2.4 of these rules.

12.2.4.h Persons interested in obtaining information pursuant to Section 12.2.4 of these rules should submit a request in accordance with Title 46, Water Resources Board, Series 8 (46 C.S.R. 8).

12.2.4.i Claims of confidentiality for the name and address of any permit applicant or permittee will be denied.

12.2.5 Public Participation in Permit Process.

12.2.5.a Scope. Public notice shall be given that the following actions have occurred:

12.2.5.a.A A draft permit has been prepared; or

12.2.5.a.B A hearing has been scheduled.

12.2.5.b Timing.

12.2.5.b.A Public notice of the preparation of a draft permit required under Section 12.2.5 of these rules shall allow at least forty-five (45) days for public comment.

12.2.5.b.B Public notice of a public hearing shall be given at least thirty (30) days before the hearing.

12.2.5.c Methods. Public notice of activities described in Section 12.2.5 of these rules shall be given by the following methods:

12.2.5.c.A By mailing a copy of the notice to the following persons:

- (a) The applicant;

(b) Any federal or state agency which the chief knows has issued or is required to issue a RCRA, UIC, PSD, NPDES or 404 permit for the facility or activity including, but not limited to, the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers;

(c) Each State agency having authority under State law with responsibility to the construction or operation of such facility;

(d) Any unit of local government having jurisdiction over the area where the facility is proposed to be located;

(e) Other appropriate federal or State agencies including, but not limited to, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the West Virginia Department of Culture and History, the West Virginia Department of Health, other governmental authorities including any affected states, and the Advisory Council on Historic Preservation (Suite 430, 1522 K Street, N.W., Washington, D.C. 20005); and

(f) Persons on the mailing list developed by:

(i) Including those who request in writing to be on the list.

(ii) Soliciting persons for "area lists" from participants in past permit proceedings in that area.

(iii) Notifying the public of the opportunity to be put on the mailing list through periodic publication in the public press and in appropriate publications of the State. The chief may update the mailing list by requesting written indication of continued interest from those listed. The chief may delete from the list the name of any person who fails to respond to such a request.

(g) By publishing the public notice, in the form of a Class I legal advertisement in a qualified daily or weekly newspaper of general circulation and broadcasting the public notice over local radio stations in the area in which the facility is or is proposed to be located. A qualified daily or weekly newspaper is, for the purpose of Section 12.2.5 of these rules, any newspaper which meets the provisions of W. Va. Code, § 59-3-1(b).

(h) By any other method reasonably calculated to give actual notice of the action in question to the person potentially affected by it, including press releases or any other forum of medium to elicit public participation.

(i) Any person otherwise entitled to receive notice under Section 12.2.5 of these rules may waive the right to receive notice for any classes and categories of permits.

12.2.5.d Personal Notification by Facility Owner or Operator to Individual Residents.

12.2.5.d.A Following the submittal of a Part B application which is deemed complete by the chief, and before the public notice of the preparation of a draft permit as required under Section 12.2.5.a of these rules, the facility owner or operator shall serve notice upon the residence of all persons residing within one-quarter mile of the boundaries of the specific hazardous waste management facility.

12.2.5.d.B Service of such notice as herein provided shall be made by delivering a copy to the residence of each person upon whom service must be made or by mailing it by registered mail to the last known address of each person or by such other reasonable means as the chief and the owner or operator agree will provide an effective and practical method of notification.

12.2.5.d.C Following completion of service of notice as set forth herein, and no later than the date of public notice required in Section 12.2.5.a of these rules, the owner or operator shall certify in writing to the chief that service has been completed, describe the method of service, and provide a copy of the written notice employed to the chief.

12.2.5.d.D The personal notice required herein shall be a written notice containing at a minimum:

- (a) The name and address of the permit applicant;
- (b) The name, location, and type of hazardous waste management facility for which the application has been submitted;
- (c) A statement advising the recipients of the notice that a complete application for permit has been submitted; and
- (d) A statement advising the notice recipients that an opportunity for public comment upon the application and draft permit will be made available to them upon completion of division review of the application and that such notice will be published as a legal advertisement in a local newspaper and broadcast over the radio.

12.2.5.e Contents.

12.2.5.e.A All public notices issued under Section 12.2.5 of these rules shall contain the following information:

(a) Name and address of the office processing the permit action for which notice is being given;

(b) Name and address of the permittee or permit applicant and, if different, of the facility or activity regulated by the permit;

(c) A brief description of the business conducted at the facility described in the permit application or the draft permit;

(d) The name, address, and telephone number of a person from whom interested persons may obtain further information including copies of the draft permit or fact sheet, and the application; and

(e) A brief description of the comment procedures required by Sections 12.2.6 and 12.2.7 of these rules and the time and place of any hearing that will be held, including a statement of procedures to request a hearing unless already scheduled, and other procedures by which the public may participate in the final permit decision.

12.2.5.e.B In addition to the general public notice described in Section 12.2.5.e.A of these rules, the public notice of a hearing shall contain the following information:

(a) Reference to the date of previous public notices relating to the permit;

(b) Date, time and place of the hearing;

(c) A brief description of the nature and purpose of the hearing, including the applicable rules and procedures; and

(d) Name and address of the nearest district office where the file will be available for inspection.

12.2.6 Public Comment and Request for Public Hearings. During the public comment period provided that any interested person may submit written comments on the draft permit and may request a public hearing if no hearing has already been scheduled. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing. All comments shall be considered in making the final decision and shall be answered as provided in Sections 12.2.8 and 12.2.9 of these rules.

12.2.7 Public Hearings.

12.2.7.a The chief shall hold a public hearing whenever he finds, on the basis of requests, a significant degree of public interest in a draft permit(s). The chief may also hold a public hearing at his discretion whenever, for instance, such hearing may clarify one or more issues involved in the permit decision.

12.2.7.b The chief shall hold a public hearing upon receiving written notice of opposition to a draft permit and a request for public hearing within forty-five (45) days of the public notice. Whenever possible the chief shall schedule a hearing under Section 12.2.7 of these rules at a location convenient to the nearest such proposed facility. Public notice of the hearing shall be given as specified in Section 12.2.5 of these rules.

12.2.8 Reopening of the Public Comment Period.

12.2.8.a If any data, information, or arguments submitted during the public comment period appear to raise substantial new questions concerning a permit, the chief may take one or more of the following actions:

12.2.8.a.A Prepare a new draft permit, appropriately modified, under Section 12.2 of these rules.

12.2.8.a.B Prepare a revised fact sheet under Section 12.2 of these rules and reopen the comment period.

12.2.8.a.C Reopen or extend the comment period under Section 12.2 of these rules to give interested persons an opportunity to comment on the information or arguments submitted.

12.2.8.b Comments filed during the reopened comment period shall be limited to the substantial new questions that caused its reopening. The public notice under Section 12.2 of these rules shall define the scope of the reopening.

12.2.9 Response to Comments.

12.2.9.a At the time that any final permit is issued, the chief shall issue a response to comments. This response shall be in writing and shall:

12.2.9.a.A Specify which provisions, if any, of the draft permit have been changed in the final permit and the reasons for change; and

12.2.9.a.B Briefly describe and respond to all significant comments on the draft permit raised during the public comment period or hearing.

12.2.9.b The response to comments shall be delivered to any person who commented or any person who requests the same.

12.3 The provisions of 40 CFR § 270.12 are excepted from incorporation by reference. Availability of information provided under these rules is controlled by the provisions of W. Va. Code, § 22-18-12 and section 12.2.4 of these rules.

12.4 The provisions of 40 CFR § 270.24 are excepted from incorporation by reference. Consult the rules of the Air Quality Board regarding emissions from process vents.

12.5 The provision of 40 CFR §§ 270.60(b) and 270.64 are excepted from incorporation by reference. Consult the rules of the Office of Water Resources and the Environmental Quality Board regarding the requirements for underground injection wells.

§ 47-35-13. DEED AND LEASE DISCLOSURE; NOTICE IN DEED TO PROPERTY.

13.1 The owner of the property on which a hazardous waste management facility is located must record, in accordance with State law, a notation on the deed or lease to the facility property -- or on some other instrument that is normally examined during title search -- that will in perpetuity notify any potential purchaser of the property that:

13.1.1 The land has been used to manage hazardous wastes; and

13.1.2 Its use is restricted under 40 CFR § 264.117(c).

13.2 Upon actual transfer of property which contains hazardous wastes that have been stored, treated, or disposed of, the previous owner shall notify the chief in writing of such transfer.

13.3 Other Requirements. Nothing contained in this Section 13 of these rules shall relieve any person from complying with the requirements on deed and lease disclosures set forth in W. Va. Code, § 22-18-21.

§ 47-35-14. STANDARDS FOR THE MANAGEMENT OF USED OIL.

14.1 The provisions of 40 CFR part 279 are hereby adopted and incorporated by reference. Notwithstanding the effective date of

this rule, the effective date of the provisions of this Section 14 shall be July 1, 1995.

§ 47-35-15. MISCELLANEOUS PROVISIONS.

15.1 The provisions set forth in Appendix 1 are incorporated as a part of these rules.

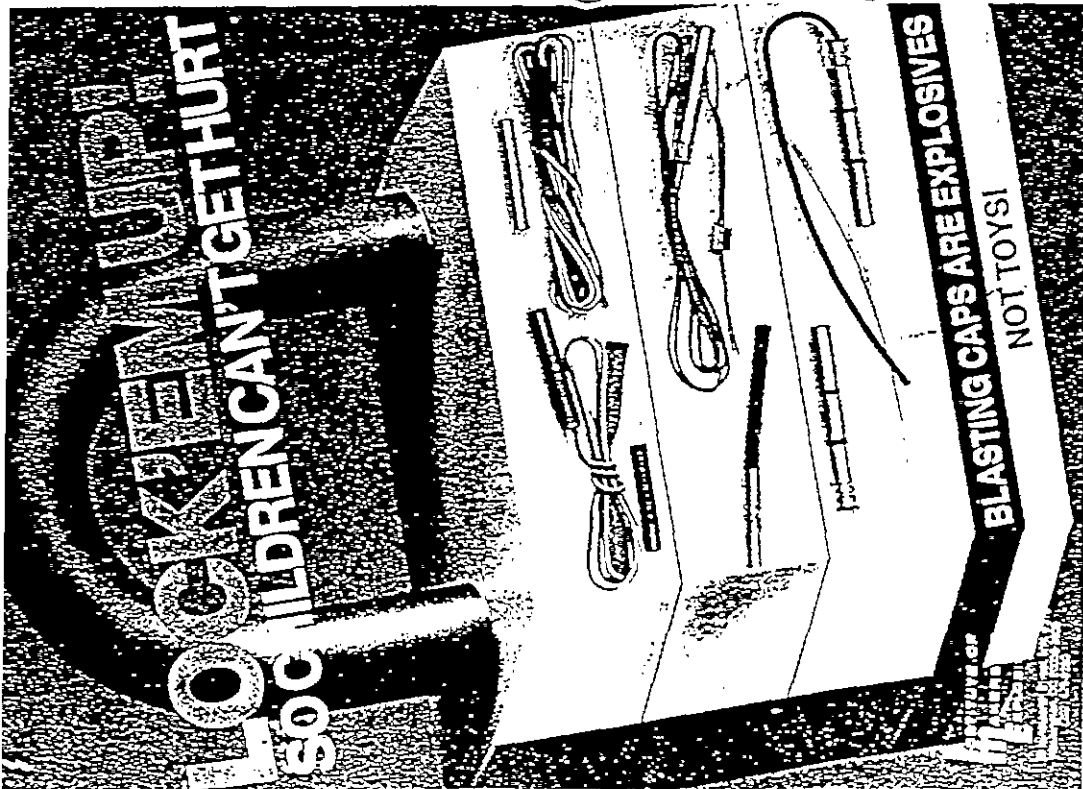
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PREFACE

The original study to develop safe distances for the location of explosive storage magazines was begun in 1909, a time when a majority of explosive materials were transported by rail and explosive materials storage facilities were located near the railroad lines. The potential hazard to passenger carrying trains and residential areas near the railroad, should an explosion occur in the magazine, necessitated radical changes in magazine location.

A special committee of the Association of Manufacturers of Powder and High Explosives was appointed to study the problem and develop recommendations. After reviewing established foreign requirements, the committee determined that these regulations could not be utilized for conditions existing in the United States. The committee then decided to develop an American Table of Distances based on empirical data gathered from explosions that had occurred in the field.

Information was gathered on a number of explosions ranging from very small amounts of explosive materials to some approximating one million pounds. The explosions studied covered a period of almost fifty years and occurred in manufacturing, transportation, and storage, both in the United States and abroad.

Based on the work of the special committee of the Association of Manufacturers of Powder and High Explosives the American Table of Distances for inhabited buildings and public railways was established in December 1910.

When it became apparent that the distance table should also contain minimum safe distances for the location of explosive storage and manufacturing buildings from public highways, the special committee, in conjunction with the Institute of Makers of Explosives (founded in 1913), conducted additional studies. The highway distances were approved and adopted by the Institute of Makers of Explosives in 1914.

After the adoption of the American Table of Distances, the collection of data on explosions was continued. The table was reviewed in 1919 and again in 1939 to evaluate it and consider the data accumulated since the table was established. No significant revisions were made after either review.

Another detailed study of the table was made in 1950 to distinguish between military explosives (bombs, projectiles, cased ammunition, etc.) and commercial explosive materials which have virtually no missile hazard. The study also noted that the table was specifically designed to cover manufacture and permanent storage of explosive materials and is not applicable for the incidental handling or temporary storage of explosive materials being transported.

Based on tests conducted by governmental agencies and scientific laboratories much additional data on blast effects have been accumulated since 1950. The current edition includes revisions and additions based on these findings, together with the excellent experience acquired after over 75 years of use.

In the study of explosion damage data, the criteria for inhabited buildings was the distance at which substantial structural damage took place. For example, such minor damage as the breaking of window glass and the shaking down of plaster was not considered. This necessitated the acceptance of a definition for substantial structural damage, from two points of view:

DAMAGE TO PROPERTY—

It was concluded that no damage which was readily repairable should be considered "substantial" for the purpose in view.

RISK TO LIFE AND LIMB—

It was concluded that unless some integral portion of the building was damaged, the occupants would not be subjected to serious risks.

Storage of large quantities of explosives in heavily populated or built-up areas should be avoided. While the tables provide adequate and reasonable protection for exposures in rural areas, the statistical nature of blast damage makes it inadvisable to subject multiple exposures to blasts at the distances prescribed. This consideration has led to an increase in distances required from major highways.

Barricaded Distance Requirements

Air blast damage at distances in excess of a few tens of feet is little affected by revetment or natural barricades. However, missile hazards are substantially affected by barricades. Accumulated experience plus DOD studies of explosion-propelled missiles indicates that at large distances the doubling of the barricaded distance is not required. The current tables reflect this finding.

Distances to Main Highways

Blast effects on vehicles have been analyzed extensively by governmental agencies in connection with assessing effects of military weapons. This work has shown the recommended distances from stored explosives to heavily travelled, high-speed highways as given in the table are necessary. Consultation and advice from the Department of Defense Explosives Safety Board is gratefully acknowledged in our analysis of this problem.

The distances given in the table are not to be construed as superseding the distances in any federal, state or municipal laws, ordinances or regulations.

Table of Recommended Separation Distances (Appendix)

Fundamental to proper application of the American Table of Distances for Storage of Explosive Materials is the question of whether adjacent stores of explodable materials can propagate from an explosion at one source. If propagation can occur, the respective weights must be summed in determining safe distances from dwellings, highways, and passenger railways. The Appendix comprises such non-propagating distances with definitions, explanations, and examples. Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents is printed on pages 8 through 15.

NOTE:

USE THE AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS TO DETERMINE SAFE DISTANCES FROM INHABITED DWELLINGS, HIGHWAYS, PASSENGER RAILWAYS, AND BETWEEN EXPLOSIVE MATERIALS MAGAZINES.

USE THE APPENDIX, SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS, TO DETERMINE NON-PROPAGATING DISTANCES TO ANFO BLASTING AGENTS AND TO AMMONIUM NITRATE.

USE THE GREATER OF THE DISTANCES SHOWN IN THE AMERICAN TABLE OF DISTANCES AND IN THE TABLE OF RECOMMENDED SEPARATION DISTANCES TO DETERMINE THE REQUIRED SEPARATION DISTANCES TO A MAGAZINE FOR STORAGE OF EXPLOSIVES AND A MAGAZINE FOR STORAGE OF BLASTING AGENTS.

AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS
 As Revised and Approved by The Institute of Makers of Explosives—
 June 1991

QUANTITY OF EXPLOSIVE MATERIALS ⁽¹⁾		DISTANCES IN FEET							
		Isolated Buildings ⁽²⁾		Public Highways with Traffic Volume of less than 1000 Vehicles/Day ⁽³⁾		Passenger Railways—Public Highways with Traffic Volume of more than 1,000 Vehicles/Day ^(4,5)		Separation of Magazines ⁽⁶⁾	
		Barricaded ^(7,8)	Unbarricaded	Barricaded ^(7,8)	Unbarricaded	Barricaded ^(7,8)	Unbarricaded	Barricaded ^(7,8)	Unbarricaded
0	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	335	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	545	1,092	65	130

QUANTITY OF EXPLOSIVE MATERIALS		DISTANCES IN FEET							
		770	1,540	245	490	573	1,146	68	135
6,000	7,000	770	1,540	245	490	573	1,146	68	135
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,955	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770

Numbers in () refer to explanatory notes

EXPLANATORY NOTES ESSENTIAL TO THE APPLICATION OF THE AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS

- NOTE 1—"Explosive materials" means explosives, blasting agents and detonators.
- NOTE 2—"Explosives" means any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. A list of explosives determined to be within the coverage of "18 U.S.C. Chapter 40, Importation, Manufacture, Distribution and Storage of Explosive Materials" is issued at least annually by the Director of the Bureau of Alcohol, Tobacco and Firearms of the Department of the Treasury. For quantity and distance purposes, detonating cord of 50 grains per foot should be calculated as equivalent to 8 lbs. of high explosives per 1,000 feet. Heavier or lighter cord loads should be rated proportionately.
- NOTE 3—"Blasting agents" means any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive. Provided, That the finished product, as mixed for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined.
- NOTE 4—"Detonator" means any device containing any initiating or primary explosive that is used for initiating detonation. A detonator may not contain more than 10 grains of total explosives by weight, excluding ignition or delay charges. The term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses, detonating cord delay connectors, and nonelectric instantaneous and delay blasting caps which use detonating cord, shock tube, or any other replacement for electric leg wires. All types of detonators in strengths through No. 8 cap should be rated at 1 1/2 lbs. of explosives per 1,000 caps. For strengths higher than No. 8 cap, consult the manufacturer.
- NOTE 5—"Magazine" means any building, structure, or container, other than an explosives manufacturing building, approved for the storage of explosive materials.
- NOTE 6—"Natural Barricade" means natural features of the ground, such as hills, or minor of sufficient density that the surrounding explosives which require protection cannot be seen from the magazine when the trees are bare of leaves.
- NOTE 7—"Artificial Barricade" means an artificial mound or revetted wall of earth of a minimum thickness of three feet.
- NOTE 8—"Barricaded" means the effective screening of a building containing explosive materials from the magazine or other building, railway, or highway by a natural or an artificial barrier. A straight line from the top of any sidewalk of the building containing explosive materials to the base line of any magazine or other building or to a point twelve feet above the center of a railway or highway shall pass through such barrier.
- NOTE 9—"Inhabited Building" means a building regularly occupied in whole or part as habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage or use of explosive materials.
- NOTE 10—"Railway" means any steam, electric, or other railroad or railway which carries passengers for hire.
- NOTE 11—"Highway" means any public street, public alley, or public road.

--6--

NOTE 12—When two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and, in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosive materials contained in detonator magazines shall govern in regard to the spacing of said detonator magazines from magazines containing other explosive materials. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosive materials stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways, and highways.

NOTE 13—Storage in excess of 300,000 lbs. of explosive materials, in one magazine is generally not required for commercial enterprises.

NOTE 14—This Table applies only to the manufacture and permanent storage of commercial explosive materials. It is not applicable to transportation of explosives or any handling or temporary storage necessary or incident thereto. It is not intended to apply to bombs, projectiles, or other heavily encased explosives.

NOTE 15—When a manufacturing building on an explosive materials plant site is designed to contain explosive materials, such building shall be located from inhabited buildings, public highways and passenger railways in accordance with the American Table of Distances based on the maximum quantity of explosive materials permitted to be in the building at one time.

AMERICAN TABLE OF DISTANCES

The American Table of Distances applies to the manufacture and permanent storage of commercial explosive materials. The distances specified are those measured from the explosive materials storage facility to the inhabited building, highway or passenger railway, irrespective of property lines.

The American Table of Distances covers all commercial explosive materials, including, but not limited to, high explosives, blasting agents, detonators, initiating systems and explosives materials in process. The Table is not designed to be altered or adjusted to accommodate varying explosive characteristics such as blast effect, weight strength, density, bulk strength, detonation velocity, etc.

The American Table of Distances should not be used to determine safe distances for blasting work, the firing of explosive charges for testing or quality control work, or the open detonation of waste explosive materials. The American Table of Distances may be utilized as a guide for developing distances for the unconfined, open burning of waste explosive materials where the probability of transition from burning to high order detonation is improbable.

APPENDIX

Recommended

Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents

Chapter 1 Derivation of the Table

1-1 A test program sponsored by industry with cooperation of the Manufacturing Chemists' Association and the Institute of Makers of Explosives and conducted by the Bureau of Mines (AN) and ammonium nitrate-fuel oil (ANFO) to sympathetic detonation. These data were applied to the existing American Table of Distances for Storage of Explosives to develop the following table of recommended separation distances for ammonium nitrate and blasting agents from stores of high explosives or blasting agents.

1-2 The American Table of Distances for barricaded storage of explosives has been proven adequate through the years, and no data were developed in the test programs that would suggest that this table should be modified for explosives. On the other hand, a factor of 2 has been suggested in the past for increasing the distances listed in the American Table of Distances when the distances are unbarricaded. The results, employing two charge sizes of AN and one charge size of ANFO, gave ratios of unbarricaded to barricaded distances of 4.2 to 7.4, for an average of about 6 which was taken as the appropriate factor. Thus, unbarricaded stores of AN or ANFO not in bullet-resistant magazines should have 6 times the separation distances as barricaded stores.

1-3 The relative sensitivity of AN and ANFO to dynamic was obtained by examining the relative K factors for 50 percent propagation distances when the cube root of the weight was employed in the usual equation:

$$S = KW^{1/3}$$

This equation allowed comparison of 1,600-pound dynamic acceptors with 5,400-pound AN and ANFO acceptors; results from these large charges are believed to be the most reliable available. The ratio of K factors for dynamic and AN was 6.27 which was rounded to 6; the ratio for dynamic and ANFO was 1.6. These factors were applied to the American Table of Distances by thus reducing the distance for barricaded stores of ANFO to 1/6 the corresponding distance for explosives in the American Table of Distances and for ANFO to 6/10.

APPENDIX

1-4 One point should be emphasized; the distances in the table are for separation of stores only. No change should be made in the American Table of Distances with respect to inhabited buildings, passenger railways, and public highways, as the blast effect from ANFO is not importantly less than for high explosives; but the blast effect from AN is about one-half that from high explosives. The blast effect is little modified by the presence of barricades, but the American Table of Distances for separation of stores from inhabited buildings, passenger railways, and public highways for unbarricaded stores provides an additional safety factor and should be retained.

TABLE OF RECOMMENDED SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS,¹

Donor Weight Pounds Over	Minimum Separation Distance of Acceptor when Barricaded ² (ft.)		Minimum Thickness of Artificial Barricade ³ (in.)
	Ammonium Nitrate ⁴	Blasting Agent ⁴	
100	3	11	12
300	4	14	12
600	5	18	12
1,000	6	22	12
1,600	7	25	12
2,000	8	29	12
3,000	9	32	15
4,000	10	36	15
6,000	11	40	15
8,000	12	43	20
10,000	13	47	20
12,000	14	50	20
16,000	15	54	25
20,000	16	58	25
25,000	18	65	25
30,000	19	68	30
35,000	20	72	30
40,000	21	76	30
45,000	22	79	35
50,000	23	83	35
55,000	24	86	35
60,000	25	90	35
70,000	26	94	40
80,000	28	101	40
90,000	30	108	40
100,000	32	115	40
120,000	34	122	50
140,000	37	133	50
160,000	40	144	50
180,000	44	158	50
200,000	48	173	50
220,000	52	187	60
250,000	56	202	60
275,000	60	216	60
300,000	64	230	60

¹See note on page 3.

Notes to Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents

NOTE 1 — Recommended separation distances to prevent explosion of ammonium nitrate and ammonium nitrate-based blasting agents by propagation from nearby stores of high explosives or blasting agents referred to in the Table as the "donor." Ammonium nitrate, by itself, is not considered to be a donor when applying this Table. Ammonium nitrate, ammonium nitrate-fuel oil or combinations thereof are acceptors. If stores of ammonium nitrate are located within the sympathetic detonation distance of explosives or blasting agents, one-half the mass of the ammonium nitrate should be included in the mass of the donor.

NOTE 2 — When the ammonium nitrate and/or blasting agent is not barricaded, the distances shown in the Table shall be multiplied by six. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers, and the like which may enclose the "donor." Where storage is in bullet-resistant magazines⁵ recommended for explosives or where the storage is protected by a bullet-resistant wall, distances and barricade thicknesses in excess of those prescribed in the American Table of Distances are not required.

NOTE 3 — The distances in the Table apply to ammonium nitrate that passes the insensitivity test prescribed in the definition of ammonium nitrate fertilizer promulgated by the Fertilizer Institute;⁶ and ammonium nitrate failing to pass said test shall be stored at separation distances determined by competent persons and approved by the authority having jurisdiction.

NOTE 4 — These distances apply to blasting agents which pass the insensitivity test prescribed in regulations of the U.S. Department of Transportation and the U.S. Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms.

NOTE 5 — Earth, or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the "donor" when the trees are bare of leaves, are also acceptable.

NOTE 6 — For determining the distances to be maintained from inhabited buildings, passenger railways, and public highways, use the American Table of Distances for Storage of Explosives Materials on pages 4 and 5.

⁵For construction of bullet-resistant magazines see Bureau of Alcohol, Tobacco and Firearms, Department of the Treasury, Publication ATF P 5400.7 (8/700), ATF Explosives Law and Regulations.

⁶Definition and Test Procedures for Ammonium Nitrate Fertilizer, Fertilizer Institute, May 8, 1971.

Chapter 2 Guide to Use of Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents

2-1 Sketch location of all potential donor and acceptor materials together with the *maximum* mass of material to be allowed in that vicinity. (Potential donors are high explosives, blasting agents, and combination of masses of detonating materials. Potential acceptors are high explosives, blasting agents, and ammonium nitrate.)

2-2 Consider separately each donor mass in combination with each acceptor mass. If the masses are closer than table allowance (distances measured between nearest edges), the combination of masses becomes a new potential donor of weight equal to the total mass. When individual masses are considered as donors, distances to potential acceptors shall be measured between edges. When combined masses within propagating distance of each other are considered as a donor, the appropriate distance to the edge of potential acceptors shall be computed as a weighted distance from the combined masses.

Calculation of weighted distance from combined masses:

Let $M_1, M_2, \dots, M_n$ be donor masses to be combined.
 M_1 is a potential acceptor mass.
 D_{11} is distance from M_1 to M_2 (edge to edge).
 D_{12} is distance from M_1 to M_3 (edge to edge), etc.

To find weighted distance $[D_1(M_1, \dots, M_n)]$ from combined masses to M_1 , add the products of the individual masses and distances and divide the total by the sum of the masses thus:

$$D_1(M_1, \dots, M_n) = \frac{M_2 \times D_{12} + M_3 \times D_{13} + \dots + M_n \times D_{1n}}{M_2 + M_3 + \dots + M_n} \quad (1)$$

Propagation is possible if either an individual donor mass is less than the tabulated distance from an acceptor or a combined mass is less than the weighted distance from an acceptor.

2-3 In determining the distances separating highways, railroads, and inhabited buildings from potential explosions (see American Table of Distances for Storage of Explosive Materials on page 4 and 5), the sum of all masses which may propagate (i.e., lie at distances less than prescribed in the Table) from either individual or combined donor masses are included. However, when the ammonium nitrate must be included, only 50 percent of its weight shall be used because of its reduced blast effects.

In applying the American Table of Distances to distances from highways, railroads, and inhabited buildings, distances are measured from the nearest edge of potentially explodable material as prescribed in the American Table of Distances, Note 5. (See American Table of Distances for Storage of Explosive Materials on page 4 and 5.)

2-4 When all or part of a potential acceptor comprises Explosives Class A as defined in DOT regulations, storage in bullet-resistant magazines is required. Safe distances to stores in bullet-resistant magazines may be obtained from the intermagazine distances prescribed in the American Table of Distances.

2-5 Barricades must not have line-of-sight openings between potential donors and acceptors which permit blast or missiles to move directly between masses.

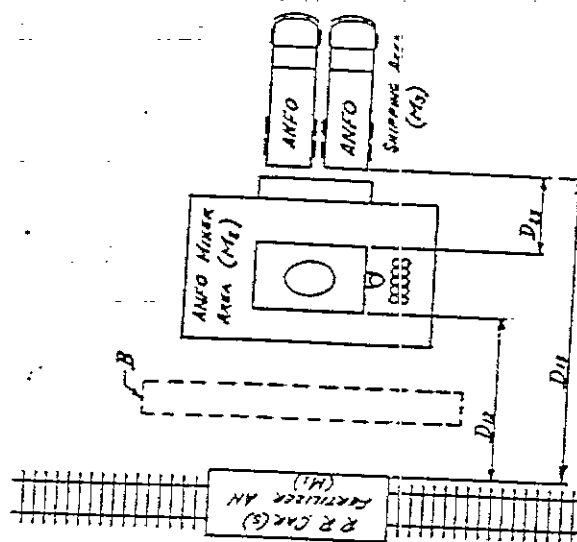


Figure 1.

Example 1

ANFO Mix Plant (Figure 1)

M_1 100,000 lbs. Fertilizer AN Prills (maximum)
 M_2 2,500 lbs. ANFO (maximum)
 M_3 80,000 lbs. ANFO (maximum)
 D_{11} 20 ft.
 D_{12} 20 ft.
 D_{13} 50 ft.
 No other stores on site; no barricade exists.

Potential Donor	Potential Acceptor	Distance On Site (ft.)	Table Distance, Minimum Required (ft.)	Propagation Possible?
M_1 (2,500 lbs.)	M_1	20	$9 \times 6 = 54$	Yes
M_1 (2,500 lbs.)	M_2	20	$32 \times 6 = 192$	Yes
M_1 (80,000 lbs.)	M_3	50	$28 \times 6 = 168$	Yes
M_1 (80,000 lbs.)	M_3	20	$101 \times 6 = 606$	Yes

Conclusion:

The maximum amount of blasting agent to be considered for public protection at this site is sum of all masses, reducing Fertilizer AN mass by 50 percent as indicated in Paragraph 23.

$$100,000 \times 50\% = 50,000$$

$$2,500$$

$$80,000$$

$$132,500 \text{ pounds}$$

In accordance with the American Table of Distances, the required separation distance from an inhabited building (unbarricaded) is 2,000 feet.

Example 2

ANFO Mix Plant (Figure 1)

M_1 100,000 lbs. Fertilizer AN Prills (maximum)
 M_2 2,500 lbs. ANFO (maximum)
 M_3 80,000 lbs. ANFO (maximum)
 D_{11} 20 ft.
 D_{12} 20 ft.
 D_{13} 50 ft.
 No other stores on site; a 4-foot-thick earth barricade exists at B (Figure 1).

Potential Donor	Potential Acceptor	Distance On Site (ft.)	Table Distance, Minimum Required (ft.)	Propagation Possible?
M_1 (2,500 lbs.)	M_1	20	9	No
M_1 (2,500 lbs.)	M_2	20	$6 \times 32 = 192$	Yes
M_1 (80,000 lbs.)	M_3	50	28	No
M_1 (80,000 lbs.)	M_3	20	$6 \times 101 = 606$	Yes
Combined $M_2 + M_3$ (82,500 lbs.)	M_1	49*	30	No

Conclusion:
 The maximum amount of blasting agent to be considered for public protection at this site is the sum of M_2 plus M_3 or 82,500 pounds. In accordance with the American Table of Distances, the required separation distance from an inhabited building (unbarricaded) is 2,000 feet. If a natural or artificial barricade protects the building, the required distance is 1,730 feet.

*Compute weighted distance to combined mass by equation 1:

$$2,500 \times 20 + 80,000 \times 50$$

$$\frac{2,500 + 80,000}{2} = 49 \text{ feet}$$

The INSTITUTE OF MAKERS OF EXPLOSIVES (IME) is the safety association of the commercial explosives industry in the United States and Canada. The primary concern of IME is the safety and protection of employees, users, the public and the environment in the manufacture, transportation, storage, handling, use and disposal of explosive materials used in blasting and other essential operations.

IME is a non-profit, incorporated association. It was founded in 1913 to provide technically accurate information and recommendations concerning explosive materials and to serve as a source of reliable data about their use. Committees of qualified representatives from IME member companies develop this information and a significant portion of IME's recommendations are embedded in the regulations of federal and state agencies as well as private standard-setting organizations.

The Institute's principal committees are: Environmental Affairs; Legal Affairs; Safety Education; Technical; and, Transportation and Distribution.

"DESTRUCTION OF COMMERCIAL EXPLOSIVE MATERIALS"

At times it may be necessary to destroy commercial explosive materials. These explosives may be fresh material from containers which have been broken during transportation, or materials that are believed to be deteriorated or no longer needed. Deteriorated or damaged explosives may be more hazardous than those in good condition and, hence, require special care in handling and disposal.

In the event it appears necessary to destroy commercial explosives, all handling and destruction should be deferred until a manufacturer has been consulted.

The member companies of the Institute of Makers of Explosives have agreed to supply advice or assistance in destroying commercial explosives to law enforcement agencies, fire departments, inspection and regulatory bodies, as well as users of explosives. If the manufacturer is known, seek his assistance. If the manufacturer is not known, a member company of the Institute of Makers of Explosives will provide advice or assistance.

The above policy of IME member companies relates only to commercial explosive materials. It does not include handling improvised explosive devices or bombs, military ordnance, military explosives or homemade explosive materials.

PE86-176492

DOD CONTRACTORS' SAFETY MANUAL FOR AMMUNITION
AND EXPLOSIVES

Department of Defense
Washington, DC.

Mar 86

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

NTIS

7. When determining inhabited building and public traffic route distances, use table 6-1 for class 1, division 1; table 6-2 for specified class 1, division 1; tables 6-6 through 6-9 for class 1, division 2; table 6-10 for class 1, division 3; and table 6-11 for class 1, division 4.

8. When determining intraline and intermagazine distances, use tables 6-3 through 6-5 for class 1, division 1; tables 6-6 through 6-9 for class 1, division 2; table 6-10 for class 1, division 3; and table 6-11 for class 1, division 4.

9. In the application of inhabited building and public traffic route distances, table 6-1, the property boundary will be treated as the governing target. In interpreting application to navigable waterways as public traffic routes, occasional small fishing and pleasure boats may be ignored.

C. CLASS 1, DIVISION 1 (MASS DETONATING)

Entire quantities of items in this division can detonate almost instantaneously. Some examples: bulk explosives, some propellants, mines, bombs, demolition charges, torpedo and missile warheads, rockets, palletized projectiles loaded with TNT or Composition B, 8-inch and larger high-capacity projectiles loaded with Explosive D, mass-detonating CBUs, and mass-detonating ammunition components.

NEW Over	Not Over	Distance in Feet to Inhabited Building			Distance in Feet to Public Traffic Route		
		From		Other PES	From		Other PES
		Standard Earth-Covered Magazine			Standard Earth-Covered Magazine		
		Front or Side	Rear		Front or Side	Rear	
1	2	3	4	5	6	7	8
0	1	35	25	40	21	15	24
1	2	44	32	50	26	19	30
2	5	60	43	69	36	26	40
5	10	75	54	87	45	32	52
10	20	95	68	110	57	41	65
20	30	110	78	125	65	47	75
30	40	120	86	140	72	51	83
40	50	130	92	150	77	55	89
50	100	160	115	190	97	70	115
100	200	205	145	235	125	88	140
200	300	235	165	270	140	100	160
300	400	260	185	295	155	110	175
400	500	280	200	320	165	120	190
500	600	295	210	340	175	125	205
600	700	310	220	355	185	135	215
700	800	325	230	375	195	140	225
800	900	340	240	390	205	145	235
900	1,000	350	250	400	210	150	240
1,000	1,500	400	285	460	240	170	275
1,500	2,000	440	315	505	265	190	305
2,000	3,000	505	360	580	305	215	350
3,000	4,000	555	395	635	335	240	380
4,000	5,000	600	430	685	360	255	410
5,000	6,000	635	455	730	380	275	440

644

Table 6-1. Class 1, Division 1: Inhabited Building and Public Traffic Route Distances.

Tuesday
December 6, 1994

Part IV

**Environmental
Protection Agency**

40 CFR Part 9 et al.

Hazardous Waste Treatment, Storage, and
Disposal Facilities and Hazardous Waste
Generators; Organic Air Emission
Standards for Tanks, Surface
Impoundments, and Containers; Final
Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 60, 260, 262, 264, 265, 270, and 271

[IL-64-2-5807; FRL-5110-8]

RIN 2060-AB94

Hazardous Waste Treatment, Storage, and Disposal Facilities and Hazardous Waste Generators; Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Under the authority of the Resource Conservation and Recovery Act (RCRA), as amended, the EPA is promulgating air standards that will further reduce organic emissions from hazardous waste management activities. The air standards apply to owners and operators of hazardous waste treatment, storage, and disposal facilities (TSDF) subject to RCRA subtitle C permitting requirements and to certain hazardous waste generators accumulating waste on-site in RCRA permit-exempt tanks and containers. Under these standards, air emission controls must be used for tanks, surface impoundments, and containers in which hazardous waste is placed on or after June 5, 1995 except under certain conditions specified in the rule. Air emission control requirements are also added to the RCRA permit terms and provisions specified for TSDF miscellaneous units. In addition, this action establishes a new EPA reference test method (Method 25E) to determine the organic vapor pressure of a waste.

EFFECTIVE DATE: The final rule is effective as of June 5, 1995. The EPA has specified in the final rule a schedule that establishes the compliance dates by which different requirements of the rule must be met. These compliance dates and requirements are explained further under **SUPPLEMENTARY INFORMATION**.

The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of June 5, 1995.

ADDRESSES: *Background information document.* The background information document (BID) for the final rule may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, North Carolina 27711, telephone (919) 541-2777. Please refer to "Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)—Background Information for Promulgated Organic

Air Emission Standards for Tanks, Surface Impoundments, and Containers", EPA document number EPA-453/R-94-076b.

This document and the BID are also available on the EPA's Clean-up Information Bulletin Board (CLU-IN). To access CLU-IN with a modem of up to 28,800 baud, dial (301) 589-8366. First-time users will be asked to input some initial registration information. Next, select "D" (download) from the main menu. Input the file name "RCRAAIR1.ZIP" to download this notice. Input the file name "RCRAAIR2.ZIP" to download the BID. Follow the on-line instructions to complete the download. More information about the download procedure is located in Bulletin 104; to read this type "B 104" from the main menu. For additional help with these instructions, telephone the CLU-IN help line at (301) 589-8366.

Docket. The supporting information used for this rulemaking is available for public inspection and copying in the RCRA docket. The RCRA docket numbers pertaining to this rulemaking are F-91-CESP-FFFFF, F-92-CESA-FFFFF, F-94-CESP-FFFFF, and F-94-CE2A-FFFFF. The RCRA docket is located at the EPA RCRA Docket Office (5305) in room 2616 of the U.S. Environmental Protection Agency, 401 M Street SW, Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT:

The RCRA Hotline, toll-free at (800) 424-9346. For further information on the specific air standards and test method promulgated by this action, contact Ms. Michele Aston, Emission Standards Division (MD-13), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-2363.

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

- I. Compliance Dates
- II. Summary of Rule Changes Since Proposal
 - A. TSDF Tanks, Surface Impoundments, and Containers
 - B. TSDF Miscellaneous Units
 - C. Generator 90-Day Tanks and Containers
 - D. Other RCRA Regulatory Actions
 - E. Test Methods
- III. Summary of Final Rule Impacts
- IV. Background
 - A. Implementation of RCRA Section 3004(n)
 - B. Public Participation in Rulemaking
 - C. Relationship to Other RCRA Standards
 - D. Relationship to CERCLA Standards
 - E. Relationship to Clean Air Act Standards

- F. Relationship to Nuclear Regulatory Commission Standards
- V. Basis for Final Rule
 - A. New Control Options
 - B. Control Option Impacts
 - C. Selection Rationale
- VI. Summary of Responses to Comments on Proposed Rule
 - A. Development of Air Standards Under RCRA
 - B. Revised Impacts Analysis
 - C. Container Air Standards
 - D. Generator 90-Day Tanks and Containers
 - E. Implementation of RCRA Air Standards
 - F. Waste Stabilization in Tanks
- VII. Requirements of Final Rule
 - A. TSDF Tank, Surface Impoundment, and Container Requirements
 - B. TSDF Miscellaneous Unit Requirements
 - C. 90-Day Tanks' and Containers' Requirements
 - D. Amendments to Subparts AA and BB Standards
- VIII. Implementation of Final Rule
 - A. Existing Sources
 - B. New Sources
 - C. State Authority
- IX. Test Methods
 - A. Method 25D
 - B. Method 25E
- X. Administrative Requirements
 - A. Paperwork Reduction Act
 - B. Executive Order 12866 Review
 - C. Regulatory Flexibility Act
 - D. Docket
- XI. Legal Authority
- I. Compliance Dates

The final rule promulgated today establishes additional air standards for TSDF owners and operators subject to 40 CFR part 264 or 40 CFR part 265. In addition, this rule amends the conditions for hazardous waste generators accumulating waste on-site in RCRA permit-exempt tanks and containers pursuant to 40 CFR 262.34(a) to include air emission control requirements. All of these rule requirements are effective as of June 5, 1995. All hazardous waste placed in the affected tanks, surface impoundments, containers, and other affected units on and after this date must be managed in accordance with the requirements of the final rule. This includes implementing the required air emission controls on an affected unit or performing the required waste determinations and recordkeeping to indicate that the affected unit is exempted from these air emission control requirements. Under circumstances when the air emission control equipment required to comply with the rule cannot be operational at an existing TSDF by June 5, 1995, an implementation schedule for installation of the equipment must be developed and placed in the facility operating records no later than June 5, 1995. In such cases, the facility owner or operator must have all air emission

controls required by the final rule in operation no later than December 8, 1997.

Today's action amends 40 CFR 270.4 to require that owners and operators of TSDf for which a final permit has been issued by the EPA prior to June 5, 1995 must comply with the air emission control requirements for interim-status TSDf under 40 CFR 265 subparts AA, BB, and CC until the facility's permit is reviewed or reissued by the EPA. The EPA's rationale for adopting this implementation practice for today's rulemaking is explained in section VI.E of this preamble.

For tanks in which waste stabilization activities (sometimes referred to as waste fixation) are performed as of December 6, 1994, be the effective date of the final rules will December 6, 1995. As of the extended effective date for stabilization tanks, each TSDf owner or operator and each hazardous waste generator subject to the final rules must either install and operate the specified air emission control requirements on all affected tanks used for stabilization, or begin performing the specified waste determinations and recordkeeping to indicate that a stabilization tank is exempted from these requirements. Under circumstances where required air emission control equipment cannot be operational on stabilization tanks by December 6, 1995, an implementation schedule for installation of the required air emission controls must be developed and placed in the facility operating records no later than December 6, 1995.

In such cases, for stabilization tanks, the facility must have all air emission controls required by the final rules in operation no later than June 8, 1998.

II. Summary of Rule Changes Since Proposal

The EPA proposed the rule on July 22, 1991 (refer to 56 FR 33491). Based on public comments received by the EPA at proposal as well as the EPA's evaluation of additional information obtained after proposal, certain requirements of the rulemaking have been changed from those proposed. The major changes affect provisions establishing the rule applicability, the procedures for determining the average volatile organic concentration of a waste, and the air emission control requirements for containers. In addition, the EPA has made many changes to the specific regulatory text to clarify the EPA's intent in the application and implementation of the rule requirements. The substantive changes to the rulemaking since proposal are summarized below. A summary of the requirements of the rule as promulgated

is presented in section VII of this preamble.

A. TSDf Tanks, Surface Impoundments, and Containers

A new subpart CC is added by today's action to both 40 CFR parts 264 and 265. Subpart CC under 40 CFR part 264 applies to owners and operators of permitted TSDf while subpart CC under 40 CFR part 265 applies to owners and operators of interim-status TSDf. All changes since proposal to subpart CC in 40 CFR part 264 and to subpart CC in 40 CFR part 265 are identical with the exception of changes to the rule reporting requirements. There are no reporting requirements under 40 CFR 265 subpart CC for owners and operators of interim-status TSDf. Hereafter for convenience in this preamble, the term "subpart CC standards" is used collectively to refer to both subpart CC in 40 CFR part 264 and subpart CC in 40 CFR part 265.

The compliance time for the subpart CC standards has been revised since proposal to allow up to an additional 30 months after June 5, 1995 to install and begin operation of air emission control equipment required by the rule provided that the owner or operator develops and places in the facility operating records by this date an implementation schedule for installation of the equipment. Compliance dates and implementation requirements for the final rule are explained in sections I and VIII of this preamble.

1. Applicability

The applicability of the subpart CC standards has been revised since proposal to specifically exempt from the rule certain tanks surface impoundments, and containers in which the owner or operator has stopped adding hazardous waste. The subpart CC standards do not apply to a tank, surface impoundment, or container that meets either of the following conditions:

(1) No hazardous waste is added to the waste management unit on or after June 5, 1995 (see generally 55 FR 39409, September 27, 1990); or

(2) Addition to hazardous waste to the waste management unit is stopped and the owner or operator has begun implementing or completed closure pursuant to an approved closure plan.

In addition, the applicability of the subpart CC standards has been changed such that the rule is not applicable to any container having a design capacity less than 0.1 m³ (approximately 26 gallons) regardless of the organic content of the hazardous waste handled

in the container. In response to comments on the proposed rule, the EPA reviewed the types of small containers commonly used to accumulate and transfer hazardous waste. Considering the small quantity of hazardous waste handled in a sample collection vial, safety can, disposal can, and other types of small containers and the short periods of time that the waste normally remains in one of these containers, the EPA concluded that existing rules for containers having a design capacity less than 0.1 m³ are sufficient to protect human health and the environment.

Finally, the EPA has decided to temporarily defer application of the subpart CC standards to tanks, surface impoundments, and containers managing hazardous wastes under certain special circumstances. For now, the EPA is deferring application of the subpart CC standards to waste management units that are used solely to treat or store hazardous wastes generated on-site from remedial activities required under RCRA corrective action or CERCLA response authorities (or similar State remediation authorities). Also, the EPA is deferring application of the subpart CC standards to waste management units that are used solely to manage radioactive mixed wastes. The EPA's rationale for these deferrals is explained in section VIII.A.1 of this preamble.

2. General Standards

For each tank, surface impoundment, or container to which the subpart CC standards apply (referred to here as an "affected unit"), the owner or operator is required to use the air emission controls specified in the rule except when the hazardous waste placed in an affected unit meets certain conditions. As explained in the following paragraphs, the conditions under which an affected unit is exempted from the air emission control requirements of the subpart CC standards have been revised since proposal.

a. *Waste volatile organic concentration exemption.* Under the final subpart CC standards, an affected unit is exempt from the air emission control requirements of the rule if all hazardous waste placed in the unit is determined to have an average volatile organic concentration less than 100 parts per million by weight (ppmw) based on the organic composition of the hazardous waste at the point of waste origination. This waste volatile organic concentration limit incorporates several revisions that have been made by the EPA since proposal.

First, the format for the limit has been changed to be the average volatile organic concentration of the hazardous waste on a mass-weighted basis during normal operating conditions for the source or process generating the waste (in contrast to the proposed format of the maximum volatile organic concentration for the hazardous waste never to be exceeded). Averaging periods up to 1 year in duration are allowed for each individual waste stream under the final rule. The procedures for determining the average volatile organic concentration of a waste are explained further under "Waste Determination Procedures" in this section and in section VII.A.3 of this preamble.

Second, determination of the volatile organic concentration of the waste under the final rule is based on the organic composition of the waste at the "point of waste origination" (instead of the "point of waste generation" as proposed). The "point of waste origination" is defined in the final rule with respect to the point where the TSDF owner or operator first has possession of a hazardous waste. When the TSDF owner or operator is the generator of the hazardous waste, the "point of waste origination" means the point where a solid waste produced by a system, process, or waste management unit is determined to be a hazardous waste as defined in 40 CFR part 261. In this case, this term is being used in a similar manner to the use of the term "point of generation" in waste operations air standards established under authority of the Clean Air Act in 40 CFR parts 60, 61, and 63 of this chapter. When neither the TSDF owner nor operator is the generator of the hazardous waste, the "point of waste origination" means the point where the owner or operator accepts delivery or takes possession of the hazardous waste.

Finally, the EPA revised the impact analysis used for this rulemaking after proposal to incorporate additional TSDF industry data. An opportunity for public comment on this analysis was provided by the EPA (refer to sections III.B and VI.B of this preamble). Based on the revised analysis results, the EPA selected a new value for the volatile organic concentration limit. Section V.C of this preamble presents the rationale for the selection of the control option used as the basis for the final rule.

b. Treated hazardous waste exemption. Under the subpart CC standards, each affected tank, surface impoundment, and container that manages hazardous waste having an average volatile organic concentration equal to or greater than 100 ppmw, as

determined by the procedures specified in the rule, is required to use air emission controls in accordance with the rule requirements. The owner or operator must install and operate the specified air emission controls on every affected tank, surface impoundment, and container used in the waste management sequence from the point of waste origination (as applies to the specific hazardous waste stream) through the point where the organics in the waste are removed or destroyed by a process in accordance with the requirements of the rule. If a particular hazardous waste is not treated to meet these requirements, then all affected units at the TSDF used in the waste management sequence for this hazardous waste are required to use the air emission controls specified by the subpart CC standards.

If the hazardous waste is treated to remove or destroy the organics in the waste by a process that meets or exceeds a minimum level of performance as specified in the rule, then affected units at the TSDF operated downstream of the treatment process in the waste management sequence for this hazardous waste are not required to use the air emission controls specified by the subpart CC standards. It is important to emphasize that tanks, surface impoundments, and containers (subject to the rule) in which the treatment process is conducted are required to use the applicable air emission controls specified by the subpart CC standards with the exception of certain tanks and surface impoundments used for active biological treatment of hazardous waste and achieving the performance requirements specified in the rule (this exception is explained further in section VII.A.4 of this preamble).

The conditions under which a treated hazardous waste no longer is required to be managed in affected units using air emission controls under the subpart CC standards have been revised and expanded since proposal to include many alternatives from which an owner or operator can choose one with which to comply. The final subpart CC standards allow an owner or operator to use any type of treatment process that can continuously achieve one of the specified sets of performance conditions. These conditions have been changed to include:

(1) The average volatile organic concentration of the hazardous waste exiting the process is less than 100 ppmw (except for certain site-specific situations where multiple hazardous waste streams are treated by a single process in which case a volatile organic concentration limit for the waste exiting

the process is established by the rule procedures at a value lower than 100 ppmw);

(2) The organic reduction efficiency for a process treating multiple hazardous waste streams is equal to or greater than 95 percent, and the average volatile organic concentration of the hazardous waste exiting the treatment process is less than 50 ppmw; or

(3) The actual organic mass removal rate for the process is greater than the required mass removal rate established for the process. The alternative treatment process performance requirements specified in the final subpart CC standards are discussed further in section VII.A.2 of this preamble.

The proposed explicit exemption for hazardous wastes complying with the land disposal restriction (LDR) treatment standards is not included in the final subpart CC standards. The EPA concluded that the expanded number of alternatives for treated hazardous waste and other provisions added to the final rule provide a reasonable regulatory mechanism by which a TSDF owner or operator can determine whether a hazardous waste complying with the LDR treatment standards is exempted from being managed in accordance with the air emission control requirements of the subpart CC standards.

3. Waste Determination Procedures

As already noted, the procedures that a TSDF owner or operator may use to determine the volatile organic concentration of a hazardous waste have been revised for the final subpart CC standards. For a case when direct measurement is chosen for determining the volatile organic concentration of a hazardous waste, the proposed statistical calculation procedure using Method 25D results is not included in the final subpart CC standards. Instead, procedures are specified in the final rule to compute the mass-weighted average volatile organic concentration of a hazardous waste using Method 25D results for waste generated as part of a continuous process and for waste generated as part of a batch process. Under circumstances when the same batch process is performed repeatedly but not necessarily continuously, the final rule allows the owner or operator to determine the average volatile organic concentration of the waste from this process by averaging results for one or more representative waste batches generated by the process. In all cases, a sufficient number of waste samples for analysis (with a minimum of four samples) must be collected to be representative of the normal range of the

operating conditions for the source or process generating the hazardous waste. Normal operating conditions for the source or process generating the waste include cyclic process operations such as startup and shutdown. Process malfunctions, maintenance activities, or equipment cleaning are not considered to be normal operating conditions for the purpose of determining the average volatile organic concentration of a waste. These waste determination procedures are discussed further in section VII.A.3 of this preamble.

The proposed explicit requirements for determining the volatile organic concentration of a hazardous waste using information in a waste certification notice prepared by the waste generator are not included in the final rule. Instead, for hazardous waste that is not generated by the TSD owner or operator (i.e., waste shipped to the TSD from off-site sources under different ownership), the final rule allows the TSD owner or operator to determine the waste volatile organic concentration by either testing the waste when he or she accepts delivery of the hazardous waste or using appropriate information about the waste composition that is prepared by the generator of the waste. The generator prepared information can be included in manifests, shipping papers, or waste certification notices accompanying the waste shipment, as agreed upon between the waste generator and the TSD owner or operator.

4. Tank Standards

Several changes to the tank standards have been made since proposal. An exemption from the tank standards has been added for those affected tanks used for biological treatment of a hazardous waste in accordance with requirements specified in the rule. Changes have been made to clarify the regulatory text regarding the tank cover design and operating requirements. Also, the conditions have been clarified that must be met for a particular tank to use a fixed-roof type cover without any additional controls in accordance with the subpart CC standards. Finally, provisions have been added to the rule to address those special situations in which emergency venting of the tank or the air emission controls installed on the tank is necessary for safety.

5. Surface Impoundment Standards

Changes to the surface impoundment standards have been made to be consistent with the changes to the tank standards as applicable.

6. Container Standards

Several changes have been made to the container standards since proposal in addition to limiting the applicability of the subpart CC standards to containers having a design capacity equal to or greater than 0.1 m³. The air emission control requirements for affected containers have been revised to provide several air emission control alternatives from which an owner or operator may choose one with which to comply. For containers having a design capacity less than or equal to 0.46 m³ (approximately 119 gallons), an owner or operator may place the hazardous waste in drums that meet U.S. Department of Transportation (DOT) specifications under 49 CFR part 178 without any additional testing, inspection, or monitoring requirements. An owner or operator is also allowed under the final rule to place the hazardous waste in tank trucks and tank railcars that are annually demonstrated to be vapor tight using Method 27 in 40 CFR part 60, appendix A without any additional testing, inspection, or monitoring requirements.

The requirements for waste transfer operations for containers have been revised under the final subpart CC standards. Submerged-fill of hazardous waste that is loaded into containers by pumping is required only when transferring the waste into containers having a design capacity greater than 0.46 m³. Submerged fill of the waste is not required when filling smaller size containers such as 55-gallon drums.

The air emission control requirements for owners and operators treating hazardous waste in open containers have been revised. Whenever it is necessary for the container to be open during the treatment process, the container is required to be located in an enclosure connected to a closed-vent system with an operating organic emission control device. The final subpart CC standards include specific enclosure design and operation requirements which allow the enclosure to have permanent openings for worker access.

Finally, the container standards have been revised to be consistent with the safety venting provisions added to the tank and surface impoundment standards.

7. Closed-Vent System and Control Device Standards

The design and operating requirements for closed-vent systems and control devices have been changed to be consistent with those requirements already applicable to TSD owners and

operators under subpart AA in 40 CFR parts 264 and 265. The subpart AA standards have been in effect since 1990 and establish RCRA air standards to control organic emissions from process vents on certain types of hazardous waste treatment units.

8. Inspection and Monitoring Requirements

The inspection and monitoring requirements under the subpart CC standards have been revised since proposal. The requirements for inspection and monitoring of closed-vent systems and control devices have been changed to be identical to the inspection and monitoring requirements under subpart AA in 40 CFR parts 264 and 265. The required interval for the visual inspection of covers installed on tanks, surface impoundments, and certain containers has been changed to once every 6 months. After the initial cover inspection and monitoring for detectable organic emissions is completed, the owner or operator is only required to inspect and monitor those cover openings that have been opened (i.e., have not continuously remained in a closed, sealed position) since the last visual inspection and monitoring. Special inspection and monitoring provisions have been added for cover fittings that are unsafe or difficult, as defined in the rule, for facility personnel to inspect and monitor.

The subpart CC standards have been changed to allow leak repair on tank and surface impoundment covers to be delayed beyond 15 calendar days if both of the following conditions occur: (1) Repair of the leak requires first emptying the contents of the tank or surface impoundment; and (2) temporary removal of the tank or surface impoundment from service will result in the unscheduled cessation of production from the process unit, or operation of the waste management unit, that is generating the hazardous waste managed in the tank or surface impoundment. Repair of a leak must be performed at the next time the process, system, or waste management unit that is generating the hazardous waste managed in the tank or surface impoundment stops operation for any reason.

9. Recordkeeping Requirements

The subpart CC standards have been changed to require cover design documentation only for floating roof-type tank covers, surface impoundment covers, and enclosures used for control of air emissions from containers. Also, the recordkeeping requirements have

been revised as appropriate to address the changes to the final rule described previously in this section of the preamble.

10. Reporting Requirements

The reporting requirements in the subpart CC standards are the same as proposed with one exception. The time interval within which TSDF owners and operators subject to the subpart CC standards under 40 CFR part 264 must report to the Regional Administrator all circumstances resulting in noncompliance with the applicable conditions has been changed to within 15 calendar days of the time that an owner or operator becomes aware of the circumstances.

B. TSDF Miscellaneous Units

Today's action amends 40 CFR 264.601 by adding to the permit terms and provisions required for RCRA permitting of a miscellaneous unit the appropriate air emission control requirements in 40 CFR part 264, subparts AA, BB, and CC. This amendment is the same as proposed.

C. Generator 90-Day Tanks and Containers

The conditions with which a hazardous waste generator must comply, pursuant to 40 CFR 262.34(a), to exempt tanks and containers accumulating hazardous waste on-site for no more than 90 days from the RCRA subtitle C permitting requirements are amended by today's action to include compliance with the air emission control requirements of 40 CFR part 265, subparts AA, BB, and CC. This amendment is the same as proposed.

D. Other RCRA Regulatory Actions

The EPA proposed several amendments to existing RCRA air standards. One amendment proposed adding requirements for the management of spent carbon removed from a carbon adsorption system to the closed-vent system and control device standards under 40 CFR part 264, subparts AA and BB, and 40 CFR part 265, subparts AA and BB. The final amendment has been revised to allow the owner or operator the additional option of burning the spent carbon in a boiler or industrial furnace that is permitted under subpart H of 40 CFR part 266. A second amendment promulgated today updates the leak detection monitoring provisions under 40 CFR part 264, subparts AA and BB, and 40 CFR part 265, subparts AA and BB for closed-vent systems to be consistent with other air standards recently promulgated by the EPA. Under

this amendment, annual leak detection monitoring is not required for those closed-vent system components which continuously operate in vacuum service or those closed-vent system joints, seams, or other connections that are permanently or semi-permanently sealed (e.g., a welded joint between two sections of metal pipe, a bolted and gasketed pipe flange).

E. Test Methods

As part of this rulemaking, the EPA proposed two new reference test methods (Method 25D and Method 25E) to be added to 40 CFR part 60, Appendix A. Method 25D is a test method for the determination of the volatile organic concentration of waste materials. Since proposal, the EPA decided it is also appropriate to use method 25D to implement other EPA air standards being developed under authority of the Clean Air Act. The promulgation of some of these other air standards prior to today's action required the EPA to promulgate Method 25D in a separate rulemaking (refer to 59 FR 19402, April 22, 1994). Comments and responses relevant to Method 25D for this rulemaking are in the BID for the final rule and in the dockets pertaining to this rulemaking.

Method 25E is being promulgated today. Method 25E is the test method for determining the organic vapor pressure of wastes. The sampling requirements for Method 25E have been revised since proposal to provide for sampling of the waste in a tank.

III. Summary of Final Rule Impacts

The EPA estimates that implementation of the subpart CC standards will reduce nationwide organic emissions from TSDF tanks, surface impoundments, and containers by approximately 970,000 Mg/yr. In addition, the EPA estimates that nationwide organic emissions from 90-day tanks and containers will be reduced by approximately 73,000 Mg/yr.

Control of organic air emissions addresses many air quality problems including ambient ozone formation, adverse human health effects from inhalation of air toxics, and, to a lesser extent, depletion of stratospheric ozone. Ambient ozone concentrations exceed the National Ambient Air Quality Standards (NAAQS) in many metropolitan areas throughout the United States. Thus, the rule promulgated today will contribute to progress in attaining the NAAQS for ozone in nonattainment areas and also in preventing significant deterioration of the air quality in those areas of the

United States currently in attainment with the NAAQS for ozone.

Today's action will also significantly reduce the risk to the public of contracting cancer posed by exposure to toxic constituents contained in the organic emissions from hazardous waste management activities. The cancer risk to the entire exposed population nationwide (i.e., annual cancer incidence) from exposure to organic emissions from TSDF is estimated by the EPA to be reduced from approximately 48 cases per year to a level of 2 cases per year. Annual cancer incidence as a result of exposure to organic emissions from 90-day tanks and containers is estimated by the EPA to be reduced from approximately four cases per year to less than one case per year.

Maximum individual risk (MIR) is a measure of the added probability of a person contracting cancer if exposed continuously over a 70-year period to the highest annual average ambient concentration of the air toxics emitted from a TSDF site. There are approximately 2,300 TSDF locations in the United States. The MIR for all but approximately 20 of these facilities is estimated by the EPA to be reduced by implementation of the subpart CC standards to a level that is less than 1×10^{-4} . The target MIR levels historically used by the EPA for other promulgated RCRA standards range from 1×10^{-4} to 1×10^{-5} . Because the MIR values for a few TSDF are estimated to remain higher than the historical RCRA target, the EPA is continuing to evaluate the waste management practices and the individual chemical compounds composing the organic emissions at these TSDF. Following this evaluation, the EPA will determine what other actions are necessary to attain the health-based goals of RCRA section 3004(n). The omnibus permitting authority in section 3005(c)(3) can be invoked to supplement or add to the requirements in today's rule, should the rule be determined to be insufficient to assure protection of human health and the environment at a particular facility.

The total nationwide capital investment cost to TSDF owners and operators to implement the subpart CC standards is estimated by the EPA to be approximately \$290 million. The total nationwide annual cost for these standards is estimated to be approximately \$110 million per year. The total nationwide capital costs to hazardous waste generators of installing the required air emission controls on 90-day tanks and containers is estimated by the EPA to be approximately \$23 million. Total nationwide annual cost

for the 90-day tank and container controls is estimated to be approximately \$7 million.

The EPA concludes that the rule promulgated today will not have a significant economic impact on hazardous waste generators or TSDF owners and operators. Prices for commercial hazardous waste management services are estimated by the EPA to increase by less than 1 percent on a nationwide annualized basis. The quantity of hazardous waste handled by commercial hazardous waste management companies is projected to be reduced by less than 1 percent on a nationwide annualized basis. Few, if any, facility closures are anticipated. Job losses in the hazardous waste industry are estimated to be less than 1.5 percent. Furthermore, this impact on employment does not reflect positive employment effects on industries producing the air emission control equipment that will be used to comply with the rule. No significant impacts are expected on small businesses.

IV. Background

A. Implementation of RCRA Section 3004(n)

The Hazardous and Solid Waste Amendments of 1984 added section 3004(n) to RCRA. Section 3004(n) directs the EPA to promulgate regulations for the monitoring and control of air emissions from TSDF as may be necessary to protect human health and the environment. The EPA completed the first phase of its regulatory development program to implement this Congressional directive with the promulgation of RCRA air standards that control organic emissions vented from certain hazardous waste treatment processes (i.e., distillation, fractionation, thin-film evaporation, solvent extraction, steam stripping, and air stripping) as well as from leaks in certain ancillary equipment used for hazardous waste management processes (55 FR 25454, June 21, 1990). Today's action completes the second phase of the EPA's regulatory development program with the promulgation of RCRA air standards for tanks, surface impoundments, containers, and miscellaneous units operated at TSDF. This rulemaking also adds air emission control requirements for certain hazardous waste generators accumulating waste on-site in RCRA permit-exempt tanks and containers.

As described at proposal (56 FR 33496, July 22, 1991), the EPA decided in both the first and second phases to develop standards that control organic

emissions as a class (as opposed to constituent-by-constituent). Implementation of these nationwide standards will achieve significant organic emission and cancer risk reductions. However, the EPA estimates the cancer risk at a few TSDF after implementation of these nationwide standards to remain at a level that is higher than the range of target risk levels for other promulgated RCRA standards (refer to section V.C of this preamble.) The third phase of this regulatory development program is to determine what other actions are necessary to attain the health-based goals of RCRA section 3004(n). To make this determination, the EPA is evaluating hazardous waste operations at those individual TSDF estimated to have MIR values greater than the historical RCRA target MIR levels.

B. Public Participation in Rulemaking

The EPA is promulgating today's final rule after careful consideration of public comments on the proposed rule (56 FR 33491, July 22, 1991). The preamble to the proposed rule discussed the availability of the background information document (BID) pertaining to the health effects of organic emissions from hazardous waste TSDF using tanks, surface impoundments, and containers. The EPA mailed copies of the Federal Register notice and the BID for the proposed rule to industry representatives, environmental groups, and State and Federal agencies.

The EPA solicited comments from the public at the time of proposal and provided a 90-day comment period, from July 22, 1991 to October 21, 1991, for the public to prepare and submit written comments on the proposed rule. In addition, the EPA provided the opportunity for a public hearing to allow interested persons to present oral comments to the EPA concerning the proposed rule. However, no one requested that the EPA hold a public hearing on the proposed rule. The EPA did receive written comments from more than 80 companies, industrial trade associations, environmental groups, and State and Federal agencies. The BID for the final rule summarizes all of the comments on the proposed rule and presents the EPA's response to each of the comments. Section VI of this preamble presents responses to selected major comments.

Following the EPA's review of public comments received on the proposed rule, the EPA revised the impact analysis used for its final determination regarding today's rulemaking. This analysis used additional TSDF industry data obtained by the EPA. The EPA

provided an opportunity for public comment on the additional TSDF industry data used for the impact modeling revisions. A Federal Register Notice of Data Availability (57 FR 43171, September 18, 1992) listed these additional data. The EPA also made the data available for public inspection at the EPA RCRA Docket Office. A 30-day comment period, from September 18, 1992 to October 19, 1992, provided the public the opportunity to comment on the additional data. The EPA received comments on the additional data from one industrial trade association. Section VI.B of this preamble presents a summary of these comments.

C. Relationship to Other RCRA Standards

1. RCRA Rules for TSDF Owners and Operators

Today's action establishes organic air emission control requirements for TSDF tanks, surface impoundments, and certain containers. Other types of waste management units operated at TSDF may be subject to these air emission control requirements as follows.

a. Miscellaneous units. Under RCRA in 40 CFR 260.10, the EPA defines a "miscellaneous unit" as a hazardous waste management unit where waste is treated, stored, or disposed of that is not a container, tank, surface impoundment, wastepile, land treatment unit, landfill, incinerator, boiler, industrial furnace, underground injection well with appropriate technical standards under 40 CFR part 146, or a unit eligible for a research, development, and demonstration permit under 40 CFR 270.65. The EPA has established provisions under 40 CFR part 264, subpart X to allow TSDF owners and operators to obtain permits to operate miscellaneous units. The EPA permits miscellaneous units on a case-by-case basis with terms and provisions as needed to protect public health and the environment through generic performance standards specified in 40 CFR 264.601.

Today's rule amends § 264.601 to state that the air emission controls required by the standards under 40 CFR 264 subparts AA, BB, and CC are among the "appropriate" controls a permit writer may require for a miscellaneous unit "to ensure protection of human health and the environment." Applicability of today's rule to miscellaneous units is discussed further in Section VII.B of this preamble.

b. Land disposal restrictions. The RCRA LDR treatment standards under 40 CFR part 268 require TSDF owners and operators to treat hazardous waste

to reduce the toxicity or mobility of specific constituents in the waste before the TSDF owner or operator can place the waste in a land disposal unit. Under certain conditions, the EPA may grant a TSDF owner or operator permission to land dispose a hazardous waste that does not meet the LDR treatment standards in a particular land treatment unit, landfill, wastepile, or surface impoundment. This action is referred to as the "no migration" variance. To obtain a "no migration" variance, a TSDF owner or operator must demonstrate in a petition to the EPA that, with a reasonable degree of certainty, there will be no migration of hazardous constituents from the disposal unit for as long as the waste remains hazardous.

On August 11, 1992, the EPA proposed its interpretation of the term "no migration", the procedures and substantive requirements for submitting to the EPA a petition to demonstrate "no migration" from a land disposal unit, and the EPA's criteria for evaluating the petitions (57 FR 35940). This proposal includes amending 40 CFR 268.6 to add as a condition for receiving a no migration variance that the applicant demonstrate that the subject land disposal unit complies with the applicable air emission standards the EPA has developed under 40 CFR parts 264 and 265.

c. Corrective action requirements. The EPA is temporarily deferring applicability of the subpart CC standards to any tank, surface impoundment, or container which is used solely for on-site treatment or storage of hazardous waste that is generated as the result of implementing remedial activities required under the RCRA corrective action authorities of 3004(u), 3004(v) or 3008(h). The EPA's rationale for this temporary deferral is explained in section VII.A.1 of this preamble.

2. RCRA Rules for Hazardous Waste Generators

Hazardous waste generators who accumulate waste on-site in containers or tanks for short periods of time can elect to be exempted from RCRA subtitle C permitting requirements provided that a generator complies with provisions specified in 40 CFR 262.34. The EPA allows a generator who generates 1,000 kilograms or more of hazardous waste per month to accumulate the hazardous waste on-site for up to 90 days in tanks and containers without a permit provided the generator complies with certain conditions specified in 40 CFR 262.34(a). These conditions include compliance with the requirements of 40

CFR part 265, subpart I when the waste is accumulated in a container and 40 CFR part 265, subpart J when the waste is accumulated in a tank. Tanks and containers used to accumulate hazardous waste on-site for 90 days or less pursuant to the conditions of 40 CFR 262.34(a) are hereafter referred to in this preamble as "90-day tanks and containers."

The rule promulgated today only amends the RCRA permit exemption requirements for generators operating 90-day tanks and containers. This action does not affect the existing RCRA permit exemption requirements for generators operating tanks and containers for on-site accumulation of hazardous waste in accordance with the provisions of 40 CFR 262.34 (d) or (e). Applicability of today's rule to 90-day tanks and containers is discussed further in Section VI.D of this preamble.

3. RCRA Rules for Hazardous Waste Transporters

Regulations in 40 CFR part 263 establish standards that apply to persons transporting hazardous waste within the United States if the transportation requires a manifest under 40 CFR part 262. Today's action does not change the RCRA rules under 40 CFR part 263. However, the air standards promulgated today may indirectly affect transporters accepting certain organic-containing hazardous wastes from TSDF owners and operators. The final subpart CC standards require that TSDF owners and operators only load these hazardous wastes into containers (including tank truck, railcars, and roll-off boxes) that use air emission controls as specified in the rule. Consequently, to continue accepting hazardous waste from a TSDF owner or operator, in some cases, transporters may need to ensure that their containers meet the subpart CC standards.

D. Relationship to CERCLA Standards

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), authorizes the EPA to undertake removal and remedial actions to clean up hazardous substance releases. Under CERCLA, on-site remedial actions are required to comply with the requirement of Federal and more stringent State environmental laws that are applicable or relevant and appropriate (ARAR) to the remedial action unless certain statutory waivers apply. In addition, the National Oil and Hazardous Substances Contingency Plan (NCP) provides that removal actions shall attain ARAR to the extent practicable considering the exigencies of

the situation. [40 CFR 300.415(i)]. As explained in section VII.A.1 of this preamble, the EPA has decided to temporarily defer application of the subpart CC standards to tanks, containers and surface impoundments which are being used to treat or store hazardous wastes containing organics generated on-site from remedial activities required under RCRA corrective action or CERCLA response authorities, or similar State remediation authorities, provided that the wastes are managed in units that do not also manage other hazardous waste containing organics. However, after the temporary deferral has been lifted, today's rules may be considered an ARAR for certain types of remedial and removal actions.

A requirement under a Federal or State environmental law may be either "applicable" or "relevant and appropriate," but not both, to a remedial or removal action conducted at a CERCLA site. An ARAR is identified on a site-specific basis in a two-part analysis that considers first, whether a given requirement is applicable; then, if it is not applicable, whether it is nevertheless both relevant and appropriate. "Applicable" requirements as defined in the NCP are those that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a CERCLA site. [40 CFR 300.415(i)]. "Relevant and appropriate" requirements are those that, while not "applicable" at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. [40 CFR 300.415(i)].

Some waste management activities used for remedial and removal actions of hazardous organic substances require the use of tanks, surface impoundments, and containers. For example, a TSDF may treat hazardous organic liquids and surface water contaminated with hazardous organic waste on site using destruction, detoxification, or organic removal processes that occur in tanks or surface impoundments. The facility may perform on-site solvent washing of soils contaminated with hazardous organic sludges in a tank or container. At a TSDF, hazardous waste in leaking drums may be repacked in new containers for treatment and disposal at another site.

Once today's deferral is lifted, the air emission control requirements of the subpart CC standards are likely to be "applicable" to on-site remedial and removal actions that use tanks, surface impoundments, and containers to

manage substances exhibiting characteristics or listed under RCRA as hazardous waste and having an average volatile organic concentration equal to or greater than 100 ppmw. In other cases, the standards may be "relevant and appropriate"; this determination must be made on a site specific basis.

On the other hand, the subpart CC standards do not specify control requirements for wastepiles, landfills, and land treatment units that manage hazardous wastes at TSDF. Therefore, the standards are not likely to be "applicable" to excavation, capping of wastes, land treatment, land farming, in situ treatment activities, and other activities involving wastepiles and landfills at CERCLA sites. Although in most cases the EPA does not expect the subpart CC standards to be "relevant and appropriate" to these types of units at CERCLA sites, remedial and removal actions performed in wastepiles may in some cases be similar in nature and scale to the waste management activities performed in surface impoundments; and waste stabilization may involve the basic process and air emission mechanism regardless of whether the mixing of the waste and binder is conducted in a tank, surface impoundment, container, wastepile, landfill, or land treatment unit. Thus, in some cases the subpart CC standards may be "relevant and appropriate" for such actions; this determination must be made on a site specific basis.

E. Relationship to Clean Air Act Standards

Section 112 of the Clean Air Act (CAA) regulates stationary sources of hazardous air pollutants (HAP). This section was comprehensively amended under Title III of the 1990 Amendments to the CAA. Under the amended CAA section 112(b), Congress listed 189 chemicals, compounds, or groups of chemicals as HAP. The EPA is directed by the CAA to regulate HAP emissions from stationary sources by establishing national emission standards for hazardous air pollutants (NESHAP).

The 1990 Amendments to the CAA required the EPA to develop and publish a list of source categories that emit HAP for which NESHAP will be developed. The EPA published its initial list of NESHAP source categories on July 16, 1992 (refer to 57 FR 31576). Many industrial sectors that may manage hazardous wastes are listed as specific NESHAP source categories. Consequently, facilities at which hazardous wastes are managed may be subject to both NESHAP and the RCRA air standards under 40 CFR part 264 and 265. At these facilities, some waste

management units would be subject to either air emission control requirements under the NESHAP or the air emission control requirements under the RCRA air standards. However, in certain situations, some waste management units would be subject to air emission control requirements under both sets of rules.

The CAA requires that the requirements of standards developed under the Act be consistent, but avoid duplication, with requirements of standards developed under RCRA. Consequently, the EPA is taking into account the air standards promulgated under RCRA section 3004(n) in determining the requirements for NESHAP affecting air emission sources at which hazardous waste could be managed.

F. Relationship to Nuclear Regulatory Commission Standards

Radioactive mixed wastes are wastes that contain radioactive materials as well as materials listed or identified as hazardous under RCRA. Radioactive mixed wastes must be managed in accordance with RCRA regulations, in addition, these wastes also are subject to standards administered by the Nuclear Regulatory Commission (NRC) under the Atomic Energy Act and Nuclear Waste Policy Act of 1982 that address the safe handling and disposal of radioactive waste.

The EPA has previously stated its general position that the management of radioactive mixed waste at TSDF is subject to regulation under subtitle C of RCRA (51 FR 24504, July 3, 1986; 53 FR 37045, September 23, 1988). In developing the RCRA standards applicable to radioactive mixed wastes, the EPA considers the management practices required for these wastes to avoid inconsistencies between the EPA's hazardous waste management requirements and the NRC's radioactive waste management requirements. Furthermore, RCRA section 1006(a) precludes any solid or hazardous waste regulation by the EPA or a State that is "inconsistent" with the requirements of the Atomic Energy Act. Thus, in a case where the regulatory requirements for radioactive mixed waste are conflicting, the NRC requirement takes precedence over the RCRA requirement. Because of the potential that air emission control equipment required by the subpart CC standards promulgated today may conflict with certain radioactive waste management requirements under NRC standards, the EPA has decided to temporarily defer application of the subpart CC standards to tanks, containers, and surface impoundments

which are being used solely to manage radioactive mixed wastes. This deferral is discussed further in section VII.A.1 of this preamble.

V. Basis for Final Rule

A. New Control Options

The EPA developed a national impacts model specific to the air emission sources affected by this rulemaking to compare the human health and environmental protection provided by the different air emission control options. Following proposal of the rule, the EPA revised this model to incorporate new information obtained by the EPA and to address public comments on the impact analysis methodology received at proposal. Section VI.B of this preamble presents a further discussion of the impact analysis revisions.

At proposal, the EPA gave notice that consideration of new results from revisions to the national impacts analysis could lead to selection of any one of the control options considered at proposal or possibly a new control option (56 FR 33516). Upon reviewing preliminary results for the revised national impacts model, the EPA decided to expand the number of control options considered for the final rule.

The EPA first performed a screening evaluation by using the revised national impacts model to estimate the nationwide organic emission and cancer incidence reductions for the original five control option configurations described at proposal (56 FR 33512), plus nine new control option configurations. The EPA included a summary of the impacts model results for these 14 control options in the information listed in the Notice of Data Availability (57 FR 43171) and made available for public inspection at the EPA RCRA Docket Office (refer to RCRA docket entry number F-92-CESA-00018).

The EPA used the screening evaluation results to select a final group of control options selected for further analysis. The EPA eliminated a control option from further consideration if another one of the control options was estimated to provide the same level of nationwide organic emission or cancer incidence reduction but at a lower cost. This is the same control option selection approach the EPA used at proposal.

Based on the screening evaluation results, the EPA selected four control options for further analysis. In addition to the control option used as the basis for the proposed rule, the EPA also analyzed "baseline" impacts. These

"baseline" impacts represent the estimated nationwide organic emissions and other impacts that would occur in the absence of implementing any of the control options. The final group of five control options (designated Options A through E) differ by the value used for the volatile organic concentration limit and the type of air emission controls used for surface impoundments.

Option A requires air emission controls on all TSDF tanks, surface impoundments, and containers managing hazardous waste with any detectable volatile organic concentration as determined at the point where the waste is generated (i.e., a volatile organic concentration action level of 0 ppmw). Under Option A, tanks use a cover vented to a control device except for tanks handling certain hazardous wastes. Tanks in which the organic vapor pressure of the hazardous waste in the tank is less than 10.4 kPa (approximately 1.5 psi) may use a cover without additional controls. All surface impoundments use a cover vented to a control device. Containers use cover and submerged fill for loading hazardous wastes into the containers.

Option B requires air emission controls only on those TSDF tanks, surface impoundments, and containers used to manage hazardous wastes having a volatile organic concentration at the point where the waste is generated equal to or greater than 100 ppmw. The control requirements are the same as described for Option A with one exception; surface impoundments used for storage of hazardous waste and surface impoundments used for treatment of hazardous waste by a process not requiring aeration or agitation of the waste require covers only.

Option C requires air emission controls only on those TSDF tanks, surface impoundments, and containers used to manage hazardous wastes having a volatile organic concentration at the point where the waste is generated greater than 500 ppmw. The air emission control requirements are the same as described for Option B. Option C is the same control option selected as the basis for the proposed rule.

Option D requires air emission controls only on those TSDF tanks, surface impoundments, and containers used to manage hazardous wastes having a volatile organic concentration at the point where the waste is generated greater than 1,500 ppmw. The air emission control requirements are the same as described for Options B and C.

Option E requires air emission controls only on those TSDF tanks, surface impoundments, and containers used to manage hazardous wastes having a volatile organic concentration at the point where the waste is generated greater than 3,000 ppmw. The air emission control requirements are the same as described for Options B, C, and D.

B. Control Option Impacts

The EPA estimated nationwide organic emission and cancer risk reductions that would be achieved if air standards were implemented for each of the five control options. The "baseline" nationwide organic emissions from TSDF are estimated to be approximately 1 million Mg/yr. The estimated nationwide TSDF organic emissions assuming implementation of the individual control options are 30,000 Mg/yr for Option A, 41,000 Mg/yr for Option B, 48,000 Mg/yr for Option C, 51,000 Mg/yr for Option D, and 90,000 Mg/yr for Option E.

To assess the risk of contracting cancer posed by exposure to organic emissions from TSDF, the EPA used two measures of health risk: Annual cancer incidence and maximum individual risk (MIR). The annual cancer incidence parameter represents an estimate of population risk and, as such, measures the aggregate risk to all people in the United States estimated to be living within the vicinity of TSDF. The MIR parameter represents the potential of air emissions from a particular source to cause cancer in the most exposed hypothetical individual under the assumptions used in the risk and exposure assessments.

Estimation of these health risk parameters requires the EPA to make several critical assumptions regarding the TSDF plant configurations and operating practices, the composition of wastes managed at these TSDF, the cancer potency of the organics contained in these wastes, the emission of these organics to the atmosphere from TSDF sources, and the exposure of people living near TSDF to these air toxic emissions. The complex interrelationship of the various assumptions prevents the EPA from definitively characterizing the estimated health risk parameter values as being overestimates or underestimates.

The EPA estimated annual cancer incidence for baseline and the five control options using the EPA's Human Exposure Model (HEM), the site-specific cancer risk factors, and TSDF industry profile data bases. This risk value is based on the estimated number of excess cancers occurring in the

nationwide population after a lifetime exposure (defined to be 70 years). For statistical convenience, the EPA divided the aggregate risk by 70 and expressed the risk as cancer incidence per year. The information provided in RCRA docket entry numbers F-92-CESA-S00014 and S00015 describes the estimation methodology in more detail. The EPA estimates baseline nationwide annual cancer incidence from exposure to TSDF organic emissions to be 48 cases per year. The estimated nationwide TSDF cancer incidences, assuming implementation of the individual control options, are two cases per year for Option A, two cases per year for Option B, four cases per year for Option C, five cases per year for Option D, and nine cases per year for Option E.

The EPA uses the MIR parameter for relative comparisons of pollutants, emission sources, and control alternatives. For the impact analysis, the EPA estimated the MIR parameter assuming that exposure of the individual to the ambient air toxic concentrations occurs for 24 hours per day for a lifetime of 70 years. The EPA realizes that this is a conservative assumption since most people do not spend their entire lives at one location. However, it is completely possible for an individual to live in the same place for his or her entire life. Furthermore, other uncertainties in the analysis could lead to underestimating the risk. For example, the actual exposed subpopulations (such as children or asthmatics) may be more sensitive to the emitted air toxics than the reference adult male for which the unit risk factor extrapolations are based. In addition, the analysis does not address potential indirect exposure pathways to humans, or potential harm to environmental receptors.

The MIR parameter reflects the added probability that a person would contract cancer if exposed continuously over a 70-year period to the highest annual average ambient concentration of the air toxics emitted from a TSDF. Baseline MIR from exposure to TSDF organic emissions is estimated to be 3×10^{-2} . The estimated MIR's, assuming implementation of the individual control options, are: 4×10^{-3} for Option A, 4×10^{-3} for Option B, 2×10^{-2} for Option C, 3×10^{-2} for Option D, and 3×10^{-2} for Option E. These MIR values apply only to the very few TSDF, of the approximately 2,300 TSDF operating in the United States, that are estimated to have the potential to cause the highest risk. The values do not represent actuarially measured risks nor do they apply to all TSDF in the United States.

The EPA is not attempting to estimate any specific individual's potential of developing cancer. Finally, the EPA is not interpreting any of these estimates as indicators of the absolute risks of contracting cancer. Rather, the purpose of this cancer risk assessment, both for incidence and MIR, is to compare relative differences among the individual control options (i.e., "degree" of human health protection).

In addition to estimating organic emissions and cancer risk parameters, the national impacts model provides an estimate of the total nationwide capital costs and annual costs to the TSDF owners and operators to install and operate the air emission controls specified by each control option. For these nationwide cost estimates, the EPA assumed that, at every TSDF location, treatment of all hazardous wastes to remove or destroy the organics in the waste occurs as the last step prior to disposal of the waste. In actuality, the EPA expects that, at many TSDF, the owner or operator (after becoming aware of the air standards) will elect to treat waste at an earlier step in the waste management sequence. By treating organics in compliance with one of the waste treatment alternatives provided in final rule, the owner or operator could avoid the costs of installing and operating control equipment on the downstream tanks, surface impoundments, and containers.

Capital investment cost represents the cost to TSDF owners and operators to purchase and install the air emission control equipment. The estimated nationwide capital costs in 1986 dollars to implement the control options are: \$520 million for Option A, \$290 million for Option B, \$240 million for Option C, \$200 million for Option D, and \$140 million for Option E. Annual cost represents the total cost to TSDF owners and operators each year to pay for operating and maintaining the air emission controls as well as to repay the capital investment for the air emission controls. The capital recovery was estimated using an interest rate of 10 percent applied over a period ranging from 10 to 20 years depending on the expected service life for each type of air emission control equipment. The estimated nationwide annual costs to implement the control options are: \$190 million/yr for Option A, \$110 million/yr for Option B, \$90 million/yr for Option C, \$80 million/yr for Option D, and \$60 million/yr for Option E.

C. Selection Rationale

From Options A through E, the EPA selected one control option to serve as the basis for today's final rule. The EPA

applied the same decision rationale used at proposal for this rulemaking (56 FR 33515-33516, July 22, 1991) as well as for RCRA air standards promulgated under subparts AA and BB to 40 CFR parts 264 and 265 (refer to 55 FR 25470, June 21, 1990). This decision rationale requires the EPA to select, whenever possible, the level of control that provides an acceptable degree of protection of human health and the environment. If no control option is available to achieve acceptable levels of protection, the EPA's approach historically has considered cost under RCRA only for equally protective control options.

All five of the control options considered for the final rule are estimated to achieve similar levels of substantial reductions in nationwide organic emissions from TSDF. The nationwide organic emission reductions for the control options are estimated to be approximately 970,000 Mg/yr for Option A, 960,000 Mg/yr for Option B, 950,000 Mg/yr for Option C, 950,000 Mg/yr for Option D, and 910,000 Mg/yr for Option E.

Both Options A and B are estimated to achieve the lowest cancer MIR and greatest reduction in annual cancer incidence of the five options. However, none of the control options reduces MIR to the target cancer risk levels used for other promulgated RCRA standards, which have been in the range of 1×10^{-4} to 1×10^{-6} . The estimated MIR is an order-of-magnitude higher for Options C, D, and E (2×10^{-2} for Option C, 3×10^{-2} for Options C and D) compared to Options A and B (4×10^{-3}). Annual cancer incidence reductions estimated for Option C (44 cases per year), Option D (43 cases per year), and Option E (39 cases per year) are lower than the annual cancer incidence reductions estimated for Options A and B (46 cases per year).

On the basis of the estimated annual cancer incidence and MIR, the EPA concluded that Options A and B are more protective of human health than Options C, D, or E. Therefore, the EPA eliminated Options C, D, and E from further consideration as the basis for the final rule.

Both Options A and B are estimated to achieve the same level of cancer risk reduction (MIR to 4×10^{-3} and annual cancer incidence to two cases per year). Therefore, the EPA concluded that Options A and B are equally protective of human health and the environment (to the extent ascertainable by this modelling methodology). Historically under RCRA, the EPA has considered control option costs only to select between options estimated to achieve

equivalent levels of protection.

Therefore, to select between Options A and B, the EPA compared the estimated costs to implement each of the control options. Option B requires the use of air emission controls only on those TSDF tanks, surface impoundments, and containers used to manage hazardous wastes with a volatile organic concentration at the point where the waste is generated equal to or greater than 100 ppmw. Because TSDF owners and operators would need to install and operate air emission controls on fewer TSDF tanks, surface impoundments, and containers, Option B would be less expensive for the TSDF industry to implement than Option A. Therefore, the EPA selected Option B as the basis for the final rule.

While Option B does not achieve the target MIR levels historically used for other promulgated RCRA rules, Option B does achieve substantial reductions in cancer risk. The annual cancer incidence is estimated to be reduced by greater than 95 percent from the baseline value. Furthermore, the MIR for most of the 2,300 TSDF nationwide are estimated to achieve the target MIR levels. To address the remaining cancer risk at TSDF after implementation of the air standards promulgated today, the EPA is further evaluating the waste management practices and the specific chemical compounds composing the organic emissions from those individual TSDF for which the MIR values are estimated to be greater than the historical RCRA target MIR levels. Following this evaluation, the EPA will determine what other actions, such as the use of section 3005(c)(3) omnibus permitting authority or additional rulemaking, are necessary to attain the health-based goals of RCRA section 3004(n).

VI. Summary of Responses to Comments on Proposed Rule

All of the comments on the proposed rule and the EPA's response to each of these comments is presented in "Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)—Background Information for Promulgated Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers". EPA document number EPA-453/R-94-076b (to obtain a copy of this document refer to the ADDRESSES section of this preamble). The EPA's responses to topics addressed by many of the commenters are summarized below.

A. Development of Air Standards Under RCRA

Comment: Many comments were received regarding the extent to which the congressional directive of RCRA section 3004(n) should be implemented using air standards established by the EPA under Clean Air Act (CAA) authority. Commenters stated the position that protection of human health and the environment from TSDF air emissions is most appropriately, effectively, and efficiently addressed by developing air standards under the CAA authority. Therefore, commenters believe that the EPA should make the determination that the requirements of RCRA section 3004(n) are best fulfilled by deferring to air standards established under CAA authority. Commenters stated that the air standards proposed by the EPA under authority of RCRA section 3004(n) are:

- (1) Not needed because existing CAA programs adequately address the control of TSDF organic emissions;
- (2) Duplicative or contradictory of new programs now being implemented by the EPA to control hazardous air pollutants as directed by section 112 of the CAA;
- (3) Not in compliance with RCRA section 1006(b) regarding duplication or contradiction of CAA requirements;
- (4) Inconsistent with CAA programs that establish ozone precursor control requirements depending on the national ambient air quality standards attainment status of the region in which a source is located;
- (5) Inconsistent with the EPA's pollution prevention policy;
- (6) Contrary to the EPA's "cluster concept" of examining and coordinating regulations addressing the same emission source to minimize duplicative or contradictory requirements; and
- (7) Difficult to administer and enforce because, traditionally, one State regulatory agency administers rules regulating air emissions while another administers rules regulating hazardous waste management.

Response: The Hazardous and Solid Waste Amendments to RCRA added section 3004(n), which directs the EPA to " * * * promulgate regulations for the monitoring and control of air emissions from hazardous waste treatment, storage, and disposal facilities, including but not limited to open tanks, surface impoundments, and landfills, as may be necessary to protect human health and the environment." The EPA considers the most appropriate, effective, and efficient way to fulfill this congressional mandate is to develop air

standards for TSDF that are implemented under the existing RCRA subtitle C permitting program already in place for these facilities. However, the EPA disagrees with one commenter's assertion that, in establishing these RCRA air standards, the EPA cannot consider the impact of air standards promulgated or currently being developed under other statutory authorities such as the CAA. On the contrary, RCRA section 1006(b) requires the EPA to coordinate its regulations under RCRA statutes and to avoid duplication, to the maximum extent practicable, with appropriate provisions of the CAA.

The EPA disagrees that the requirements of RCRA section 3004(n) are best fulfilled by deferring to air standards established under CAA authority. There is no indication that Congress intended for air standards to be issued only within the authority granted to the EPA by the CAA. If this was the case, then Congress would not have amended RCRA section 3004(n) under HSWA after Congress had already authorized the EPA to control air emissions under the CAA. Refer to S. Rep. No. 284, 98th Cong. 1st sess. 63. Thus, both RCRA and the CAA authorize the EPA to control air emissions from TSDF.

Although historically many standards promulgated by the EPA under authority of RCRA have addressed the prevention of soil and water contamination from improper management of hazardous waste, the EPA is not limited by RCRA to promulgating standards only for certain media (e.g., surface waters, groundwater, and soils). Indeed, RCRA section 3004(n) specifically directs the EPA to issue regulations controlling air emissions from TSDF as necessary to protect human health and the environment.

The selection of TSDF air emission sources for control by establishing air standards under RCRA section 3004(n) is based on controlling those TSDF air emission sources determined by the EPA to have significant toxic and ozone precursor emission potential but for which emission control is not adequately addressed by other standards promulgated by the EPA such as NESHAP and NSPS established under the CAA. At proposal, the EPA concluded that additional air emission control requirements for TSDF tanks, surface impoundments, and containers are needed. This decision was based on the EPA's determination that existing and future Federal standards under the CAA and State air standards do not

adequately address the control of TSDF organic air emissions.

As previously described in section III.E of this preamble, CAA section 112 has been amended by Congress since RCRA section 3004(n) was enacted. Section 112 of the CAA as amended requires the EPA to identify major sources and area sources of HAP emissions and to develop NESHAP for these sources. To date for this air standards development program, the EPA has either promulgated or proposed several NESHAP that may apply to some hazardous waste management activities at TSDF. However, in general, these NESHAP added requirements to address HAP emissions from certain waste and material recovery operations that are not subject to or exempted from regulation under the RCRA air standards in 40 CFR parts 264 and 265. Thus, the NESHAP and other air standards being developed under CAA are not intended to duplicate the RCRA air standards, but instead to integrate with the RCRA air standards to create a comprehensive air program for addressing organic air emissions from all waste and related material recovery operations.

For example, on-site wastewater treatment operations at synthetic organic chemicals manufacturing industry (SOCMI) facilities are regulated under the hazardous organic NESHAP ("the HON") promulgated on April 22, 1994 (see 59 FR 19402). At many of these facilities, the hazardous wastewaters generated by process units and resulting wastewater treatment sludges are managed in tank systems that are exempted from RCRA permitting requirements under provisions in 40 CFR 264.1(g)(6) or 40 CFR 265.1(c)(10). Thus, the air emission control requirements under the HON, in most cases, affect wastewater treatment tanks not subject to the RCRA air standards.

A second example is the recently proposed NESHAP for off-site waste and recovery operations (59 FR 51913, October 13, 1994). This NESHAP would apply to owners and operators of facilities, with certain exceptions, that manage wastes or recoverable materials which have been generated off-site at another facility and contain specific organic HAP. The rule would apply to operations managing solid wastes as defined under RCRA (hazardous and nonhazardous wastes) as well as operations handling recovered materials excluded from the RCRA definition of solid waste (e.g., recycled materials containing organic HAP, used oil reprocessed for sale as a fuel). As a result, certain off-site waste and recovery operations with organic HAP

emissions, but exempted from regulation under the RCRA air standards, would be required to use air emission controls under this NESHAP.

In contrast to the NESHAP now being developed under CAA section 112, the EPA has already achieved progress toward full implementation of RCRA section 3004(n), which requires a "cradle to grave" approach to hazardous waste management that addresses protection of air, water, and groundwater. Air standards have been promulgated for TSDf treatment process vents (subpart AA in 40 CFR parts 264 and 265) and for TSDf process equipment leaks (subpart BB in 40 CFR parts 264 and 265) in addition to the development of these air standards for TSDf tanks, surface impoundments, and containers. There is no benefit to delaying implementation of air standards for TSDf tanks, containers, and surface impoundments to a future rulemaking under amended CAA section 112 when the EPA can proceed now with the promulgation of effective air standards under RCRA section 3004(n) for these air emission sources.

The RCRA air standards adopted today do comply with RCRA section 1006(b). This section requires that the air standards be consistent with and not duplicative of CAA standards. Although RCRA section 1006(b) requires some accommodation with existing regulatory standards, it "does not permit the substantive standards of RCRA to be compromised." *Chemical Waste Management v. EPA*, 976 F.2d at 23 (D.C. Cir. 1992). It is obviously reasonable for the EPA to view the RCRA section 3004(n) mandate as a standard which cannot (or at least need not) be compromised. Similarly, the CAA Amendments of 1990 require that air standards developed under the CAA be consistent with RCRA rules. To conform with the dual RCRA and CAA requirements that standards be consistent, the air standards developed under RCRA section 3004(n) do not duplicate or contradict existing NESHAP or NSPS.

The EPA is fully aware that at many facilities where hazardous wastes are managed, the RCRA air standards under 40 CFR part 264 and 265 as well as NESHAP and NSPS for specific source categories may be applicable to a particular TSDf. Certain testing, monitoring, inspection, recordkeeping, and other requirements under the RCRA air standards may be similar to or duplicative of requirements under the applicable NESHAP or NSPS. In many cases at a TSDf, individual waste operations will be subject to either the air emission control requirements under

the RCRA air standards or the air emission control requirements under the applicable NESHAP or NSPS. Thus, it is necessary to include testing, monitoring, inspection, recordkeeping, and other implementation requirements in each rule to assure compliance with and enforcement of the rule. However, in certain situations, some individual waste operations at a TSDf could be subject to air emission control requirements under both the RCRA air standards as well as a NESHAP or NSPS. In such cases, the EPA believes it is unnecessary for owners and operators of these waste management units to conduct duplicative waste testing, keep duplicate sets of records, or perform other duplicative actions to demonstrate compliance with both sets of rules. Therefore, to be consistent with RCRA section 1006(b) to the maximum extent practicable, the EPA is coordinating the testing, recordkeeping, reporting, and other implementation activities required under the RCRA air standards and related rules developed under the CAA. The EPA has requested public comment in a related proposed NESHAP rulemaking (the off-site waste and recovery operations NESHAP; see 59 FR 51919, October 13, 1994) on how the applicable requirements included in the RCRA air standards should be incorporated into CAA rules being developed by the EPA for waste and recovery operations that will allow owners and operators subject to both sets of rules to demonstrate compliance with all applicable rules without having to repeat the duplicative requirements.

Nevertheless, RCRA section 1006(b) cannot be used to ignore key elements of RCRA; see *Chemical Waste Management v. EPA*, 976 F.2d at 23. In this case, Congress has indicated that TSDf air emissions need to be controlled on the RCRA timetable, not that of the CAA. Deferring totally to the CAA would vitiate this key RCRA requirement. [See also RCRA section 3004(q) and CAA section 112(n)(7) in which Congress indicated that pendency of CAA air standards for RCRA units does not vitiate RCRA requirements.]

The EPA's approach to developing air standards for TSDf under RCRA is consistent with CAA programs to achieve attainment and to maintain national ambient air quality standards (NAAQS). The NAAQS specify limits to pollutant concentrations in the ambient air to protect public health and welfare. A NAAQS has been established for ozone. Ambient ozone concentrations in many metropolitan regions of the United States exceed the NAAQS. Organic emissions from TSDf as well as

other sources react photochemically with other chemical compounds in the atmosphere to form ozone. The CAA requires that States develop and the EPA approve air emission control plans called "State implementation plans" (SIP's). For those regions within a State that are in nonattainment with the NAAQS for ozone, the SIP specifies the standards and other control measures to be implemented by the State to attain the NAAQS. However, the CAA requires the EPA not only to implement programs to attain the NAAQS in nonattainment areas but also to maintain, and prevent significant deterioration of, the air quality in those areas of the Nation currently in attainment with the NAAQS. Consequently, in addition to the CAA control programs to address specific regional NAAQS attainment problems, the EPA also develops under the CAA authority minimum national emission standards applicable to stationary sources independent of whether the source is located in a NAAQS attainment or nonattainment area. The EPA considers the subpart CC standards to be reasonable national standards needed to control emissions of air toxics as well as to attain and maintain NAAQS for ozone.

The subpart CC standards are consistent with the EPA's pollution prevention policy. Pollution prevention involves reducing the quantity of pollution produced for a given quantity of product prior to recycling, treatment, or control of emissions. Activities defined as source reduction measures in the Pollution Prevention Act include technology modifications, process and procedure modifications, reformulation or redesign of products, and substitution of raw materials. A decrease in production alone does not qualify as pollution prevention. Under the subpart CC standards, a TSDf owner or operator is not required to manage a hazardous waste in a tank, surface impoundment, or container using the specified air emission controls in cases when the owner or operator determines that the organic content of all hazardous waste placed in the unit meets certain conditions specified in the rule. Thus, the subpart CC standards encourage pollution prevention by providing an incentive to generators to initiate source reduction measures that will reduce the concentration of organics in a hazardous waste.

The development of TSDf air standards under RCRA is not contrary to the EPA's "cluster" approach of examining and coordinating regulations addressing the same emission source to minimize duplicative or contradictory

requirements. The different EPA Offices responsible for implementing RCRA and CAA requirements are coordinating the development of this rulemaking to ensure that subpart CC standards are compatible with other rules and programs applicable to TSDF owners and operators.

The air emission control requirements for tanks under the subpart CC standards incorporate provisions of NSPS that were promulgated under the authority of the CAA and apply to storage tanks constructed or modified after July 23, 1984, that contain volatile organic liquids (40 CFR part 60, subpart Kb). Therefore, air emission controls already in use on a TSDF tank in compliance with 40 CFR part 60, subpart Kb will comply with air emission control requirements of the subpart CC standards. Also, the subpart CC standards for closed-vent systems and control devices cross reference the requirements for closed-vent systems and control devices promulgated under subpart AA in 40 CFR parts 264 and 265. The subpart AA requirements are consistent with the requirements for closed-vent systems and control devices under several CAA air standards.

The implementation of air standards under RCRA does not create difficulties in administration and enforcement of the rules by State regulatory agencies. Although many existing RCRA standards focus on preventing the contamination of soil and water, other existing RCRA regulations regulate air emissions from some TSDF sources (e.g., combustion of hazardous waste is regulated under 40 CFR part 264, subpart O for hazardous waste incinerators and under 40 CFR part 266 subpart H for boilers and industrial furnaces). Air emissions are also sometimes addressed through the EPA's omnibus permitting authority under RCRA section 3005(c)(3). States authorized by the EPA administer and enforce the requirements of RCRA rules in lieu of the EPA administering the rules in that State. The EPA is aware that, in many States, one State agency administers air standards while another State agency administers rules regulating the management of hazardous waste in the State. Similarly, it is common for yet another State agency to administer water quality rules. The experience of authorized States administering existing RCRA rules shows that responsibility for administering these rules can be delegated to a separate State agency without impeding the administration and enforcement of non-RCRA air and water rules by other State agencies.

B. Revised Impacts Analysis

Comment: The commenter on the Notice of Data Availability (NDA) (57 FR 43171, September 18, 1992) supports the EPA's use of the updated waste data base for the national impacts analysis and the EPA's changes to the emission models for biological treatment processes. In addition, the commenter agrees with the EPA's conclusion that many surface impoundments reported in the waste data base to be managing waste at TSDF have been or are being replaced with tanks to comply with the RCRA land disposal restriction and other regulations. However, the commenter believes that the EPA's assumption that 75 percent of the total waste quantity reported in the waste data base to be managed in surface impoundments is now managed in tanks is too low. The commenter agrees with the EPA's revised approach in the impact analysis of using site-specific cancer risk factors to estimate cancer risk due to exposure to TSDF emissions. However, the commenter states that some of the specific assumptions made by the EPA for the risk analysis are implausible (e.g., assuming exposure of the individual for 70 years) and the analysis should be conducted in accordance with the EPA's own Exposure Assessment Guidelines. Finally, the commenter does not believe that any MIR estimate is necessary to assess the need for and effectiveness of the rule.

Response: For the national impacts analysis, the EPA believes that 75 percent is a reasonable assumption for the amount of waste that is converted from surface impoundment to tank management. As discussed further in the BID for the final rule, the EPA selected the 75 percent value based on information obtained by the EPA from a telephone survey of owners and operators of large TSDF and from TSDF site visits as well as information provided to the EPA by several TSDF owners and operators in comments on the proposed rule. The EPA did not find nor receive any additional information from the commenter that justifies increasing the percentage of waste converted from surface impoundment to tank management.

The cancer risk impact analysis for this rulemaking was conducted in accordance with the EPA's Exposure Assessment Guidelines. With regard to the 70 year lifetime assumption used in the impact analysis, the EPA believes 70 years to be conservative, but plausible. The EPA did however conduct a second risk assessment assuming a 33 year exposure scenario (95 percentile). Using

this assumption reduced risk estimates by one-half, but did not change the decision to control these facilities, nor the choice of control options. Furthermore, the risk assessment conducted here was for the purpose of determining relative differences in risk estimates between the control options. For this application, the exposure scenario would not matter; the results, i.e., the relative differences in risk estimates, would not change.

The EPA holds that the assumptions used to determine the MIR are, as with the 70 year exposure scenario, conservative, but plausible, and result in a reasonable overall estimate of risk. In addition, while the EPA acknowledges the uncertainties associated with the MIR, such uncertainties cancel out when the risk assessment is used to discern relative risk, as in this case. Thus the EPA believes that the use of the MIR is an appropriate tool to apply in the impact analysis for this rulemaking to both estimate risk and to discern differences between risk estimates associated with the various control options.

C. Container Air Standards

Comment: Many commenters disagree with the EPA's decision to require air emission controls for containers under the subpart CC standards. One group of commenters argues that the organic emission potential from TSDF containers does not warrant the application of additional controls beyond those already required by existing RCRA standards. A second group of commenters contends that TSDF containers should not be subject to this rulemaking because the EPA analysis does not show organic emissions from TSDF containers to be a significant emission source warranting controls.

Response: The EPA maintains that the management of organic-containing wastes in containers at TSDF is a potentially significant source of organic emissions that is not adequately regulated by existing regulations. Control requirements for containers under the subpart CC standards are needed to:

- (1) Ensure that containers used for storage of organic-containing waste use covers effective for organic emission control;
- (2) Control organic emissions from treatment of organic-containing wastes in containers by waste stabilization and other processes; and
- (3) Prevent circumvention of the containment and control strategy that serves as a key component of the

integrated approach to implementing RCRA section 3004(n).

The EPA disagrees with the commenters' conclusion that existing regulations are sufficient to control organic emissions from containers used to manage hazardous waste at TSDF. Existing RCRA regulations under 40 CFR 264.173 require containers used to store hazardous waste at TSDF to be closed except when necessary to add or remove waste. This requirement for closed containers during storage does not specify organic air emission controls for these covers. Furthermore, no RCRA requirements exist that address organic emissions associated with other container operations such as hazardous waste transfer or treatment in open containers.

The EPA also disagrees with the commenters' conclusion that managing hazardous wastes in containers is not a significant potential source of organic air emissions. The baseline analysis to estimate nationwide TSDF organic emissions by waste management category is not the only factor that the EPA considered in assessing the organic emission potential of containers. The revised nationwide baseline emissions from storage of hazardous waste in TSDF containers is estimated to be approximately 5,000 Mg/yr. However, this emission estimate for containers does not include organic emissions from hazardous waste treatment in containers. As described in the BID for the final rule, the EPA estimates the total organic emissions from waste fixation operations performed in containers to be approximately 11,000 Mg/yr. Information obtained by the EPA representatives during site visits to TSDF conducting waste fixation operations indicates that use of containers for waste fixation continues to be a common industry practice. Thus, treatment of hazardous waste in containers is a large potential source of organic emissions that is not regulated by the existing RCRA regulations.

The air emission control requirements for the subpart CC standards are based on applying a containment and control strategy to TSDF tanks, surface impoundments, and containers from generation of the waste through treatment of the waste to remove or destroy the organics in the waste. Requiring control of only TSDF tanks and surface impoundments but not containers creates a significant potential organic emission source if large quantities of hazardous waste currently stored or treated in tanks required to use air emission controls under subpart CC standards are transferred to containers not using air emission controls. This

would allow organics in the hazardous waste managed in uncontrolled containers to escape to the atmosphere prior to treatment and, thus, reduce the effectiveness of the containment and control approach.

D. Generator 90-Day Tanks and Containers

Comment: Many commenters disagree with the EPA's decision to apply the proposed air standards to 90-day tanks and containers for the following reasons:

(1) The EPA is not authorized under RCRA section 3004(n), or under other provision, to extend the air standards to 90-day tanks and containers;

(2) The proposed rule failed to cite authority to extend the requirements to 90-day tanks and containers, in violation of section 553(b)(2) of the Administrative Procedures Act;

(3) If the EPA imposes air emission controls on generators, this must be accomplished pursuant to the pre-HSWA authorization process and thus should not become effective in authorized States until enacted and implemented as State law; and

(4) Application of air emission control requirements to 90-day tanks and containers impermissibly interferes with manufacturing processes.

Response: The EPA disagrees with each of these comments. The provisions of 40 CFR 262.34 (promulgated under the authority of RCRA section 2002, 3001-3005, and 3007) allow generators to accumulate hazardous waste in tanks and containers for specified time periods without obtaining RCRA permits, provided the generator meets certain conditions. Amending these conditions is a valid exercise of the EPA's authority under RCRA section 3004(n).

The intent of including the provisions of 40 CFR 262.34 in the RCRA requirements for hazardous waste generators is to obtain a reasonable balance between the Congress's desire not to interfere with the generator's manufacturing or production processes with the need to provide adequate protection of human health and the environment (45 FR 12730, February 26, 1980). Thus, 40 CFR 262.34 does not provide a hazardous waste generator with a complete exemption from all RCRA requirements. On the contrary, it incorporates most of the relevant tank and container requirements under 40 CFR part 265 and requires compliance with these standards as a condition for maintaining RCRA permit-exempt status [refer to 40 CFR 262.34(a)(1)]. The intent of these provisions is not to exclude 90-day tanks and containers from future

technical TSDF requirements.

Therefore, it is wholly appropriate for the EPA to update the technical requirements for tanks and containers that serve as the basis for the RCRA permit exemption. The EPA has already done so, for example, when tank standards were amended in 1986.

Although 90-day tanks and containers are not required to be permitted under RCRA subtitle C, the EPA rejects the commenters' narrow reading of RCRA section 3004(n) as limiting the EPA's authority to extend the requirements to these units. Section 3004(n) of RCRA requires the EPA to promulgate standards for the control of air emissions from "hazardous waste treatment, storage, and disposal facilities." The EPA does not agree that RCRA section 3004(n) reflects a congressional intent that the EPA regulate air emissions only from permitted and interim-status TSDF and not from 90-day tanks and containers. These tanks and containers are physically identical (i.e., the same types of tanks and containers are used by generators to accumulate and by TSDF owners and operators to store and treat waste). There is no environmental basis for not considering them subject to the section 3004(n) mandate. Such units are, in fact, storing or treating hazardous waste and are subject to numerous standards promulgated under the authority of both RCRA sections 3002 and 3004. The exemption of 90-day tanks and containers from the permitting requirements of RCRA subtitle C is regulatory, not statutory; there is no directive in the RCRA legislation that precludes the EPA from imposing any or all of the TSDF requirements on them. The use of the term "facility" in RCRA section 3004(n) can certainly be read to encompass 90-day tanks and containers, given the EPA's flexibility to construe that term (see *United Technologies v. EPA*, 821 F.2d at 814 (D.C. Cir. 1988) and the fact that 90-day tanks and containers are already subject to the substantive standards for tanks and containers and pose precisely the same potential environmental risks as other tanks and containers holding hazardous waste. In addition, the EPA sees to reason that Congress intended 90-day tanks and containers to be subject to air emission controls at a different time than other tanks and containers (which would be the case if the 90-day units are not regulated pursuant to a HSWA provision).

Therefore, it is proper for the EPA to use its authority under RCRA section 3004(n) to amend 40 CFR 262.34(a) by adding air emission control

requirements to the conditions required for a 90-day tank or container to be exempted from the RCRA permitting requirements. For these reasons, the EPA rejects the commenters' arguments that the Agency is not authorized or failed to cite authority to use this rulemaking to amend the exemption requirements for 90-day tanks and containers. In addition, the EPA rejects the argument that the exemption requirements are under the EPA's pre-HSWA authority and, therefore, are not applicable in authorized States until the individual States are authorized to implement the rule (See 51 FR 25464, July 14, 1986, where the EPA indicated that the modifications to 40 CFR 262.34, to reflect amended tank standards, were HSWA rules).

As a variation of the argument that 90-day tanks and containers should not be regulated, one commenter asserts that RCRA section 3004(n) reflects a congressional intent that the EPA regulate air emissions only from permitted and interim-status TSDF and not from 90-day tanks and containers. The commenter apparently argues that the explicit inclusion of such authority under RCRA section 3004(n) and not under RCRA section 3002 implies a congressional finding that waste accumulation does not significantly contribute to air pollution. The EPA finds no indication, in the legislative history of RCRA, or elsewhere, that Congress ever made such a finding, and the EPA's conclusion, as discussed later in this section, is that on-site accumulation of hazardous waste in 90-day units is a significant source of organic air emissions. Again, the EPA finds no indication that Congress intended to preclude the EPA from regulating air emissions from nonpermitted hazardous waste storage and treatment under RCRA section 3004(n).

In addition to RCRA section 3004(n), the EPA has authority under RCRA section 3002 to amend 40 FR 262.34(a). One commenter states that, although RCRA section 3002(a)(3) authorizes the EPA to require the use of appropriate containers, RCRA section 3002 provides no authority to regulate air emissions. The EPA disagrees with this statement. The RCRA section 3002(a)(3) authority, as well as the general authority under RCRA section 3002 to promulgate such rules regulating generators "as may be necessary to protect human health and the environment," is broad enough to encompass the regulation of air emissions from units storing or treating hazardous waste at generator facilities.

Finally, the EPA cited both RCRA sections 3002 and 3004 as the statutory

authority for the proposed rule. Therefore, this rulemaking is in full conformance with section 553(b)(2) of the Administrative Procedures Act.

The EPA also rejects the argument that the application of air emission controls to 90-day tanks and containers impermissibly interferes with manufacturing processes. The EPA concluded in 1980, as cited above, that the appropriate balance between protection of the environment and noninterference with manufacturing processes was achieved by requiring 90-day tanks and containers to comply with certain technical requirements as a condition of being exempt from the requirement to have a RCRA permit. The EPA estimates that nationwide baseline organic emissions from 90-day tanks and containers are approximately 76,000 Mg/yr. Given the significant organic emissions from 90-day tanks and containers, the same rationale has led the EPA to require that these units comply with the appropriate air emission control requirements of the subparts AA, BB, and CC standards to maintain an exemption from RCRA permitting. In contrast, the EPA decided not to extend under this rulemaking the requirements of these air standards to containers used for satellite accumulation because of the widespread use of these containers by manufacturing process operators to collect small quantities of hazardous waste as generated, and the integrated use of these containers with the manufacturing operations (discussed further in section 7.2 of the BID for today's rule). The EPA believes that this regulatory framework maintains the appropriate balance between environmental protection and noninterference with manufacturing processes.

E. Implementation of RCRA Air Standards

Comment: A total of 24 commenters addressed the EPA's proposed action of modifying the "permit-as-a-shield" practice to require that owners and operators of TSDF that have been issued final permits prior to the effective date of this rulemaking comply with the air standards under 40 CFR 265 subparts AA, BB, and CC until the facility's permit is reviewed or reissued by the EPA. Four of the commenters support the EPA's proposed modification. The other 20 commenters oppose the proposed modification and maintain that "permit-as-a-shield" practice should remain unchanged because any action by the EPA to remove this practice:

(1) Is without the legal authority and that to do so would be contrary to congressional intent;

(2) Violates the due process rights of permittees, which are normally protected through the permit process;

(3) Negates the purpose and importance of the RCRA permit because the "permit-as-a-shield" practice serves to unify all the regulatory requirements in the permit for a TSDF;

(4) Is contrary to previously stated policy whereby the EPA binds itself to the principle of using "permit-as-a-shield" (45 FR 33290, May 19, 1980); and

(5) Is disruptive to TSDF owner and operator planning, burdensome to comply with, and has an adverse effect on the availability and cost of control equipment.

Response: The practice known as "permit-as-a-shield" is derived from an exercise of the EPA's regulatory authority and was first codified in the 1980 implementing regulations of the RCRA permit program (45 FR 33290, May 19, 1980). It is not a provision of RCRA and is therefore no part of the statutory mandate by Congress to manage the Nation's hazardous wastes. *Shell Oil v. EPA*, 950 F.2d at 741, 762 (D.C. Cir. 1991). Because it is a regulatory and not a statutory provision, the EPA can modify the "permit-as-a-shield" practice in any situation where the Agency determines that the practice does not serve the EPA's mandate to protect human health and the environment. For the final subpart CC standards, the EPA estimates that baseline nationwide excess cancer incidence resulting from exposure to TSDF organic emissions is 48 cases per year. In addition, total nationwide organic emissions from TSDF are estimated to be approximately 1 million Mg/yr and, thus, contribute significantly to the formation of atmospheric ozone. These health and environmental impacts are very high relative to the impacts of emissions from other sources regulated under RCRA and the CAA. Accordingly, the EPA has determined that the health and environmental impacts resulting from organic air emissions from TSDF are of a magnitude to warrant narrowly rescinding the "permit-as-a-shield" practice for this limited case.

The "permit-as-a-shield" practice is not a consequence of Constitutional or statutory obligations of the EPA to any individual and its removal does not violate any substantive or procedural due process rights of individuals. The "permit-as-a-shield" practice was established by regulations promulgated by the EPA and therefore can be

modified when the EPA determines it is necessary to do so for the protection of human health and the environment. Numerous government regulations have a direct effect on regulated entities, and the EPA's "permit-as-a-shield" practice does not vest the regulated community with a right to a variance from all new RCRA regulations. Furthermore, the proposal put the public on notice that the EPA was planning to modify the "permit-as-a-shield" practice in this rule, and the public has therefore had an opportunity for meaningful comment on the issue.

The EPA continues to believe that the permit process and requirements are fundamental components of the RCRA program and that, by and large, compliance with the permits should constitute compliance with the RCRA program. For the other rulemakings for which the EPA rescinded the "permit-as-a-shield" practice, the EPA determined that the risk to human health and the environment was too high to allow the practice to continue (for remaining permit periods), and required that all TSDf comply with the new requirements regardless of their permit status. The EPA has determined that allowing owners and operators of permitted TSDf to be shielded from compliance with the regulatory requirements of subparts AA, BB, and CC standards will allow excessively high risks. Today's action by the EPA does not negate the value of the RCRA permit program or the "permit-as-a-shield" practice. Instead, the EPA is making a distinction between a provision that is sufficiently protective in most cases and one that, under specific situations, is not sufficiently protective.

The EPA disagrees with the commenters' claims that the permit modification process can adequately accommodate the timely implementation of the subpart CC standards. For the EPA to apply the subpart CC standards into permits by way of modifications would require a significant and unreasonable resource commitment. Furthermore, the fact that existing permits can be modified to incorporate new regulatory requirements [per 40 CFR 270.41(a)(3), which implements RCRA section 3005(c)(3)] shows that "permit-as-a-shield" is hardly an inviolate principle. The rulemaking simply accomplishes nationally what a modification would accomplish individually. Accordingly, the EPA developed the subpart AA, BB, and CC standards to be "self-implementing" so that State and Regional permit writers will not be required to reopen and rewrite permits

to incorporate the provisions. Permitted facilities will be able to comply directly with the regulatory standards in the same way that interim-status facilities must comply. Modifying "permit-as-a-shield" for these rules eliminates any confusion or ambiguity as to which TSDf is subject to the requirements.

As noted by the commenters, the EPA stated a policy for "permit-as-a-shield" in the so-called consolidated permit regulations issued in 1980 (45 FR 33290). However, this does not mean that the policy for "permit-as-a-shield" can never be amended. The EPA has never agreed to "bind" itself to any particular policy or provision. Instead, the EPA may adhere to a general practice or policy with the understanding that, if the circumstances warrant and the EPA provides a rational explanation, it can modify or rescind a particular provision. It should be noted, for example, that Congress has since amended RCRA to require that air emissions from TSDf be controlled, and in the same amendments provide that the EPA may reopen permits to add conditions reflecting new control practices and to redress potential risks posed by the facility (RCRA section 3005(c)(3) and S. Rep. No. 284, 98th Cong. 1st Sess. at 31). Here, the EPA is determining that there are excessively high risks from these facilities, and therefore that these more protective provisions should become effective immediately.

It should also be noted that the EPA does not intend to rescind "permit-as-a-shield" on a regular or frequent basis for other rulemakings. As stated earlier, the EPA generally does view "permit-as-a-shield" as a beneficial and legitimate part of the RCRA program and that, in most cases, it will apply.

The EPA believes that the commenters claiming that removing "permit-as-a-shield" will be disruptive to TSDf implementation planning are greatly overstating the adverse or disruptive effects that an accelerated implementation will have on TSDf owner and operator planning and operations because the control technologies for the different kinds of management units are varied and widely available. The EPA specifically considered the costs and economic impacts of the various control options in the regulatory impact analysis for the proposed rule (RCRA docket entry number F-91-CESP-S00494). Based on this analysis, the EPA found that the costs of installing and operating air emission control equipment required by the control options are projected to be less than 1 percent of the total cost of hazardous waste management at TSDf.

Any air emission control equipment supply availability constraints resulting from these rules should be short term, if at all. Furthermore, TSDf owners and operators required to install air emission control equipment to comply with the subpart CC standards are allowed up to an additional 30 months after the rule's effective date to complete the equipment design and installation if they can document that the air emission controls cannot be installed and operating by the effective date, for reasons such as the unavailability of control equipment.

Also, the EPA expects that many TSDf owners and operators will choose to treat their hazardous waste earlier in the management sequence that they now do to reduce the organic content of the waste in accordance with one of the treatment requirements allowed for in the final subpart CC standards, and thus avoid the cost of installing and operating the control equipment on the downstream tanks, surface impoundments, and containers. The EPA also encourages the use of pollution prevention techniques as a means of reducing the quantity of waste generated, the organic concentration of the waste, or the toxicity of constituents in the waste.

F. Waste Stabilization in Tanks

Just prior to the long-scheduled and publicly-known promulgation date, representatives from the hazardous waste treatment industry notified the EPA of their opinion that the draft requirements for waste stabilization operations performed in tanks are economically and technically infeasible. These draft requirements are included in a May 19, 1994 interim review draft of the final rule, made publicly available in June 1994. (See RCRA docket entry number F-94-CESP-S00509.) Moreover, the industry indicated that volatilization of organic constituents during stabilization operations are negligible. No data were submitted to the EPA in support of these assertions. Industry representatives nevertheless feel strongly that for the majority of waste streams treated by stabilization, the organic constituents in the waste are not volatilized during the stabilization process. Additionally, they allege that for these same stabilization operations:

- (1) It is technically infeasible to comply with the air emission control requirements for tanks in the subpart CC standards; and
- (2) It is not feasible to treat organic waste prior to stabilization such that the volatile organic concentration of the waste entering the stabilization process would be below 100 ppmw, and the

downstream units managing the waste (including the stabilization tanks) would thereby be exempt from subpart CC tank control requirements. (See RCRA docket number F-94-CESF-FFFFF.)

These statements contradict the conclusions drawn by the EPA based on site visits to observe hazardous waste stabilization processes, and experiments and studies conducted by the EPA to characterize waste stabilization processes and estimate associated organic emissions. The most recent EPA studies were mentioned in the Notice of Data Availability (see 57 FR 43171, September 13, 1992) and were made available for public review and comment in the docket for this rulemaking (see RCRA docket number F-92-CESA-FFFFF). No comments were received concerning the validity of these stabilization study conclusions.

At the same time, however, and despite the inappropriate timing of industry's comments on this issue (compounded by the industry's failure to comment on the information presented by the Notice of Data Availability), the EPA has determined that it may be worthwhile to review pertinent data for current waste stabilization activities at hazardous waste TSDF. Industry has pledged to provide detailed data from an emissions test conducted to measure organic emissions from a full-scale stabilization operation treating hazardous waste streams. The test will be conducted using the EPA approved sampling and analytical methods, and the volatile organic concentration of the waste streams will be measured using Method 25D, with gas chromatography and with mass spectrometry (see RCRA docket number F-94-CESF-FFFFF). The EPA will accept until September 6, 1995 all pertinent information and comments on the following limited issues: (1) Volatilization of organics during waste stabilization activities, (2) feasibility of treating organic wastes to destroy or remove organics prior to stabilization to immobilize toxic metals, and (3) alternative organic emission controls applicable to stabilization tanks. Persons interested in submitting comments or data pertaining to these issues should notify the EPA of their intent by contacting Ms. Michele Aston at the address listed in the FOR FURTHER INFORMATION CONTACT section at the beginning of this preamble. Written information and comments regarding the above issues should be mailed to the RCRA Docket Office (5305), U.S. Environmental Protection Agency, room 2616, 401 M Street SW., Washington, DC 20460. Please send an original and

two copies of all information, and refer to RCRA docket number F-94-CESA-FFFFF.

The EPA will assess all submitted information, and will make a rapid determination whether to amend the requirements under the subpart CC standards being promulgated today for tanks in which waste stabilization operations are performed. The EPA emphasizes that the current record does not support any amendment to these standards. However, if the EPA were to amend the requirements for stabilization tanks, the amendment could include any of the provisions described below, a modification of today's promulgated requirements, or possibly other options.

The EPA may choose to amend the final subpart CC tank standards such that stabilization tanks could comply with alternative air emission controls to those included in today's promulgation. The EPA will determine the appropriateness of such an amendment based on the evaluation of:

- (1) Information that is submitted relating to industry's comments that it is not feasible to comply with the technical requirements of today's final rule or to pretreat waste prior to stabilization;
- (2) Information related to alternative emission controls that could be applied to stabilization tanks for effective organic emission reduction;
- (3) Data related to the specific characteristics of hazardous waste that is stabilized at TSDF;
- (4) Detailed information regarding the stabilization processes performed in TSDF tanks; and
- (5) Other related information.

For a given stabilization tank to qualify for certain compliance options, the EPA could require the facility owner or operator to demonstrate (through specified testing, monitoring, sampling, or other means) that organic constituents are not volatilized during the hazardous waste stabilization operations performed in that tank. A similar requirement for biological treatment performed in tanks and surface impoundments is included in the final subpart CC standards (for example see 40 CFR 264.1085(a)(2)) as well as other air standards developed by the EPA under the Clean Air Act (e.g., the Hazardous Organic NESHAP (59 FR 19402, April 22, 1994) and the proposed Off-Site Waste and Recovery Operations NESHAP (59 FR 51919, October 13, 1994)). For biological treatment processes, which are generally acknowledged by the EPA as appropriate treatment for organic constituents in waste with respect to controlling organic emissions, the EPA

considers such a demonstration to be a reasonable requirement for certain compliance options. Therefore, the EPA also could consider it reasonable to require that stabilization operations, which the EPA does not consider appropriate treatment for organic constituents in waste with respect to controlling organic emissions, perform at least an equivalent demonstration for certain compliance options. If the EPA were to amend today's promulgated subpart CC tank standards to include such a demonstration, the required procedure could include any of the following, or possibly other procedures: whole waste analyses, full-scale analyses, specified emissions monitoring, material balance calculations, temperature monitoring, and water content information.

In light of this supplemental comment opportunity, the EPA considers it appropriate to extend the effective date of the final rules for tanks that could be affected if the EPA chooses to modify the standards. Therefore, a separate compliance schedule is applicable to tanks in which waste stabilization activities are performed as of December 6, 1994. It is important to note that all applicable requirements with respect to other units at a facility subject to the subpart CC standards will be effective June 5, 1995. For these stabilization tanks, the effective date of the final rules will be December 6, 1995. As of the extended effective date for stabilization tanks, each TSDF owner or operator and each hazardous waste generator subject to the final rules must either install and operate the specified air emission control requirements on all affected tanks used for stabilization, or begin performing the specified waste determinations and recordkeeping to indicate that a stabilization tank is exempted from these requirements. Under circumstances where required air emission control equipment cannot be operational by December 6, 1995, an implementation schedule for installation of the required air emission controls must be developed and placed in the facility operating records no later than December 6, 1995. In such cases, the facility must have all air emission controls required by the final rules in operation no later than June 8, 1998.

VII. Requirements of Final Rule

A. TSDF Tank, Surface Impoundment, and Container Requirements

Today's action by the EPA promulgates air emission standards for TSDF tanks, surface impoundments, and containers as a new subpart CC in both 40 CFR parts 264 and 265. Subpart

CC under 40 CFR part 265 establishes standards for owners and operators of interim-status TSDF. As discussed in section VIII.A of this preamble, owners and operators of permitted TSDF that have been issued final permits prior to June 5, 1995, are required to comply with subpart CC under 40 CFR part 265 until the facility's permit is reviewed or reissued by the EPA.

The air emission control requirements of the final subpart CC standards in 40 CFR part 264 and 40 CFR part 265 are identical with the exception of the reporting requirements. There are no reporting requirements in subpart CC under 40 CFR part 265.

1. Applicability

a. General applicability. In general, the subpart CC standards apply to RCRA-permitted tanks, surface impoundments, and containers subject to 40 CFR part 264, subparts J, K, or I, respectively, as well as to interim-status TSDF tanks, surface impoundments, and containers subject to 40 CFR part 265, subparts J, K, or I, respectively. However, certain specific types of TSDF tanks, surface impoundments, and containers are not subject to the subpart CC standards under applicability provisions in other RCRA regulations as well as provisions included specifically in the subpart CC standards.

The subpart CC standards do not apply to those TSDF tanks, surface impoundments, or containers excluded from regulation under 40 CFR 264.1. For example, TSDF owners and operators are not required to obtain a RCRA permit for tanks or tank systems that manage hazardous wastewaters or wastewater treatment sludges and are subject to regulation under either section 402 or 307(b) of the Clean Water Act [refer to 40 CFR 264.1(g)(6) and 40 CFR 265.1(c)(10)]. Because these tanks are exempted from RCRA permitting requirements, they are not subject to the requirements of 40 CFR parts 264 and 265. Thus, the subpart CC standards do not apply to a TSDF tank that is considered to be a part of a "wastewater treatment unit" as defined in 40 CFR 260.10. Similarly, the subpart CC standards do not apply to TSDF tanks, surface impoundments, or containers when these units are used for emergency or spill management activities in accordance with 40 CFR 264.1(g)(8)(i) or 40 CFR 265.1(c)(11)(i).

b. Exemptions. The subpart CC standards are only applicable to containers with a design capacity greater than or equal to 0.1 m³ (approximately 26 gallons). This means that any container that has a design capacity less than 0.1 m³ is not subject

to the subpart CC standards regardless of the volatile organic concentration of the hazardous waste placed in the container.

The subpart CC standards apply only to TSDF tanks, surface impoundments, and containers in which an owner or operator places hazardous waste on or after June 5, 1995. With respect to surface impoundments, the EPA has already explained that RCRA regulations do not apply to impoundments at which there is no active management of hazardous waste after the rule's effective date (see 55 FR 39410, September 27, 1990). This would include impoundments that cease operation before the rule's effective date, and impoundments that convert to non-hazardous waste impoundments before the effective date. This latter class of impoundments includes those impoundments that contain hazardous wastes deposited before the rule's effective date for which the impoundment is the final disposal site for hazardous waste already in the unit (i.e., the impoundment is a disposal unit) and hazardous wastes are not actively managed in the impoundment. *Id.* The principle in today's rule is consistent with this existing interpretation.

The rationale for not applying the subpart CC standards to tanks and containers that do not receive hazardous waste after the effective date is somewhat different. Under the subpart CC standards, the need to apply air emission controls to a particular tank or container is determined by the organic content of the hazardous waste at a point prior to being placed in the tank or container (this is discussed in the following section under "General Standards"). In many situations where existing tanks and containers at a TSDF already hold hazardous waste but no longer receive new wastes, a TSDF owner or operator will be unable to perform a waste determination as specified in the rule because waste samples cannot be collected at the required locations and the owner or operator has insufficient knowledge about the waste. Furthermore, even if a waste determination can be performed for these tanks or containers but the units presently are uncovered or have other openings, most if not all of the volatile organics in the waste have most likely already been emitted to the atmosphere. Thus, the EPA decided that air emission control requirements should only apply to those tanks and containers in which hazardous waste is placed on or after the effective date of the rule.

The EPA decided not to apply the subpart CC standards to a tank once an owner or operator stops adding hazardous waste to the unit and begins closure pursuant to an approved closure plan because in many cases, use of the required air emission controls would hinder or prevent closure activities from being performed.

c. Remediation wastes. The EPA has further decided to temporarily defer application of the subpart CC standards to tanks, containers, and surface impoundments which are being used on-site to treat or store hazardous wastes containing organics generated from remedial activities required under RCRA corrective action or CERCLA response authorities, or similar State remediation authorities, provided that the wastes are managed in units that do not also manage other hazardous wastes. This deferral applies only to on-site management of such wastes. For remediation waste transported off-site, the point of waste origination will be the point at which the wastes are physically moved outside the facility boundary (or for CERCLA response actions, outside the site boundary).

As the D.C. Circuit recently explained, a temporary deferral such as today's is permissible if the Agency legitimately needs further time to ascertain the best means of integrating concurrent statutory and regulatory schemes to avoid potential interference with the objectives of both schemes, and where Congress has not expressly forbidden a temporary deferral. *Edison Electric Inst. v. EPA*, 2 F. 3d 438, 451-53 (D.C. Cir. 1993). See also RCRA section 1006, requiring the EPA to integrate all provisions of RCRA for purposes of administration and enforcement, and to avoid duplication to the maximum extent practicable in doing so.

This situation is presented here. Control of air emissions from units at remediation sites implicates the overlapping and potentially competing concerns of RCRA section 3004(n) and the complex statutory provisions under RCRA, CERCLA, and State laws relating to remediation. The EPA's primary goal in this rulemaking has been to develop air emission standards for tanks, containers, and surface impoundments holding as-generated hazardous wastes containing organics. At proposal, the EPA thus did not fully consider the issue of whether different standards should appropriately apply to wastes that are generated and managed as the result of remedial activities, or how the proposed rule for air emissions could best be integrated with the remediation authorities of RCRA and other Federal

or State laws. 56 FR at 33497-98 (July 22, 1991).

Commenters on the proposed subpart CC regulations pointed out that these were important issues deserving careful attention. The EPA agrees. It is possible that certain provisions of the air emission requirements promulgated today may be inappropriate or unnecessarily restrictive if applied to remediation activities (see 58 FR 8660, February 16, 1993).

The EPA notes that some measure of control of air emissions from remediation tanks, containers, and impoundments will be assured during the deferral period. Remediation authorities of RCRA and CERCLA and similar State authorities allow overseeing officials to impose, on a site-specific basis, appropriate air emission controls on these types of units, as well as on other waste management units and handling operations. In addition, hazardous wastes containing organics that are managed off-site (i.e., outside a RCRA facility's boundary, or outside a CERCLA site) would be subject to the subpart CC management standards.

Finally, the EPA emphasizes that the deferral is indeed temporary. The issue of appropriate air emission controls for remediation units is likely to be addressed in the context of the Hazardous Waste Identification Rules which are currently being developed by the EPA. The issue is also potentially part of the third phase of the RCRA section 3004(n) implementation. In addition, waste remediation sites are on the initial list of source categories under CAA section 112, and the EPA currently is scheduled to issue technology-based standards to control emissions of hazardous air pollutants from this source (see 57 FR 31576, July 16, 1992). Consequently, the EPA will be addressing this issue in the reasonably near future.

d. Radioactive mixed wastes. As explained in section IV.F of this preamble, the management of radioactive mixed waste at TSDF is subject to regulation under subtitle C of RCRA. The EPA reviewed the special nature of radioactive mixed wastes with respect to the air emission control requirements under the final subpart CC standards. In certain cases, the air emission controls used as the basis for the subpart CC standards are not compatible with the NRC requirements for safe handling of radioactive mixed wastes. For example, drums used to store radioactive mixed waste cannot be sealed with vapor leak-tight covers because of unacceptable pressure buildup of hydrogen gas to levels that can potentially cause rupture of the

drum or create a potentially serious explosion hazard. This generation of hydrogen gas results from the radiolytic decomposition of organic materials (e.g., plastics) or aqueous solutions stored in the drums. Consequently, a drum used for storage of radioactive mixed wastes must be continuously vented through special filters in accordance with technical guidance issued by the NRC to prevent the hydrogen concentration in the drum from reaching dangerous levels. The EPA is planning to further investigate methods for effective control of organic emissions from waste management units handling radioactive mixed waste that are consistent with the NRC waste management practices.

2. General Standards

The final subpart CC standards require that TSDF owners and operators install and operate air emission controls on each tank, surface impoundment, and container subject to the rules except when all of the hazardous waste placed in the unit is determined to meet certain conditions. These conditions are based on properties of the hazardous waste determined at either one of two locations:

- (1) The point where a hazardous waste is generated or the point where the waste is received by an off-site facility; or
- (2) The point following treatment of a hazardous waste to remove or destroy the organics in the waste.

a. Point of waste origination. Under the final subpart CC standards, a TSDF owner or operator is exempted from managing a hazardous waste in a tank, surface impoundment, or container in accordance with the air emission control requirements of the rule when the owner or operator determines that all hazardous waste placed in the unit has an average volatile organic concentration at the point of waste origination less than 100 ppmw. The point of waste origination is defined in the rule with respect to the point where the TSDF owner or operator first has possession of a hazardous waste. When the TSDF owner or operator is the generator of the hazardous waste, the point of waste origination means the point where a solid waste produced by a system, process, or waste management unit is determined to be a hazardous waste as defined in 40 CFR part 261. As previously stated, the term "point of waste origination" applied to this situation is being used in a similar manner to the use of the term "point of generation" in waste operations air standards established under authority of the Clean Air Act in 40 CFR parts 60, 61, and 63 of this chapter. When neither

the TSDF owner nor operator is the generator of the hazardous waste, point of waste origination means the point where the owner or operator accepts delivery or takes possession of the hazardous waste.

b. Treated Hazardous Waste. If a hazardous waste has an average volatile organic concentration equal to or greater than 100 ppmw based on the hazardous waste composition at the point of waste origination, then this waste is required under the subpart CC standards to be managed in accordance with the air emission control requirements of the rule. Under these requirements, specific air emission controls must be installed and operated on every tank, surface impoundment, and container subject to the rule used in the waste management sequence from the point of waste origination through the point where the organics in the waste are removed or destroyed by a process that meets or exceeds a minimum level of performance specified in the rule. In other words, once a hazardous waste is treated to remove or destroy the organics in the waste in accordance with the rule requirements, the subsequent downstream tanks, surface impoundments, and containers used to manage this particular hazardous waste are not required to meet the air emission control requirements of the subpart CC standards.

The final subpart CC standards provide TSDF owners and operators with several alternative provisions for determining when a treated hazardous waste is no longer required to be managed in tanks, surface impoundments, and containers meeting the air emission control requirements of the rule. Treated hazardous waste provisions are specified in the subpart CC standards for the following processes:

- (1) An organic destruction, biological degradation, or organic removal process that reduces the organic content of the hazardous waste and is designed and operated in accordance with certain conditions specified in the rule;

- (2) A hazardous waste incinerator that is designed and operated in accordance with the requirements of 40 CFR 264 subpart O or 40 CFR 265 subpart O; or

- (3) A boiler or industrial furnace that is subject to the requirements of 40 CFR part 266 subpart H.

A process that simply mixes, blends, combines, or aggregates a hazardous waste stream with other materials does not destroy the organics in the waste stream or remove the organics from the waste stream. While diluting a hazardous waste stream having a volatile organic concentration greater

than 100 ppmw with sufficient quantities of other hazardous waste streams having a volatile organic concentration less than 100 ppmw (or water or other low organic content materials) would reduce the volatile organic concentration of the resulting hazardous waste mixture to a level below 100 ppmw, the total mass quantity of organics in the waste does not change since no organics were removed or destroyed from the waste. The potential for organic emissions from handling the waste mixture is essentially the same as for the individual hazardous waste streams prior to being mixed. Therefore, the EPA does not allow dilution of a hazardous waste as a means for complying with the requirements specified in the subpart CC standards for placing treated hazardous waste in affected tanks, surface impoundments, or containers not using the required air emission controls. Consequently, when a hazardous waste is treated by an organic destruction or removal process and the hazardous waste has been mixed or aggregated together with other hazardous wastes or materials with a volatile organic concentration less than 100 ppmw prior to the point of waste treatment, the subpart CC standards require that TSD owners and operators meet special requirements to ensure that organics in the hazardous waste have actually been removed or destroyed. An owner or operator can choose from several alternative provisions to comply with these requirements.

One provision requires that mixed hazardous wastes be treated by an organic destruction or removal process that reduces the volatile organic concentration of the hazardous waste to meet a site-specific treatment process exit concentration limit. This limit is determined by the TSD owner or operator on a case-by-case basis using an equation specified in the rule that accounts for the portion of the reduction in the volatile organic concentration in the resulting treated hazardous waste stream due to dilution. To use this equation, the owner or operator must first determine the volatile organic concentration at the point of waste origination for each individual hazardous waste stream that is mixed together prior to entering the treatment process. As an alternative to calculating the exit concentration limit for a treatment process, the subpart CC standards allow the owner or operator to treat the mixed hazardous wastes to a volatile organic concentration level that is less than or equal to the lowest waste volatile organic concentration at the

point of waste origination for all of the individual hazardous waste streams mixed together prior to entering the treatment process.

Another alternative in the subpart CC standards available to owners and operators allows mixed hazardous wastes to be treated using a single process that achieves an organic reduction efficiency of 95 percent or greater on a mass basis, and reduces the average volatile organic concentration of the resulting hazardous waste stream exiting the process to a level less than 50 ppmw. This alternative does not require the owner or operator to perform any volatile organic concentration waste determinations for the hazardous wastes prior to mixing, yet still accommodates the mixing of wastes that have different volatile organic concentrations. For a waste stream having a volatile organic concentration greater than 2,000 ppmw, requiring only a minimum 95 percent reduction of the organic content in the waste stream would not lower the volatile organic concentration of the treated waste stream to the 100 ppmw level of the rule. However, if such a waste stream had been mixed together prior to treatment with other waste streams having lower volatile organic concentrations, then the volatile organic concentration of the treated waste exiting the process could be less than 100 ppmw. The EPA does not consider such situations to be unlikely, and has therefore chosen for this alternative to require an exit concentration for the treated waste lower than 100 ppmw. The EPA considers an exit concentration of 50 ppmw, combined with a 95 percent treatment efficiency, to be an appropriate demonstration that the reduction in volatile organic concentration for a mixture of hazardous waste streams has been achieved through destruction or removal of organic constituents in the waste, rather than by dilution.

The final subpart CC standards also provide another alternative that does not require the owner or operator to perform any volatile organic concentration waste determinations for the hazardous wastes prior to mixing when the waste is treated by a biological process that destroys or degrades the organics contained in the hazardous waste to meet certain performance requirements specified in the rule. These conditions are either of the following:

(1) Achieve an organic reduction efficiency for the biological treatment process equal to or greater than 95 percent, and achieve an organic biodegradation efficiency for the process equal to or greater than 95 percent; or

(2) Achieve a total actual organic mass biodegradation rate for all hazardous waste treated by the process equal to or greater than the required organic mass removal rate for the process.

Compliance with these parameters is determined using the procedures specified in rule.

The EPA may at any time measure or request that the owner or operator measure using Method 25D the volatile organic concentration of a hazardous waste that is placed in a tank, surface impoundment, or container not using air emission controls in accordance with the requirements of the subpart CC standards. Measurement results showing that the volatile organic concentration of the hazardous waste is equal to or greater than 100 ppmw constitutes noncompliance with the subpart CC standards. However, in a case where the owner or operator has used an averaging period greater than 1 hour for determining the volatile organic concentration of a hazardous waste, the Regional Administrator may consider information that was used by the owner or operator to determine the average volatile organic concentration of the hazardous waste (e.g., test results, measurements, calculations, and other documentation) together with the results of the waste determination in determining whether the owner or operator is in compliance with the subpart CC standards.

3. Waste Determination Procedures

A determination of the volatile organic concentration of a hazardous waste is required by the subpart CC standards only when a hazardous waste is to be placed in a tank, surface impoundment, or container subject to the rule that does not use air emission controls in accordance with the requirements of the rule. A TSD owner or operator is not required to determine the volatile organic concentration of the waste if it is placed in a tank, surface impoundment, or container using the required air emission controls.

When the hazardous waste is generated as part of a continuous process, the owner or operator is required to perform an initial waste determination of the average volatile organic concentration of the waste stream before the first time any portion of the material in the waste stream is placed in a waste management unit subject to the rule, and thereafter update the information used for the waste determination at least once every 12 months following the date of the initial waste determination. When the hazardous waste is generated as part of a batch process that is performed

repeatedly but not necessarily continuously, the owner or operator is required to perform an initial waste determination of the average volatile organic concentration for one or more representative waste batches generated by the process before the first time any portion of the material in the these waste batches is placed in a waste management unit subject to the rule, and thereafter update the information used for the waste determination at least once every 12 months following the date of the initial waste determination. For either case, the owner or operator is required to perform a new waste determination whenever changes to the process generating the hazardous waste are reasonably likely to cause the average volatile organic concentration to increase to a level at or above 100 ppmw. If an average volatile organic concentration is used, an initial waste determination must be performed for each averaging period.

Waste determinations should be performed for any waste that is generated as a part of an unplanned event or is generated as a part of an event that is not included in the normal operating conditions for the source or process generating the hazardous waste. Examples of an unplanned event include malfunctions that affect the operation of the process or that alter the composition of the waste or product. Examples of events that are not normal operating conditions include maintenance activities and equipment cleaning. Normal operating conditions for the source or process generating the waste include cyclic process operations such as start-up and shutdown.

For processes that have variations in normal operating conditions such that the waste volatile organic concentration may exceed 100 ppmw, but for which the average waste volatile organic concentration for the averaging period is below 100 ppmw, documentation must be retained in the facility operating record that specifies the following information: (1) The maximum and minimum waste volatile organic concentration values that will occur for that averaging period; (2) the circumstances under which a waste volatile organic concentration above 100 ppmw would occur, and; (3) the calculations and waste determination procedures used as the basis for the determination of the average volatile organic concentration. For a given averaging period, if there are no deviations from the operating circumstances or from the maximum or minimum waste volatile organic concentrations specified in the operating plan, then no additional waste

determinations would be required after the initial waste determination for that averaging period.

The subpart CC standards include provisions that allow a TSD owner or operator to use either direct measurement or knowledge of the waste to determine the volatile organic concentration of a hazardous waste. The following paragraphs describe these two options available to the owner or operator for performing a waste determination.

a. *Direct measurement.* When the hazardous waste is generated on a continuous basis, the averaging period to be used for determining the volatile organic concentration on a mass-weighted average basis must be designated and recorded. This averaging period can represent any time interval that the hazardous waste flows until such time that a new waste determination must be performed pursuant to the requirements of the rule. However, this averaging period cannot exceed 1 year. A sufficient number of samples, but no less than four, must be collected to represent the complete range of organic compositions and organic quantities that occur in the hazardous waste stream during the entire averaging period due to normal variations in the operating conditions for the source or process generating the hazardous waste.

When the hazardous waste is generated as part of a batch process that is performed repeatedly but not necessarily continuously, samples are collected from one or more representative waste batches generated by the process. The volatile organic concentration for the waste is calculated as a mass-weighted average based on the analysis results for all of the waste samples collected for these waste batches. A sufficient number of samples, but no less than four, must be collected to represent the organic composition for each representative batch.

Each sample of the hazardous waste is to be collected in accordance with the requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846, third edition, November 1986, as amended by Update I, November 15, 1992. Sufficient information must be recorded to document the waste quantity and the operating conditions for the source, process, or waste management unit generating the hazardous waste represented by each sample collected.

Each of the collected waste samples is to be prepared and analyzed in accordance with the requirements of Method 25D in 40 CFR part 60,

appendix A. The volatile organic concentration for a hazardous waste on a mass-weighted average basis is then calculated by entering the analysis results for all of the collected waste samples into an equation specified in the rule.

b. *Knowledge of the waste.* The final subpart CC standards allow TSD owners or operators to use their knowledge of the waste for waste determinations (see *Hazardous Waste Treatment Council v. EPA*, 886 F.2d 355, 370-71 (D.C. Cir. 1989) upholding the use of generator knowledge to determine if treatment standards are met). Information may be used that is prepared by either the facility owner or operator or by the generator of the hazardous waste. Examples of information that could constitute acceptable knowledge include:

(1) Organic material balances for the source, process, or waste management unit generating the waste;

(2) Documentation that lists the raw materials or intermediate products fed to a process showing that no organics are used in the process generating the waste;

(3) Information that shows the waste is generated by a process that is substantially similar to a process at the same or another facility that generates a waste that has previously been determined by direct measurement to have a volatile organic content less than the action level;

(4) Test data that provide speciation analysis results for the waste that are still applicable to the current waste management practices and from which the total concentration of organics in the waste can be computed; or

(5) Other knowledge based on manifests, shipping papers, or waste certification notices.

When test data are used as the basis for knowledge of the waste, the owner or operator must provide documentation describing the testing protocol and the means by which sampling variability and analytical variability are accounted for in the determination of the volatile organic concentration of the hazardous waste. For example, an owner or operator may use individual organic constituent concentration test data that are validated in accordance with Method 301 in appendix A to 40 CFR part 63 as the basis for knowledge of the waste.

4. Tank Standards

The tank standards establish the requirements for tanks using air emission controls to comply with the general standards of the rule. No air emission controls are required under the

subpart CC standards for a tank in which all hazardous waste placed in the unit has been treated to remove or destroy organics in accordance with the requirements specified in the general standards.

Also, the tank standards do not apply to a tank in which biological degradation of the organics in the hazardous waste treated in the unit is demonstrated to achieve specific performance levels. Either of the following sets of conditions must be demonstrated to qualify for this exemption: (1) The organic reduction efficiency for the process is equal to or greater than 95 percent, and the organic biodegradation efficiency for the process is equal to or greater than 95 percent; or (2) the total actual organic mass biodegradation rate for all hazardous waste treated by the process is equal to or greater than the required organic mass removal rate. The organic biodegradation efficiency or the organic mass biodegradation rate for a biological treatment unit is determined by procedures specified in the rule.

The tank standards specify that the owner or operator install and operate on each affected tank one of the following air emission control systems: (1) A cover that is connected through a closed-vent system to a control device; (2) a fixed-roof type cover with an internal floating roof that is designed and operated in accordance with the requirements equivalent to the new source performance standard (NSPS) for volatile organic liquid (VOL) storage; (3) an external floating roof that is designed and operated in accordance with the requirements equivalent to the VOL storage NSPS; or (4) a pressure tank that is designed to operate as a closed system. Under the subpart CC standards, an owner or operator is allowed to use a fixed-roof type cover (without any additional controls) for affected tanks under certain conditions.

Four conditions must be met for a particular tank before use of a fixed-roof type cover (without any additional controls) is allowed under the subpart CC standards. First, the hazardous waste cannot be mixed, stirred, agitated, or circulated within the tank by a process that results in splashing, frothing, or visible turbulent flow on the waste surface except during limited circumstances. Second, the hazardous waste in the tank cannot be heated by the owner or operator except when necessary to prevent the waste from freezing or to maintain adequate waste flow conditions for continuous normal process operations. Third, the hazardous waste cannot be treated using a waste stabilization process or a

process that produces an exothermic reaction. Finally, the maximum organic vapor pressure of the hazardous waste in the tank must be less than the limit established in the rule by tank design capacity. For a tank having a design capacity equal to or greater than 151 m³ (approximately 40,000 gallons), then the maximum organic vapor pressure of the hazardous waste in the tank must be less than 5.2 kPa. For a tank having a design capacity equal to or greater than 75 m³ (approximately 20,000 gallons) but less than 151 m³, then the maximum organic vapor pressure of the waste in the tank must be less than 27.6 kPa. For a smaller tank (design capacity less than 75 m³), the maximum organic vapor pressure must be less than 76.6 kPa.

The subpart CC standards require each cover opening not vented to a control device to be maintained in a closed, sealed position except at those times when a specific opening must be used to add, remove, inspect, or sample the waste in the tank or when it is necessary to use the opening to inspect, maintain, or repair equipment located inside the tank. Also, safety devices that vent directly to the atmosphere may be used on the tank, cover, closed-vent system, or control device provided that the safety device is not used for planned or routine venting of organic vapors. These safety devices are to remain in a closed position except when an unplanned event requires that the device be open for the purpose of preventing physical damage or permanent deformation of the tank, cover, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

5. Surface Impoundment Standards

The surface impoundment standards establish the requirements for surface impoundments using air emission controls to comply with the general standards of the rule. No air emission controls are required under the subpart CC standards for a surface impoundment in which all hazardous waste placed in the unit has been treated to remove or destroy organics in accordance with the requirements specified in the general standards. Also, air emission controls are not required for a surface impoundment in which biological treatment of a hazardous waste is performed under the same conditions specified in the rule for tanks.

The surface impoundment standards specify that the owner or operator install and operate on each affected surface impoundment a cover (e.g., air-supported structure) that is connected through a closed-vent system to a control device. Under the subpart CC standards, an owner or operator is allowed to use a floating membrane cover (without any additional controls) for affected surface impoundments under certain conditions specified in the rule.

The requirements under the subpart CC standards for surface impoundment air emission control equipment are consistent with the requirements for tanks.

6. Container Standards

The container standards establish the requirements for affected containers (containers with a design capacity greater than or equal to 0.1 m³) using air emission controls to comply with the general standards of the rule. No air emission controls are required by the subpart CC standards for any container with a design capacity less than 0.1 m³ regardless of the volatile organic concentration of the hazardous waste placed in the container.

For affected containers used for storage, treatment, or handling of hazardous waste, the owner or operator is required to use either: (1) A container that is equipped with a vapor leak-tight cover; (2) a container having a design capacity less than or equal to 0.46 m³ (approximately 119 gallons) that is equipped with a cover and complies with all applicable U.S. Department of Transportation (DOT) regulations on packaging hazardous waste for transport under 49 CFR part 178; or (3) a container that is attached to or forms a part of any truck, trailer, or railcar and that has been demonstrated within the preceding 12 months to be organic vapor tight in accordance with the procedure specified in Method 27. For a container in which treatment of hazardous waste is performed, the owner or operator is required to place the container inside an enclosure that is connected through a closed-vent system to a control device at all times that the container is completely or partially uncovered during the treatment operation. Transfer of hazardous waste by pumping into a container having a design capacity greater than 0.46 m³ is required to be performed using submerged fill loading.

The requirement for use of leak-tight covers on containers is established by testing the cover for no detectable organic emissions as determined using Method 21 in 40 CFR part 60, appendix

A. The test is performed when all openings in the cover (e.g., lids, bungs, hatches, and sampling ports) are secured in a closed, sealed position. Under certain circumstances, the EPA has determined that a cover other than a rigid, gasketed cover can be used on a container that will meet the requirement for no detectable organic emissions. For example, the EPA has concluded that use of a tarpaulin with a vapor-suppressing foam is an acceptable cover for roll-off boxes used for short-term storage (e.g., less than 30 days) of bulk solid materials (refer to RCRA docket entry number F-94-CESP-S00507 for specific conditions under which this type of cover is acceptable).

As an alternative to using covers tested for no detectable organic emissions on drums and other containers with a design capacity less than or equal to 0.45 m³, the subpart CC standards allow an owner or operator to place the hazardous waste in drums meeting the DOT specifications and testing requirements under 49 CFR part 178. When a container meeting these DOT regulations is used, no leak detection monitoring nor recordkeeping for the container is required by the subpart CC standards. It is important to note that none of the exceptions to the 49 CFR part 178 regulations other than the exception for lab packs used for combination packagings as specified in 49 CFR 173.12(b) apply to a container for the purpose of complying with the subpart CC standards.

The subpart CC container standards allow use of a tank truck or tank railcar that has been tested for organic vapor tightness within the preceding 12 months in accordance with the requirements of Method 27. This method is a pressure test procedure originally developed by the EPA for determining the vapor-leak tightness of a tank truck into which gasoline is placed. The EPA considers Method 27 also appropriate for determining vapor-leak tightness of tank trucks and railcars into which hazardous wastes containing volatile organics are placed. No Method 21 leak monitoring or recordkeeping is required for tank trucks or tank railcars complying with this provision of the rule.

When it is necessary for a container to be open during certain treatment processes, the subpart CC standards require the container to be located in an enclosure connected to a closed-vent system with control device. The enclosure must be designed to operate with sufficient airflow into the structure to capture all organic vapors vented from the container and route the vapors

through the closed-vent system to the control device. The enclosure may have permanent or temporary openings to allow worker access, passage of containers through the enclosure by conveyor or other mechanical means, entry of permanent mechanical or electrical equipment, or to direct airflow into the enclosure. Whenever an open container is placed inside the enclosure, the pressure drop across each opening in the enclosure is to be maintained at a pressure below atmospheric pressure such that no organic vapors released from the container can exit the enclosure through the opening.

Finally, the container standards include the same unit and control equipment safety venting provisions allowed under the subpart CC standards for tanks and surface impoundments.

7. Closed-Vent System and Control Device Requirements

The design and operating requirements under the final subpart CC standards for a closed-vent system with control device are the same as those already applicable to TSDI owners and operators under subpart AA in 40 CFR parts 264 and 265 with one exception. The subpart CC standards require that each control device achieve at least a 95 percent reduction in the total organic content of the vapor stream vented to the device or, in the case of an enclosed combustion device, a reduction of the total organic content of the vapor stream to a level less than or equal to 20 ppmw on a dry basis corrected to 3 percent oxygen.

The standards do not require the use of any specific type of equipment or add-on control device. The standards allow the owner or operator the flexibility of choosing the control device best suited for a control application based on the characteristics of the particular organic vapor stream. Furthermore, the subpart CC standards do not require that each tank, surface impoundment, and container be vented to a separate control device dedicated to that particular unit. Vent streams from several units can be combined and discharged to a single control device that achieves the required level of performance.

8. Inspection and Monitoring

The subpart CC standards provide exemptions from inspection and monitoring for specific circumstances defined in the rule. In the case of an underground tank, only those portions of the tank cover and those connections to the tank cover or tank body (e.g., fill ports, access hatches, gauge wells, etc.) that extend to or above the ground

surface and can be opened to the atmosphere must be inspected and monitored. Leak monitoring using Method 21 in 40 CFR part 60, appendix A, is not required for the following: (1) Drums that meet applicable DOT regulations specified in the rule; (2) tank trucks and tank railcars that are annually demonstrated to be vapor-tight by Method 27 in 40 CFR part 60, appendix A; and (3) closed-vent systems and control devices operated in vacuum service (i.e., equipment that is operated at an internal pressure that is at least 5 kPa below ambient pressure) or closed-vent system connections that are permanently or semi-permanently sealed (e.g., a welded joint between two sections of metal pipe or a bolted and gasketed pipe flange). Also, semiannual leak monitoring is not required for a cover opening that has continuously remained in the closed, sealed position for the entire period since the cover opening was last monitored.

To ensure that emission control equipment is properly operated and maintained, the subpart CC standards require the TSDI owner or operator to visually inspect certain emission control equipment items semiannually. For example, emission control equipment covers on tanks are to be checked semiannually by facility employees to ensure that equipment is being used properly (e.g., covers are closed and latched except when an opening must be used to add, remove, inspect, or sample the waste in the tank or to inspect, maintain, replace, or repair equipment located inside the tank or to vent gases or vapors from the tank) and the equipment is being maintained in good condition (e.g., no visible holes, gaps, tears, or splits have developed in covers).

Continuous monitoring of control device operation is required under the subpart CC standards. This involves the use of automated instrumentation to measure critical operating parameters that indicate whether the control device is operating correctly or is malfunctioning. Semiannual leak detection monitoring using Method 21 under 40 CFR part 60, appendix A, is required for certain cover components to ensure gaskets and seals are in good condition and for closed-vent systems to ensure all fittings remain leak-tight. In addition, with the previously noted exception of permanently or semi-permanently sealed connections, each closed-vent system must be monitored for leaks using Method 21 at least once per year.

Special inspection and monitoring provisions are included in the final subpart CC standards for cover fittings

that are unsafe or difficult for facility personnel to inspect and monitor. A TSD owner or operator may designate a cover fitting as "unsafe to inspect and monitor" if a worker would be exposed to dangerous, hazardous, or other unsafe conditions when performing the inspection or monitoring. A cover fitting that is designated as unsafe must be inspected and monitored as frequently as practicable during those times when it is safe to inspect and monitor the fitting. Similarly, a cover may be designated as "difficult to inspect and monitor" if in so doing a worker would be elevated to a height more than 2 meters above a support surface and the cover was installed before June 5, 1995. A cover fitting that is designated as difficult must be monitored and inspected at least once per calendar year.

The subpart CC standards require that the TSD owner or operator repair a cover fitting found to be leaking within 15 days of detection. Repair of control equipment on a tank or surface impoundment may be delayed beyond 15 calendar days under certain circumstances. To delay repair, the owner or operator must document that the repair cannot be completed without emptying the contents of the unit and also that removing the unit from service would result in the unscheduled cessation of production from the process unit or operation of the waste management unit that is generating the hazardous waste. Repair of this control equipment must be completed the next time the process unit or waste management unit that is generating the hazardous waste managed in the tank or surface impoundment is shut down.

9. Recordkeeping Requirements

The final subpart CC standards require the TSD owner or operator to record certain information in the on-site facility operating logs or files. This information is to be readily available for review by authorized representatives of the EPA. Consistent with 40 CFR 264.73 and 40 CFR 265.73, the rule requires that air emission control equipment design records and certain other records be maintained in the facility operating record until facility closure. Records and results of waste determinations, inspections, and monitoring are required to be kept for at least 3 years from the date of entry.

The information to be collected and recorded includes: the results of all waste determinations such as of volatile organic concentration at the point of waste origination and organic vapor pressure; design specifications for closed-vent systems and control devices

and certain control equipment; emission control equipment inspection and monitoring results; Methods 27 test results; control device exceedances and actions taken to remedy them; leak repairs; management of carbon removed from carbon adsorption systems; identification of incinerators, boilers, or industrial furnaces used to treat hazardous waste in accordance with the general requirements of the rule; documentation for biological wastewater treatment units using air emission controls in accordance with the rule requirements; and identification of equipment fittings designated as unsafe or difficult to monitor or inspect.

At a facility where air emission control equipment required by the final rule cannot be in operation by June 5, 1995, the owner or operator is required to prepare an implementation schedule for the air emission control equipment specifying dates by which progress will be completed by the facility owner or operator to ensure the required air emission controls are in operation no later than December 8, 1997. Alternatively, the owner or operator may come into compliance by modifying facility processes to eliminate waste streams with average volatile organic concentration greater than or equal to 100 ppmw at the point of waste origination. At a minimum, specific calendar dates shall be established for: award of contracts or issuance of purchase orders for the air emission control equipment; initiation of on-site installation of the equipment; completion of the equipment installation; and performance of any testing to demonstrate that the installed air emission control equipment meets the standards.

The EPA recognizes that, in some cases, owners or operators may be unable to meet the implementation date for reasons beyond their control. For example, several commenters pointed out that permit modifications may be required to implement necessary changes, and that modification processes can be lengthy. The EPA developed this rule to be self-implementing and to eliminate the need for permit modifications to the extent possible; furthermore, in the final rule the implementation period has been extended from 2 to 3 years. Therefore, the EPA expects that most if not all facilities will be able to comply. However, the EPA acknowledges that in some cases State permits may have to be modified (e.g., when surface impoundments are replaced with tanks). If the permit process is lengthy, or undergoes extensive appeal, the facility's ability to comply with the

implementation date may be jeopardized. To address this and similar situations, the EPA has included a provision that will allow the Regional Administrator to extend the implementation date in situations beyond the owner or operator's control, where he or she made all reasonable and prudent efforts to meet the date. The EPA emphasizes that this extension would be available only where meeting the date was truly beyond the facility's control, and the EPA expects its application would be limited to situations such as delays in State permit processing. The extension would not be available where the facility's planning was at fault, a permit application was submitted unreasonably late, or permit processing was delayed because the permit application was inadequate.

In some cases, the owner or operator of a facility in interim status at the time this rule becomes effective may not be able to implement the requirements of the rule before EPA (or an authorized state) issues the facility its RCRA permit. In this case, the EPA will generally incorporate the facility's implementation schedule into the permit, in accordance with the requirements of 40 CFR 270.33, which allows schedules of compliance in RCRA permits. Consistent with this approach, 40 CFR 270.27(a)(7) requires permit applicants to submit their schedules of implementation with their permit applications, if the owner or operator cannot implement the requirements of this rule before permit issuance.

As the EPA develops new hazardous waste listings or characteristics in the future, new containers, tanks, and surface impoundments will become subject to subpart CC standards. For these units, the effective date of the standards will be the effective date of the new listing or characteristic. Owners or operators of these units must institute controls by that date. In cases when owners or operators cannot comply with the applicable requirements of the subpart CC standards by this date, they must install and operate required air emission control equipment no later than 30 months after the effective date provided that they prepare a implementation schedule (as described above) for this control equipment by the effective date.

10. Reporting Requirements

The final subpart CC standards in 40 CFR part 264 require a TSD owner or operator to submit reports to the EPA only when circumstances occur at the facility resulting in noncompliance with certain provisions of the rule. There are

no reporting requirements under 40 CFR 265 subpart CC for owners and operators of interim-status TSDF.

Each report required under the final subpart CC standards in 40 CFR part 264 is to be submitted to the EPA Regional office having jurisdiction for a particular TSDF location. The report is required to be signed and dated by an authorized representative of the facility owner or operator.

A TSDF owner or operator subject to the requirements of 40 CFR 264 subpart CC must report to the EPA all circumstances resulting in placement of a hazardous waste in a tank, surface impoundment, or container subject to the rule and not using air emission controls required by the rule when either of the following conditions occur: (1) The hazardous waste has a volatile organic concentration equal to or greater than 100 ppmw as determined on a mass-weighted average basis at the point of waste origination, or (2) the process used to treat the hazardous waste fails to meet the applicable conditions specified in the rule. The owner or operator must submit a written report within 15 calendar days of the time that the owner or operator becomes aware of the circumstances.

A TSDF owner or operator subject to the requirements of 40 CFR part 264, subpart CC and using a control device in accordance with the requirements of the rule is required to submit a semiannual written report to the EPA. This report is to describe each occurrence during the previous 6-month period when a control device is operated continuously for 24 hours or longer in noncompliance with the applicable operating values defined in 40 CFR 264.1035(c)(4) or when a flare is operated with visible emissions as defined in 40 CFR 264.1033(d). A TSDF owner or operator is not required to submit this report for a 6-month period during which all control devices at a facility subject to the subpart CC standards are operated by the owner or operator so that during no period of 24 hours or longer did a control device operate continuously in noncompliance with the applicable operating values defined in the rule.

B. TSDF Miscellaneous Unit Requirements

The EPA permits miscellaneous units at TSDF on a case-by-case basis with terms and provisions as needed to protect public health and the environment through generic performance standards specified in 40 CFR 264.601. Today's rule amends § 264.601 to include the air emission controls required by the standards

under 40 CFR part 264, subparts AA, BB, and CC among the "appropriate" controls a permit writer may require for a miscellaneous unit.

Application of the air standards under 40 CFR part 264, subparts AA, BB, and CC to subpart X miscellaneous units will require determining which one of the waste management unit categories (e.g., tank, surface impoundment, container), if any, is most similar to the miscellaneous unit. As an example, hazardous waste is sometimes stored or treated in a miscellaneous unit consisting of a flexible, synthetic liner supported by an above ground metal frame (instead of a depression formed of earthen materials as is the case for a surface impoundment). Placing hazardous waste containing organics in this type of miscellaneous unit could result in significant organic emissions from the exposed waste surface comparable to those resulting from placing the waste in a similar size surface impoundment. Using the types of air emission controls applicable to surface impoundments (e.g., floating membrane cover) would reduce organic emissions from this type of miscellaneous unit. Therefore, in the case where the miscellaneous unit is determined to resemble a surface impoundment, a subpart X permit may be issued that includes air emission control requirements for surface impoundments under the subpart CC standards. The same application of the rule would be true for a miscellaneous unit used to manage organic-containing hazardous waste and determined to be similar to a tank or a container.

C. 90-Day Tanks and Containers Requirements

Today's final rulemaking amends subparts I and J of 40 CFR part 265 to add a requirement that 90-day tanks and containers covered by these subparts also have to comply with air emission control requirements in subparts AA, BB, and CC. The rule adds these provisions as conditions with which generators must comply to not be required to obtain a permit for on-site tanks and containers used to accumulate hazardous waste.

D. Amendments to Subparts AA and BB Standards

Today's action adds new requirements for TSDF owners and operators using activated carbon adsorption systems to comply with the control device requirements of subparts AA and BB under 40 CFR parts 264 and 265. These requirements specify the procedures for managing the spent carbon removed from the control

devices, and are consistent with the requirements promulgated today in subpart CC under 40 CFR parts 264 and 265.

VIII. Implementation of Final Rule

A. Existing Sources

Today's action by the EPA modifies the "permit-as-a-shield" practice for implementation of RCRA rules by owners and operators of existing TSDF for which final RCRA permits have been issued by the EPA. The EPA is amending 40 CFR 270.4 to require that owners and operators of TSDF that have been issued final permits prior to June 5, 1995, comply with the air standards under 40 CFR part 265, subparts AA, BB, and CC until the facility's permit is reviewed or reissued by the EPA. This amendment eliminates application of the "permit-as-a-shield" practice for these air standards but does not require that the EPA or the TSDF owner or operator initiate a permit modification to add the requirements of 40 CFR part 264, subparts AA, BB, or CC. The EPA believes that this will minimize the administrative burden on the TSDF owner or operator as well as limit the additional burden on the permitting resources of the EPA. However, when a permit is reopened or subject to renewal, or when a TSDF owner or operator submits a Class 3 modification request pertaining to an existing unit or addition of a new unit subject to these standards (e.g., a modification regarding a tank, surface impoundment, or container), then the applicable requirements of 40 CFR part 264, subparts AA, BB, and CC shall be incorporated into the permit conditions.

The subpart CC standards promulgated today are implemented on the following schedule by owners and operators of existing TSDF (except for tanks in which waste stabilization activities are performed as of December 6, 1994, as explained in section VI.F of this preamble):

(1) All owners and operators of existing TSDF become subject to the requirements of 40 CFR part 265, subparts AA, BB, and CC effective June 5, 1995.

(2) Beginning June 5, 1995, each TSDF owner or operator is required to be in compliance with 40 CFR part 265, subparts AA, BB, and CC. Implementation of the leak detection and repair program required by the subpart BB standards is required by this date. At a facility where the air emission controls required by the subpart AA, BB, and CC standards are not in place, the owner or operator must have one of the following in the facility's operating

record: An implementation schedule for the air emission controls in accordance with the recordkeeping requirements of the rule or the facility's waste determination that indicates that air emission controls are not required.

(3) No later than December 8, 1997, the air emission controls required by 40 CFR part 265, subparts AA, BB, and CC must be installed and in operation.

All final permits, or Class 3 permit modifications, issued by the EPA after June 5, 1995, must incorporate the requirements of 40 CFR part 264, subparts AA, BB, and CC. The owner and operator of an interim status TSDF who have submitted Part B applications to the EPA but have not received a draft permit as of June 5, 1995, are required to modify the Part B application to incorporate the requirements of 40 CFR part 264, subparts AA, BB, and CC prior to a draft permit being issued by the EPA. However, if the owner and operator have received a draft permit as of June 5, 1995, then the requirements of 40 CFR part 264, subparts AA, BB, and CC must be incorporated into the permit conditions prior to final permit determination. The Regional Administrator may establish, on a case-by-case basis, a reasonable date for submittal of the revised Part B application.

An existing solid waste management unit (or facility) may become a hazardous waste management unit (or facility) requiring a RCRA permit when a waste becomes newly listed or identified as hazardous. Owners and operators of TSDF not previously requiring a RCRA permit who have existing units handling newly listed or identified hazardous waste can submit a Part A application and gain interim status. The air standards being promulgated today are implemented at these facilities on the following schedule:

(1) 180 days following the date the waste is listed or identified as hazardous waste, the standards become effective; all facilities become subject to the standards.

(2) Beginning June 5, 1995, each TSDF owner or operator is required to be in compliance with the subpart AA, BB, and CC standards. At a facility where the air emission controls required by the subpart AA, BB, and CC standards are not in place, the owner or operator must have one of the following in the facility's operating record: an implementation schedule for the air emission controls in accordance with the recordkeeping requirements of the rule, or the facility's waste determination that indicates that air emission controls are not required.

(3) No later than December 8, 1997, the controls required by the standards must be installed at all facilities.

B. New Sources

All air emission controls required by 40 CFR part 264, subparts AA, BB, and CC must be in place and operating upon startup of a new TSDF. Under 40 CFR 270.10, owners and operators of new TSDF are required to submit Part A and Part B permit applications and to receive a final permit from the EPA prior to construction of the facility. The Part B application for a new facility must incorporate the requirements of 40 CFR part 264. Owners and operators who have submitted a Part B application for a new TSDF but have not been issued a final permit as of June 5, 1995, are required to modify their Part B applications to incorporate the requirements of 40 CFR part 264, subpart CC.

C. State Authority

1. Applicability of Rule in Authorized States

Under RCRA section 3006, the EPA may authorize a qualified State to administer and enforce the RCRA program within the State (refer to 40 CFR part 271 for the standards and requirements for authorization). Although an authorized State has primary responsibility for enforcement of RCRA, the EPA retains enforcement authority under RCRA sections 3008, 7003, and 3013, as well as inspection authority under RCRA section 3007.

Prior to the enactment of the HSWA, a State with final authority administered its hazardous waste program entirely in lieu of the EPA administering the Federal program in that State. The Federal requirements no longer applied in the authorized State, and the EPA could not issue permits for facilities in that State. When new, more stringent Federal requirements were promulgated or enacted, the State was obligated to enact equivalent requirements within specified time frames. The new Federal requirements did not take effect as Federal law in an authorized State until the State adopted the requirements as State law and was granted authority by the EPA to administer the requirements.

In contrast, new Federal requirements promulgated under authority of the HSWA, become effective in authorized States at the same time they are effective in nonauthorized States. Under RCRA section 3006(g)(1), the EPA is directed to administer the new Federal requirements in authorized States, including the issuance of permits, until the State is granted authority to do so.

While authorized States must still adopt all new RCRA provisions as State law to retain final authorization, requirements promulgated under RCRA provisions added by the HSWA are administered by the EPA as Federal law in authorized States in the interim.

Today's rules are promulgated under authority of RCRA section 3004(n), a provision added to RCRA by the HSWA. Therefore, the EPA is adding the requirements of the rules to Table 1 in 40 CFR 271.1(j). This table identifies the Federal program requirements that are promulgated pursuant to the HSWA and that take effect in all States, regardless of their authorization status.

2. Effect on State Authorizations

The EPA will implement the air standards promulgated today in an authorized State until such a time when the State either: (1) Modifies its RCRA program to adopt the rule and receives final authorization from the EPA for the modification; or (2) receives interim authorization from the EPA as described below. Because these air standards are promulgated under authority of the HSWA, a State submitting a program modification may apply to receive either interim or final authorization under RCRA section 3006(g)(2) or 3006(b), respectively, on the basis of requirements that are substantially equivalent or equivalent to the EPA's. The procedures and schedule for State program modifications for either interim or final authorization are described in 40 CFR 271.21. The availability of HSWA interim authorization was recently extended by the EPA until January 1, 2003 (see 57 FR 60129, December 18, 1992).

In accordance with the requirements of 40 CFR 271.21(e)(2), States with final authorization must modify their programs to reflect Federal program changes and subsequently must submit the modifications to the EPA for approval. The deadline by which a State must modify its RCRA program to adopt today's rulemaking is determined by the date of promulgation of the final rule, in accordance with 40 CFR 271.21(e)(2). This deadline can be extended in certain cases [40 CFR 271.21(e)(3)]. Once the EPA approves the modification, the State requirements become subtitle C RCRA requirements.

A State that submits its Base program application less than 12 months after the effective date of these standards is not required to include standards equivalent to these standards in its application. However, the State must modify its program by the deadlines set forth in 40 CFR 271.21(e). States that submit official applications for final

authorization 12 months after the effective date of these standards must include standards equivalent to these standards in their applications. The 40 CFR 271.3 sets forth the requirements a State must meet when submitting its final authorization application.

States with authorized RCRA programs may already have requirements similar to those in today's rule. Such State regulations have not been assessed against the Federal regulations being finalized today to determine whether they meet the tests for authorization. Thus, a State is not authorized to implement these requirements as RCRA requirements until the State program modification is assessed against Federal requirements and approved. Of course, States with existing standards may continue to administer and enforce their standards as a matter of State law. In implementing the Federal program, the EPA will work with States under cooperative agreements to minimize duplication of efforts. In many cases, the EPA will be able to defer to the States in their efforts to implement their programs, rather than take separate actions under Federal authority.

IX. Test Methods

A. Method 25D.

Method 25D in 40 CFR part 60, appendix A is the applicable test method for the determination of the volatile organic concentration of wastes. Method 25D was originally proposed as a part of this rulemaking but was subsequently promulgated in a separate rulemaking (see 56 FR 19402, April 22, 1994). Responses to comments received on the proposed Method 25D as part of this rulemaking are presented in the BID for today's final rule. Additional comments and responses relevant to the proposed Method 25D that were received as part of other EPA rulemakings are available in Air Docket Number A-90-23 located at the EPA's Air and Radiation Docket Information Center, Waterside Mall, room 1500, 1st Floor, 401 M Street, SW., Washington, DC 20460.

The sampling requirements in Method 25D have been changed since proposal. The promulgated version of Method 25D requires that samples of waste be collected from a source following specific procedures for sampling a single-phase or well-mixed waste, a multiple-phase waste, and solid materials. Each sample is suspended in an organic/aqueous matrix, then heated and purged with nitrogen for 30 minutes to separate certain organic compounds. A portion of the sample is analyzed for

carbon concentration, as methane, with a flame ionization detector. The other portion of the sample is analyzed for chlorine concentration, as chloride, with an electrolytic conductivity detector. The volatile organic concentration of the waste is then computed as the sum of the measured carbon and chlorine contents.

B. Method 25E

Method 25E is the applicable test method for determining the organic vapor pressure of waste managed in tanks. The version of Method 25E promulgated today in 40 CFR part 60, appendix A, is the same as the proposed version with one addition to the sampling requirements to provide for sampling waste in a tank. Method 25E requires collection of a waste sample in a headspace sample vial and transfer of the vial to a balanced pressure headspace sampler. The headspace vapor of the sample is analyzed for carbon content by a headspace analyzer, which uses a flame ionization detector.

X. Administrative Requirements

A. Paperwork Reduction Act

The information collection requirements in these rules have been approved by the Office of Management and Budget (OMB) under the *Paperwork Reduction Act*, 44 U.S.C. 3501 et seq., and have been assigned control number 1593.02.

To aid the EPA with enforcement of the rule being promulgated today, TSDF owners and operators and hazardous waste generators subject to today's action are required to record certain information in the on-site facility operating logs or files. The recordkeeping requirements for each respondent (i.e., person subject to the rule) will vary depending on a variety of site-specific factors. These factors include: the number of tanks, surface impoundments, and containers subject to the rule in operation at the respondent's facility; the number of hazardous waste streams managed at the facility; the type of waste determination methods selected by the respondent; and the type of air emission control equipment selected by the respondent to comply with the requirements of the rule.

This collection of information has an estimated reporting burden averaging 1.4 hours per response and an estimated annual recordkeeping burden averaging 62.5 hours per respondent. These estimates include time for reviewing instructions, searching existing data sources, gathering and maintaining the

data needed, and completing and reviewing the collection of information.

In general, a respondent is not required to submit any reports to the EPA unless certain events occur at the respondent's facility in which a hazardous waste is improperly managed in a unit not using the required air emission controls or a control device malfunction cannot be corrected by the respondent within 24 hours of being detected. Thus, the EPA expects that many respondents complying with this rule will have no reporting burden. On a nationwide average basis, the public reporting burden resulting from today's action is estimated by the EPA to be approximately 2 hours per year per respondent.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Chief, Information Policy Branch; EPA: 401 M St., S.W. (Mail Code 2136); Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention Desk Officer for EPA."

B. Executive Order 12866 Review

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

- (1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a "significant regulatory action" based on the estimated annual cost of the rulemaking to the economy (i.e., the EPA's estimate of nationwide annual costs for the subpart CC standards exceeds \$100 million). As such, the EPA has submitted this action

to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

C. Regulatory Flexibility Act

Under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.), whenever a Federal agency publishes any proposed or final rule in the Federal Register, it must prepare a Regulatory Flexibility Analysis (RFA) that describes the impact of the rule on small entities (i.e., small businesses, organizations, and governmental jurisdictions). This analysis is not necessary, however, if the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

The EPA has established guidelines for determining whether an RFA is required for the EPA rulemaking. These guidelines state that, if a preliminary analysis indicates that a proposed regulation would affect 20 percent or more of "small entities", then an RFA is to be prepared. In addition, these guidelines are used to evaluate if a regulation will have a "significant impact" on small entities. A regulation is considered by the EPA to have a "significant impact" if any one of the following four criteria is met:

(1) Annual compliance costs increase the relevant production costs for small entities by more than 5 percent;

(2) The ratio of compliance costs to sales will be 10 percent higher for small entities than for large entities;

(3) Capital costs of compliance will represent a significant portion of the capital available to small entities, taking into account internal cash flow plus external financing capabilities;

(4) Costs of the regulation will likely result in closures of small entities.

The EPA used the economic impact model developed for the RIA to estimate the effects of today's rulemaking on small entities (refer to Chapter VI of the RIA for additional details). The results of this analysis indicate that the effects of the air standards on small entities are minimal. The number of affected small entities is insubstantial, and the impacts are insignificant.

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that these final rules promulgated today will not have a significant impact on a substantial number of small entities. Therefore, an RFA is not required for this rulemaking.

D. Docket

Three RCRA dockets contain information pertaining to today's rulemaking:

(1) RCRA docket number F-91-CESP-FFFFF, which contains copies of all BID

references and other information related to the development of the rule up through proposal;

(2) RCRA docket number F-92-CESA-FFFFF, which contains copies of the supplemental data made available for public comment prior to promulgation; and

(3) RCRA docket number F-94-CESF-FFFFF, which contains copies of all BID references and other information related to development of the final rule following proposal.

The public may review all materials in these dockets at the EPA RCRA Docket Office.

The EPA RCRA Docket Office is located in room 2427 of the U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. The Docket Office is open from 9 a.m. to 4 p.m., Monday through Friday, except for Federal holidays. The public must have an appointment to review docket materials. Appointments can be scheduled by calling the Docket Office at (202) 260-9327. An individual may copy a maximum of 100 pages of material from any one regulatory docket free of charge. Additional pages of material from the docket may be copied at a charge of \$0.15 per page.

XI. Legal Authority

These regulations are promulgated under the authority of sections 2002, 3001-3007, 3010, and 7004 of the Solid Waste Disposal Act of 1970, as amended by RCRA, as amended (42 U.S.C. 6921-6927, 6930, and 6974).

List of Subjects

40 CFR Part 9

Environmental protection, Reporting and recordkeeping requirements.

40 CFR Part 60

Air pollution control, Test method, Vapor-phase organic concentration, Volatile organic concentration, Waste, Waste testing.

40 CFR Part 260

Air pollution control, Incorporation by reference.

40 CFR Part 262

Accumulation time, Air pollution control, Container, Tank.

40 CFR Parts 264 and 265

Air pollution control, Container, Control device, Hazardous waste, Incorporation by reference, Inspection, Miscellaneous unit, Monitoring, Reporting and recordkeeping requirements, Standards, Surface impoundment, Tank, Waste determination.

40 CFR Part 270

Administrative practice and procedure, Air pollution control, Confidential business information, Hazardous waste, Permit, Permit modification, Reporting and recordkeeping requirements.

40 CFR Part 271

Administrative practice and procedure, Air pollution control, Confidential business information, Hazardous waste, Reporting and recordkeeping requirements.

Dated: November 15, 1994.

Carol M. Browner,
The Administrator.

For the reasons set out in the preamble, title 40, chapter I, parts 9, 60, 260, 262, 264, 265, 270, and 271 of the Code of Federal Regulations are amended as follows:

PART 9—OMB APPROVALS UNDER THE PAPERWORK REDUCTION ACT

1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 et seq., 136-136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601-2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 et seq., 1311, 1313d, 1314, 1321, 1326, 1330, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971-1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-1, 300j-2, 300j-3, 300j-4, 300j-9, 1857 et seq., 6901-6992k, 7401-7671q, 7542, 9601-9657, 11023, 11048.

2. Section 9.1 is amended by adding new entities in numerical order to the table under the indicated headings to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

40 CFR citation	OMB control No.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	
264.1089	2060-0318
264.1090	2060-0318
Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	
265.1090	2060-0318

PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

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

Authority: Sections 111, 301(a) of the Clean Air Act as amended (42 U.S.C. 7411, 7601(a)) unless otherwise noted.

4. Appendix A is amended by adding Method 25E:

Appendix A—Test Methods

* * * * *

Method 25E—Determination of Vapor Phase Organic

Concentration in Waste Samples

Introduction

Performance of this method should not be attempted by persons unfamiliar with the operation of a flame ionization detector (FID) nor by those who are unfamiliar with source sampling because knowledge beyond the scope of this presentation is required.

1. Applicability and Principle

1.1 Applicability. This method is applicable for determining the vapor pressure of waste samples which represent waste which is or will be managed in tanks.

1.2 Principle. The headspace vapor of the sample is analyzed for carbon content by a headspace analyzer, which uses an FID.

2. Interferences

2.1 The analyst shall select the operating parameters best suited to the requirements for a particular analysis. The analyst shall produce confirming data through an adequate supplemental analytical technique and have the data available for review by the Administrator.

3. Apparatus

3.1 Sampling. The following equipment is required:

3.1.1 Sample Containers. Vials, glass, with butyl rubber septa, Perkin-Elmer Corporation Numbers 0105-0129 (glass vials), B001-0728 (gray butyl rubber septum,

plug style), 0105-0131 (butyl rubber septa), or equivalent. The seal must be made from butyl rubber. Silicone rubber seals are not acceptable.

3.1.2 Vial Sealer. Perkin-Elmer Number 105-0106, or equivalent.

3.1.3 Gas-Tight Syringe. Perkin-Elmer Number 00230117, or equivalent.

3.1.4 The following equipment is required for sampling.

3.1.4.1 Tap.

3.1.4.2 Tubing. Teflon, 0.25-in. ID. Note: Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

3.1.4.3 Cooling Coil. Stainless steel (304), 0.25 in.-ID, equipped with a thermocouple at the coil outlet.

3.2 Analysis. The following equipment is required:

3.2.1 Balanced Pressure Headspace Sampler. Perkin-Elmer HS-6, HS-100, or equivalent, equipped with a glass bead column instead of a chromatographic column.

3.2.2 FID. An FID meeting the following specifications is required:

3.2.2.1 Linearity. A linear response (± 5 percent) over the operating range as demonstrated by the procedures established in Section 6.1.2.

3.2.2.2 Range. A full scale range of 1 to 10,000 ppm CH_4 . Signal attenuators shall be available to produce a minimum signal response of 10 percent of full scale.

3.2.3 Data Recording System. Analog strip chart recorder or digital integration system compatible with the FID for permanently recording the output of the detector.

3.2.4 Thermometer. Capable of reading temperatures in the range of 30° to 60°C with an accuracy of $\pm 0.1^\circ\text{C}$.

4. Reagents

4.1 Analysis. The following items are required for analysis:

4.1.1 Hydrogen (H_2). Zero grade.

4.1.2 Carrier Gas. Zero grade nitrogen, containing less than 1 ppm carbon (C) and less than 1 ppm carbon dioxide.

4.1.3 Combustion Gas. Zero grade air or oxygen as required by the FID.

4.2 Calibration and Linearity Check.

4.2.1 Stock Cylinder Gas Standard. 100 percent propane. The manufacturer shall:

(a) Certify the gas composition to be accurate to ± 3 percent or better (see Section 4.2.1.1);

(b) Recommend a maximum shelf life over which the gas concentration does not change by greater than ± 5 percent from the certified value; and

(c) Affix the date of gas cylinder preparation, certified propane concentration, and recommended maximum shelf life to the cylinder before shipment to the buyer.

4.2.1.1 Cylinder Standards Certification.

The manufacturer shall certify the concentration of the calibration gas in the cylinder by (a) directly analyzing the cylinder and (b) calibrating his analytical procedure on the day of cylinder analysis. To calibrate his analytical procedure, the manufacturer shall use, as a minimum, a three-point calibration curve.

4.2.1.2 Verification of Manufacturer's Calibration Standards. Before using, the manufacturer shall verify each calibration standard by (a) comparing it to gas mixtures prepared in accordance with the procedure described in Section 7.1 of Method 106 of part 61, appendix B, or by (b) calibrating it against Standard Reference Materials (SRM's) prepared by the National Bureau of Standards, if such SRM's are available. The agreement between the initially determined concentration value and the verification concentration value shall be within ± 5 percent. The manufacturer must reverify all calibration standards on a time interval consistent with the shelf life of the cylinder standards sold.

5. Procedure

5.1 Sampling.

5.1.1 Install a sampling tap to obtain the sample at a point which is most representative of the unexposed waste (where the waste has had minimum opportunity to volatilize to the atmosphere). Assemble the sampling apparatus as shown in Figure 25E-1.

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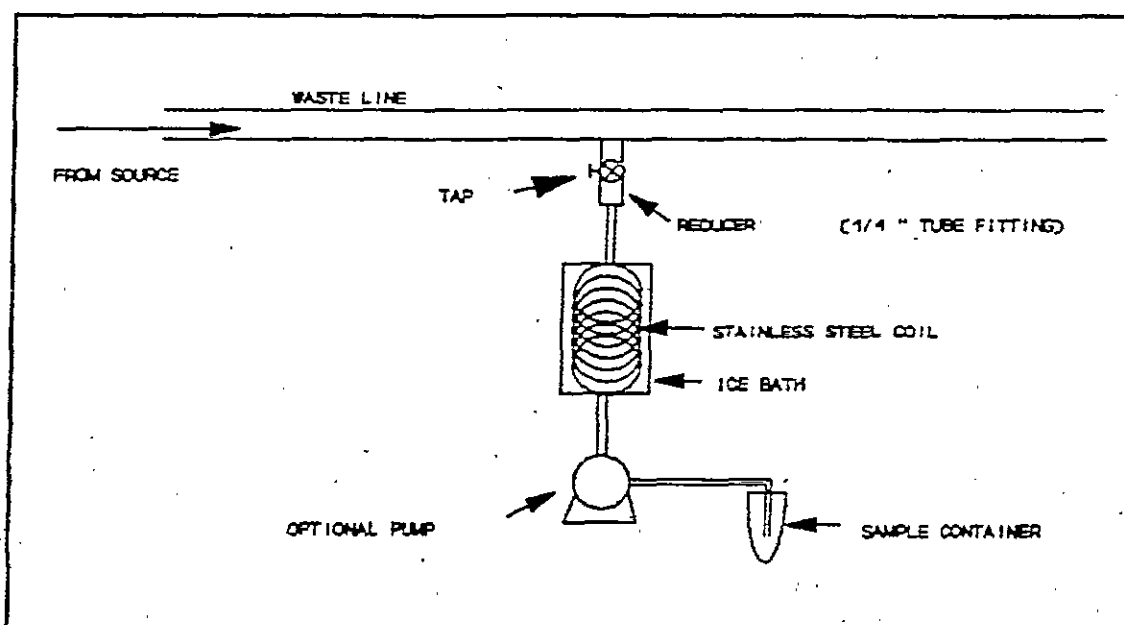


Figure 25E-1. Schematic of Sampling Apparatus.

BILLING CODE 5560-50-C

5.1.2 Begin sampling by purging the sample lines and cooling coil with at least four volumes of waste. Collect the purged material in a separate container and dispose of it properly.

5.1.3 After purging, stop the sample flow and transfer the Teflon sampling tube to a sample container. Sample at a flow rate such that the temperature of the waste is $<10^{\circ}\text{C}$ ($<50^{\circ}\text{F}$). Fill the sample container halfway (± 5 percent) and cap it within 5 seconds. Store immediately in a cooler and cover with ice.

5.1.4 Alternative sampling techniques may be used upon the approval of the Administrator.

5.2 Analysis.

5.2.1 Allow one hour for the headspace vials to equilibrate at the temperature specified in the regulation. Allow the FID to warm up until a stable baseline is achieved on the detector.

5.2.2 Check the calibration of the FID daily using the procedures in Section 6.1.2.

5.2.3 Follow the manufacturer's recommended procedures for the normal operation of the headspace sampler and FID.

5.2.4 Use the procedures in Sections 7.4 and 7.5 to calculate the vapor phase organic vapor pressure in the samples.

5.2.5 Monitor the output of the detector to make certain that the results are being properly recorded.

6. Operational Checks and Calibration

Maintain a record of performance of each item.

6.1 Use the procedures in Section 6.1.1 to calibrate the headspace analyzer and FID and check for linearity before the system is first placed in operation, after any shutdown longer than 6 months, and after any modification of the system.

6.1.1 Calibration and Linearity. Use the procedures in Section 6.2.1 of Method 18 of Part 60, Appendix A, to prepare the standards and calibrate the flowmeters, using propane as the standard gas. Fill the calibration standard vials halfway (± 5 percent) with deionized water. Purge and fill the airspace with calibration standard. Prepare a minimum of three calibration standards in triplicate at concentrations that will bracket the applicable cutoff. For a cutoff of 5.2 kPa, prepare nominal concentrations of 30,000, 50,000, and 70,000 ppm as propane. For a cutoff of 27.6 kPa, prepare nominal concentrations of 200,000, 300,000, and 400,000 ppm as propane.

6.1.1.1 Use the procedures in Section 5.2.3 to measure the FID response of each standard. Use a linear regression analysis to calculate the values for the slope (k) and the y-intercept (b). Use the procedures in Sections 7.2 and 7.3 to test the calibration and the linearity.

6.1.2 Daily FID Calibration Check. Check the calibration at the beginning and at the end of the daily runs by using the following procedures. Prepare two calibration standards at the nominal cutoff concentration using the procedures in Section 6.1.1. Place one at the beginning and one at the end of the daily run. Measure the FID response of the daily calibration standard and use the values for k and b from the most recent calibration to calculate the concentration of the daily standard. Use an equation similar to 25E-2 to calculate the percent difference between the daily standard and C_s . If the difference is within 5 percent, then the previous values for k and b may be used. Otherwise, use the procedures in Section 6.1.1 to recalibrate the FID.

7. Calculations

7.1 Nomenclature.

A = Measurement of the area under the response curve, counts.

b = y-intercept of the linear regression line.

C_s = Measured vapor phase organic concentration of sample, ppm as propane.

C_{ma} = Average measured vapor phase organic concentration of standard, ppm as propane.

C_m = Measured vapor phase organic concentration of standard, ppm as propane.

C_s = Calculated standard concentration, ppm as propane.

k = Slope of the linear regression line.

P_{bar} = Atmospheric pressure at analysis conditions, mm Hg (in. Hg).

P^* = Organic vapor pressure in the sample, kPa (psi).

$\beta = 1.333 \times 10^{-7} \text{ kPa}/[(\text{mm Hg})(\text{ppm})], (4.91 \times 10^{-7} \text{ psi}/[(\text{in. Hg})(\text{ppm})])$

7.2 Linearity. Use the following equation to calculate the measured standard concentration for each standard vial.

$$C_m = kA + b \quad \text{Eq. 25E-1}$$

7.2.1 Calculate the average measured standard concentration (C_{ma}) for each set of triplicate standards and use the following equation to calculate the percent difference (PD) between C_{ma} and C_s .

$$PD = \frac{C_s - C_{ma}}{C_s} \times 100 \quad \text{Eq. 25E-2}$$

The instrument linearity is acceptable if the percent difference is within five for each standard.

7.3 Relative Standard Deviation (RSD). Use the following equation to calculate the RSD for each triplicate set of standards.

$$RSD = \frac{100}{C_m} \sqrt{\frac{\sum (C_m - C_{ms})^2}{2}} \quad \text{Eq. 25E-3}$$

The calibration is acceptable if the RSD is within five for each standard concentration.

7.4 Concentration of organics in the headspace. Use the following equation to calculate the concentration of vapor phase organics in each sample.

$$C_a = k A + b \quad \text{Eq. 25E-4}$$

7.5 Vapor Pressure of Organics in the Headspace Sample. Use the following equation to calculate the vapor pressure of organics in the sample.

$$P^* = \beta P_{sat} C_a \quad \text{Eq. 25E-5}$$

PART 260—HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

5. The authority citation for part 260 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921-6927, 6930, 6934, 6935, 6937, 6938, 6939, and 6974.

6. Section 260.11 is amended by adding the following references to the end of paragraph (a) and by revising the first sentence of paragraph (b) to read as follows:

§ 260.11 References.

(a) ***
API Publication 2517, Third Edition, February 1989, "Evaporative Loss from External Floating-Roof Tanks," available from the American Petroleum Institute, 1220 L Street, Northwest, Washington, D.C. 20005.

"ASTM Standard Test Method for Vapor Pressure—Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope," ASTM Standard D 2879-92, available from American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pennsylvania 19103;

(b) The references listed in paragraph (a) of this section are also available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC. ***

PART 262—STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE

8. The authority citation for part 262 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6922, 6923, 6924, 6925, 6937 and 6938, unless otherwise noted.

8a. Section 262.34 is amended by revising paragraphs (a)(1)(i), (a)(1)(ii) and (d)(2) as follows:

§ 262.34 Accumulation time.

(a) ***

(1) ***

(i) In containers and the generator complies with subparts I AA, BB and CC of 40 CFR part 265; and/or

(ii) In tanks and the generator complies with subparts J, AA, BB and CC of 40 CFR part 265, except §§ 265.197(c) and 265.200; and/or

* * * * *

(d) ***

(2) The generator complies with the requirements of subpart I of part 265 of this chapter, except for §§ 265.176 and 265.178;

* * * * *

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

9. The authority citation for part 264 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924 and 6925.

Subpart B—General Facility Standards

§ 264.13 [Amended]

10. In § 264.13, paragraph (b)(6) is amended by adding "264.1083," after the phrase "as specified in §§ 264.17, 264.314, 264.341, 264.1034(d), 264.1063(d)."

11. In § 264.13, paragraph (b)(8) is added to read as follows:

§ 264.13 General waste analysis.

* * * * *

(b) ***

(8) For owners and operators seeking an exemption to the air emission standards of subpart CC in accordance with § 264.1082—

(i) The procedures and schedules for waste sampling and analysis, and the analysis of test data to verify the exemption.

(ii) Each generator's notice and certification of the volatile organic concentration in the waste if the waste is received from off site.

* * * * *

§ 264.15 [Amended]

12. In § 264.15, paragraph (b)(4) is amended by removing the word "and" after the phrase "frequencies called for in §§ 264.174, 264.193, 264.195, 264.226, 264.254, 264.278, 264.303, 264.347, 264.602, 264.1033, 264.1052, 264.1053," and adding "264.1088, and 264.1091(b)," after "264.1053."

Subpart E—Manifest System, Recordkeeping, and Reporting

13. Section 264.73 is amended by revising paragraphs (b)(3) and (b)(6) to read as follows:

§ 264.73 Operating record.

* * * * *

(b) ***

(3) Records and results of waste analyses and waste determinations performed as specified in §§ 264.13, 264.17, 264.314, 264.341, 264.1034, 264.1063, 264.1083, 268.4(a), and 268.7 of this chapter.

* * * * *

(6) Monitoring, testing or analytical data, and corrective action where required by subpart F of this part and §§ 264.19, 264.191, 264.193, 264.195, 264.222, 264.223, 264.226, 264.252 through 264.254, 264.276, 264.278, 264.280, 264.302 through 264.304, 264.309, 264.347, 264.602, 264.1034(c) through 264.1034(f), 264.1035, 264.1063(d) through 264.1063(i), 264.1064, 264.1088, 264.1089, and 264.1091.

* * * * *

14. Section 264.77 is amended by revising paragraph (c) to read as follows:

§ 264.77 Additional reports.

* * * * *

(c) As otherwise required by subparts F, K through N, AA, BB, and CC of this part.

Subpart I—Use and Management of Containers

15. Section 264.179 is added to read as follows:

§ 264.179 Air Emission Standards.

The owner or operator shall manage all hazardous waste placed in a container in accordance with the requirements of subpart CC of this part.

Subpart J—Tank Systems

16. Section 264.200 is added to read as follows:

§ 264.200 Air emission standards.

The owner or operator shall manage all hazardous waste placed in a tank in accordance with the requirements of subpart CC of this part.

Subpart K—Surface Impoundments

17. Section 264.232 is added to read as follows:

§ 264.232 Air emission standards.

The owner or operator shall manage all hazardous waste placed in a surface impoundment in accordance with the requirements of subpart CC of this part.

Subpart X—Miscellaneous Unit**§ 264.601 [Amended]**

18. The introductory text of § 264.601 is amended by adding the words "and subparts AA through CC" after "subparts I through O".

Subpart AA—Air Emission Standards for Process Vents

19. Section 264.1033 is amended by revising paragraph (k)(2) and adding paragraph (m) to read as follows:

§ 264.1033 Standards: Closed-vent systems and control devices.

* * * * *

(k) * * *

(2) Closed-vent systems shall be monitored to determine compliance with this section during the initial leak detection monitoring, which shall be conducted by the date that the facility becomes subject to the provisions of this section, annually, and at other times as requested by the Regional Administrator. For the annual leak detection monitoring after the initial leak detection monitoring, the owner or operator is not required to monitor those closed-vent system components which operate in vacuum service or those closed-vent system joints, seams, or other connections that are permanently or semi-permanently sealed (e.g., a welded joint between two sections of metal pipe or a bolted and gasketed pipe flange).

* * * * *

(m) The owner or operator using a carbon adsorption system shall document that all carbon removed from a carbon adsorption system to comply with § 264.1033(g) and § 264.1033(h) is managed in one of the following manners:

(1) Regenerated or reactivated in a thermal treatment unit that is permitted under subpart X of this part;

(2) Incinerated by a process that is permitted under subpart O of this part; or

(3) Burned in a boiler or industrial furnace that is permitted under subpart H of part 266 of this chapter.

20. In part 264, subpart CC is added to read as follows:

Subpart CC—Air Emission Standards for Tanks, Surface Impoundments, and Containers

Sec.

264.1080 Applicability.

264.1081 Definitions.

264.1082 Standards: General.

264.1083 Waste determination procedures.

264.1084 Standards: Tanks.

264.1085 Standards: Surface impoundments.

264.1086 Standards: Containers.

264.1087 Standards: Closed-vent systems and control devices.

264.1088 Inspection and monitoring requirements.

264.1089 Recordkeeping requirements.

264.1090 Reporting requirements.

264.1091 Alternative control requirements for tanks.

Subpart CC—Air Emission Standards for Tanks, Surface Impoundments, and Containers**§ 264.1080 Applicability.**

(a) The requirements of this subpart apply to owners and operators of all facilities that treat, store, or dispose of hazardous waste in tanks, surface impoundments, or containers subject to either subparts I, J, or K of this part except as § 264.1 and paragraph (b) of this section provide otherwise.

(b) The requirements of this subpart do not apply to the following waste management units at the facility:

(1) A waste management unit that holds hazardous waste placed in the unit before June 5, 1995, and in which no hazardous waste is added to the unit on or after June 5, 1995.

(2) A container that has a design capacity less than or equal to 0.1 m³.

(3) A tank in which an owner or operator has stopped adding hazardous waste and the owner or operator has begun implementing or completed closure pursuant to an approved closure plan.

(4) A surface impoundment in which an owner or operator has stopped adding hazardous waste (except to implement an approved closure plan) and the owner or operator has begun implementing or completed closure pursuant to an approved closure plan.

(5) A waste management unit that is used solely for on-site treatment or storage of hazardous waste that is generated as the result of implementing remedial activities required under the corrective action authorities of RCRA sections 3004(u), 3004(v) or 3008(h), CERCLA authorities, or similar Federal or State authorities.

(6) A waste management unit that is used solely for the management of radioactive mixed waste in accordance with all applicable regulations under the authority of the Atomic Energy Act and the Nuclear Waste Policy Act.

(c) For the owner and operator of a facility subject to this subpart and who received a final permit under RCRA section 3005 prior to June 5, 1995, the requirements of this subpart shall be incorporated into the permit when the permit is reissued in accordance with the requirements of 40 CFR 124.15 or reviewed in accordance with the requirements of 40 CFR 270.50(d). Until

such date when the owner and operator receives a final permit incorporating the requirements of this subpart, the owner and operator is subject to the requirements of 40 CFR part 265, subpart CC.

§ 264.1081 Definitions.

As used in this subpart, all terms shall have the meaning given to them in 40 CFR 265.1081, the Act, and parts 260 through 266 of this chapter.

§ 264.1082 Standards: General.

(a) This section applies to the management of hazardous waste in tanks, surface impoundments, and containers subject to this subpart.

(b) The owner or operator shall control air emissions from each waste management unit in accordance with standards specified in §§ 264.1084 through 264.1087 of this subpart, as applicable to the waste management unit, except as provided for in paragraph (c) of this section.

(c) A waste management unit is exempted from standards specified in §§ 264.1084 through 264.1087 of this subpart provided that all hazardous waste placed in the waste management unit is determined by the owner or operator to meet either of the following conditions:

(1) The average VO concentration of the hazardous waste at the point of waste origination is less than 100 parts per million by weight (ppmw). The average VO concentration shall be determined by the procedures specified in § 264.1083(a) of this subpart.

(2) The organic content of the hazardous waste has been reduced by an organic destruction or removal process that achieves any one of the following conditions:

(i) A process that removes or destroys the organics contained in the hazardous waste to a level such that the average VO concentration of the hazardous waste at the point of waste treatment is less than the exit concentration limit (C_e) established for the process. The average VO concentration of the hazardous waste at the point of waste treatment and the exit concentration limit for the process shall be determined using the procedures specified in § 264.1083(b) of this subpart.

(ii) A process that removes or destroys the organics contained in the hazardous waste to a level such that the organic reduction efficiency (R) for the process is equal to or greater than 95 percent, and the average VO concentration of the hazardous waste at the point of waste treatment is less than 50 ppmw. The organic reduction efficiency for the process and the average VO

concentration of the hazardous waste at the point of waste treatment shall be determined using the procedures specified in § 264.1083(b) of this subpart.

(iii) A process that removes or destroys the organics contained in the hazardous waste to a level such that the actual organic mass removal rate (MR) for the process is greater than the required organic mass removal rate (RMR) established for the process. The required organic mass removal rate and the actual organic mass removal rate for the process shall be determined using the procedures specified in § 264.1083(b) of this subpart.

(iv) A biological process that destroys or degrades the organics contained in the hazardous waste, such that either of the following conditions is met:

(A) The organic reduction efficiency (R) for the process is equal to or greater than 95 percent, and the organic biodegradation efficiency (R_{bio}) for the process is equal to or greater than 95 percent. The organic reduction efficiency and the organic biodegradation efficiency for the process shall be determined in accordance with the procedures specified in § 264.1083(b) of this subpart.

(B) The total actual organic mass biodegradation rate (MR_{bio}) for all hazardous waste treated by the process is equal to or greater than the required organic mass removal rate (RMR). The required organic mass removal rate and the actual organic mass biodegradation rate for the process shall be determined using the procedures specified in § 264.1083(b) of this subpart.

(v) A process that removes or destroys the organics contained in the hazardous waste and meets all of the following conditions:

(A) All of the materials entering the process are hazardous wastes.

(B) From the point of waste origination through the point where the hazardous waste enters the process, the hazardous waste is continuously managed in waste management units which use air emission controls in accordance with the standards specified in §§ 264.1084 through 264.1087 of this subpart, as applicable to the waste management unit.

(C) The average VO concentration of the hazardous waste at the point of waste treatment is less than the lowest average VO concentration at the point of waste origination determined for each of the individual hazardous waste streams entering the process or 100 ppmw, whichever value is lower. The average VO concentration of each individual hazardous waste stream at the point of waste origination shall be determined

using the procedure specified in § 264.1083(a) of this subpart. The average VO concentration of the hazardous waste at the point of waste treatment shall be determined using the procedure specified in § 264.1083(b) of this subpart.

(vi) A hazardous waste incinerator for which the owner or operator has either:

(A) Been issued a final permit under 40 CFR part 270, and designs and operates the unit in accordance with the requirements of subpart O of this part; or

(B) Has certified compliance with the interim status requirements of 40 CFR part 265, subpart O.

(vii) A boiler or industrial furnace for which the owner or operator has either:

(A) Been issued a final permit under 40 CFR part 270, and designs and operates the unit in accordance with the requirements of 40 CFR part 266, subpart H, or

(B) Has certified compliance with the interim status requirements of 40 CFR part 266, subpart H.

(d) When a process is used for the purpose of treating a hazardous waste to meet one of the sets of conditions specified in paragraphs (c)(2)(i) through (c)(2)(v) of this section, each material removed from or exiting the process that is not a hazardous waste but has an average VO concentration equal to or greater than 100 ppmw shall be managed in a waste management unit in accordance with the requirements of paragraph (b) of this section.

(e) The Regional Administrator may at any time perform or request that the owner or operator perform a waste determination for a hazardous waste managed in a tank, surface impoundment, or container exempted from using air emission controls under the provisions of this section as follows:

(1) The waste determination for average VO concentration of a hazardous waste at the point of waste origination shall be performed using direct measurement in accordance with the applicable requirements of § 264.1083(a) of this subpart. The waste determination for a hazardous waste at the point of waste treatment shall be performed in accordance with the applicable requirements of § 264.1083(b) of this subpart.

(2) In a case when the owner or operator is requested to perform the waste determination, the Regional Administrator may elect to have an authorized representative observe the collection of the hazardous waste samples used for the analysis.

(3) In a case when the results of the waste determination performed or requested by the Regional Administrator

do not agree with the results of a waste determination performed by the owner or operator using knowledge of the waste, then the results of the waste determination performed in accordance with the requirements of paragraph (e)(1) of this section shall be used to establish compliance with the requirements of this subpart.

(4) In a case when the owner or operator has used an averaging period greater than 1 hour for determining the average VO concentration of a hazardous waste at the point of waste origination, the Regional Administrator may elect to establish compliance with this subpart by performing or requesting that the owner or operator perform a waste determination using direct measurement based on waste samples collected within a 1-hour period as follows:

(i) The average VO concentration of the hazardous waste at the point of waste origination shall be determined by direct measurement in accordance with the requirements of § 264.1083(a) of this subpart.

(ii) Results of the waste determination performed or requested by the Regional Administrator showing that the average VO concentration of the hazardous waste at the point of waste origination is equal to or greater than 100 ppmw shall constitute noncompliance with this subpart except in a case as provided for in paragraph (e)(4)(iii) of this section.

(iii) For the case when the average VO concentration of the hazardous waste at the point of waste origination previously has been determined by the owner or operator using an averaging period greater than 1 hour to be less than 100 ppmw but because of normal operating process variations the VO concentration of the hazardous waste determined by direct measurement for any given 1-hour period may be equal to or greater than 100 ppmw, information that was used by the owner or operator to determine the average VO concentration of the hazardous waste (e.g., test results, measurements, calculations, and other documentation) and recorded in the facility records in accordance with the requirements of § 264.1083(a) and § 264.1089 of this subpart shall be considered by the Regional Administrator together with the results of the waste determination performed or requested by the Regional Administrator in establishing compliance with this subpart.

§ 264.1083 Waste determination procedures.

(a) Waste determination procedure for average volatile organic (VO)

concentration of a hazardous waste at the point of waste origination.

(1) An owner or operator shall determine the average VO concentration at the point of waste origination for each hazardous waste placed in waste management units exempted under the provisions of § 264.1082(c)(1) of this subpart from using air emission controls in accordance with standards specified in § 264.1084 through § 264.1087 of this subpart, as applicable to the waste management unit.

(2) The VO concentration at the point of waste origination for a hazardous waste shall be determined in accordance with the procedures specified in 40 CFR 265.1084(a)(2) through (a)(6) of this chapter.

(b) Waste determination procedures for treated hazardous waste.

(1) An owner or operator shall perform the applicable waste determinations for each treated hazardous waste placed in waste management units exempted under the provisions of § 264.1082(c)(2) of this subpart from using air emission controls in accordance with standards specified in § 264.1084 through § 264.1087 of this subpart, as applicable to the waste management unit.

(2) The waste determination for a treated hazardous waste shall be performed in accordance with the procedures specified in 40 CFR 265.1084(b)(2) through (b)(10), as applicable to the treated hazardous waste.

(c) Procedure to determine the maximum organic vapor pressure of a hazardous waste in a tank.

(1) An owner or operator shall determine the maximum organic vapor pressure for each hazardous waste placed in tanks using air emission controls in accordance with standards specified in § 264.1084(c) of this subpart.

(2) The maximum organic vapor pressure of the hazardous waste shall be determined in accordance with the procedures specified in 40 CFR 265.1084(c)(2) through (c)(4).

§ 264.1084 Standards: Tanks.

(a) This section applies to owners and operators of tanks subject to this subpart into which any hazardous waste is placed except for the following tanks:

(1) A tank in which all hazardous waste entering the tank meets the conditions specified in § 264.1082(c) of this subpart; or

(2) A tank used for biological treatment of hazardous waste in accordance with the requirements of § 264.1082(c)(2)(iv) of this subpart.

(b) The owner or operator shall place the hazardous waste into one of the following tanks:

(1) A tank equipped with a cover (e.g., a fixed roof) that is vented through a closed-vent system to a control device in accordance with the requirements specified in paragraph (d) of this section;

(2) A tank equipped with a fixed roof and internal floating roof in accordance with the requirements of § 264.1091 of this subpart;

(3) A tank equipped with an external floating roof in accordance with the requirements of § 264.1091 of this subpart; or

(4) A pressure tank that is designed to operate as a closed system such that the tank operates with no detectable organic emissions at all times that hazardous waste is in the tank except as provided for in paragraph (g) of this section.

(c) As an alternative to complying with paragraph (b) of this section, an owner or operator may place hazardous waste in a tank equipped with a cover (e.g., a fixed roof) meeting the requirements specified in paragraph (d)(1) of this section when the hazardous waste is determined to meet all of the following conditions:

(1) The hazardous waste is neither mixed, stirred, agitated, nor circulated within the tank by the owner or operator using a process that results in splashing, frothing, or visible turbulent flow on the waste surface during normal process operations;

(2) The hazardous waste in the tank is not heated by the owner or operator except during conditions requiring that the waste be heated to prevent the waste from freezing or to maintain adequate waste flow conditions for continuing normal process operations;

(3) The hazardous waste in the tank is not treated by the owner or operator using a waste stabilization process or a process that produces an exothermic reaction; and

(4) The maximum organic vapor pressure of the hazardous waste in the tank as determined using the procedure specified in § 264.1083(c) of this subpart is less than the following applicable value:

(i) If the tank design capacity is equal to or greater than 151 m³, then the maximum organic vapor pressure shall be less than 5.2 kPa;

(ii) If the tank design capacity is equal to or greater than 75 m³ but less than 151 m³, then the maximum organic vapor pressure shall be less than 27.6 kPa; or

(iii) If the tank design capacity is less than 75 m³, then the maximum organic

vapor pressure shall be less than 76.6 kPa.

(d) To comply with paragraph (b)(1) of this section, the owner or operator shall design, install, operate, and maintain a cover that vents the organic vapors emitted from hazardous waste in the tank through a closed-vent system connected to a control device.

(1) The cover shall be designed and operated to meet the following requirements:

(i) The cover and all cover openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable organic emissions when all cover openings are secured in a closed, sealed position.

(ii) Each cover opening shall be secured in a closed, sealed position (e.g., covered by a gasketed lid or cap) at all times that hazardous waste is in the tank except as provided for in paragraph (f) of this section.

(2) The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 264.1087 of this subpart.

(e) The owner and operator shall install, operate, and maintain enclosed pipes or other closed systems. EPA considers a drain system that meets the requirements of 40 CFR 61.346(a)(1) or 40 CFR 61.346(b)(1) through (b)(3) to be a "closed system", to:

(1) Transfer all hazardous waste to the tank from another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 264.1082(c) of this subpart; and

(2) Transfer all hazardous waste from the tank to another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 264.1082(c) of this subpart.

(f) Each cover opening shall be secured in a closed, sealed position (e.g., covered by a gasketed lid) at all times that hazardous waste is in the tank except when it is necessary to use the cover opening to:

(1) Add, remove, inspect, or sample the material in the tank;

(2) Inspect, maintain, repair, or replace equipment located inside the tank; or

(3) Vent gases or vapors from the tank to a closed-vent system connected to a control device that is designed and operated in accordance with the requirements of § 264.1087 of this subpart.

(g) One or more safety devices which vent directly to the atmosphere may be

used on the tank, cover, closed-vent system, or control device provided each safety device meets all of the following conditions:

(1) The safety device is not used for planned or routine venting of organic vapors from the tank or closed-vent system connected to a control device; and

(2) The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the tank, cover, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

§ 264.1085 Standards: Surface impoundments.

(a) This section applies to owners and operators of surface impoundments subject to this subpart into which any hazardous waste is placed except for the following surface impoundments:

(1) A surface impoundment in which all hazardous waste entering the surface impoundment meets the conditions specified in § 264.1082(c) of this subpart; or

(2) A surface impoundment used for biological treatment of hazardous waste in accordance with the requirements of § 264.1082(c)(2)(iv) of this subpart.

(b) The owner or operator shall place the hazardous waste into a surface impoundment equipped with a cover (e.g., an air-supported structure or a rigid cover) that is vented through a closed-vent system to a control device meeting the requirements specified in paragraph (d) of this section.

(c) As an alternative to complying with paragraph (b) of this section, an owner or operator may place hazardous waste in a surface impoundment equipped with a floating membrane cover meeting the requirements specified in paragraph (e) of this section when the hazardous waste is determined to meet all of the following conditions:

(1) The hazardous waste is neither mixed, stirred, agitated, nor circulated within the surface impoundment by the owner or operator using a process that results in splashing, frothing, or visible turbulent flow on the waste surface during normal process operations;

(2) The hazardous waste in the surface impoundment is not heated by the owner or operator; and

(3) The hazardous waste is not treated by the owner or operator using a waste

stabilization process or a process that produces an exothermic reaction.

(d) To comply with paragraph (b)(1) of this section, the owner or operator shall design, install, operate, and maintain a cover that vents the organic vapors emitted from hazardous waste in the surface impoundment through a closed-vent system connected to a control device.

(1) The cover shall be designed and operated to meet the following requirements:

(i) The cover and all cover openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable organic emissions when all cover openings are secured in a closed, sealed position.

(ii) Each cover opening shall be secured in the closed, sealed position (e.g., covered by a gasketed lid or cap) at all times that hazardous waste is in the surface impoundment except as provided for in paragraph (g) of this section.

(iii) The closed-vent system and control device shall be designed and operated in accordance with § 264.1087 of this subpart.

(e) To comply with paragraph (c) of this section, the owner or operator shall design, install, operate, and maintain a floating membrane cover that meets all of the requirements specified in 40 CFR 265.1085(e)(1) through (e)(4).

(f) The owner or operator shall install, operate, and maintain enclosed pipes or other closed-systems, EPA considers a drain system that meets the requirements of 40 CFR 61.346(a)(1) or 40 CFR 61.346(b)(1) through (b)(3) to be a "closed system", to:

(1) Transfer all hazardous waste to the surface impoundment from another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 264.1082(c) of this subpart; and

(2) Transfer all hazardous waste from the surface impoundment to another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 264.1082(c) of this subpart.

(g) Each cover opening shall be secured in the closed, sealed position (e.g., a cover by a gasketed lid or cap) at all times that hazardous waste is in the surface impoundment except when it is necessary to use the cover opening to:

(1) Add, remove, inspect, or sample the material in the surface impoundment;

(2) Inspect, maintain, repair, or replace equipment located underneath the cover;

(3) Remove treatment residues from the surface impoundment in accordance with the requirements of 40 CFR 268.4; or

(4) Vent gases or vapors from the surface impoundment to a closed-vent system connected to a control device that is designed and operated in accordance with the requirements of § 264.1087 of this subpart.

(h) One or more safety devices that vent directly to the atmosphere may be installed on the cover, closed-vent system, or control device provided each device meets all of the following conditions:

(1) The safety device is not used for planned or routine venting of organic vapors from the surface impoundment or the closed-vent system connected to a control device; and

(2) The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the cover, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

§ 264.1086 Standards: Containers.

(a) This section applies to the owners and operators of containers having design capacities greater than 0.1 m³ subject to this subpart into which any hazardous waste is placed except for a container in which all hazardous waste entering the container meets the conditions specified in § 264.1082(c) of this subpart.

(b) An owner or operator shall manage hazardous waste in containers using the following procedures:

(1) The owner or operator shall place the hazardous waste into one of the following containers except when a container is used for hazardous waste treatment as required by paragraph (b)(2) of this section:

(i) A container that is equipped with a cover which operates with no detectable organic emissions when all container openings (e.g., lids, bungs, hatches, and sampling ports) are secured in a closed, sealed position. The owner or operator shall determine that a container operates with no detectable emissions by testing each opening on the container for leaks in accordance with Method 21 in 40 CFR part 60, appendix A the first time any portion of

the hazardous waste is placed into the container. If a leak is detected and cannot be repaired immediately, the hazardous waste shall be removed from the container and the container not used to meet the requirements of this paragraph until the leak is repaired and the container is retested.

(ii) A container having a design capacity less than or equal to 0.46 m³ that is equipped with a cover and complies with all applicable Department of Transportation regulations on packaging hazardous waste for transport under 49 CFR part 178.

(A) A container that is managed in accordance with the requirements of 49 CFR part 178 for the purpose of complying with this subpart is not subject to any exceptions to the 49 CFR part 178 regulations, except as noted in paragraph (b)(1)(ii)(B) of this section.

(B) A lab pack that is managed in accordance with the requirements of 49 CFR part 178 for the purpose of complying with this subpart may comply with the exceptions for combination packagings specified in 49 CFR 173.12(b).

(iii) A container that is attached to or forms a part of any truck, trailer, or railcar; and that has been demonstrated within the preceding 12 months to be organic vapor tight when all container openings are in a closed, sealed position (e.g., the container hatches or lids are gasketed and latched). For the purpose of meeting the requirements of this paragraph, a container is organic vapor tight if the container sustains a pressure change of not more than 750 pascals within 5 minutes after it is pressurized to a minimum of 4,500 pascals. This condition is to be demonstrated using the pressure test specified in Method 27 of 40 CFR part 60, appendix A, and a pressure measurement device which has a precision of ± 2.5 mm water and which is capable of measuring above the pressure at which the container is to be tested for vapor tightness.

(2) An owner or operator treating hazardous waste in a container by either a waste stabilization process, any process that requires the addition of heat to the waste, or any process that produces an exothermic reaction shall meet the following requirements:

(i) Whenever it is necessary for the container to be open during the treatment process, the container shall be located inside an enclosure that is vented through a closed-vent system to a control device.

(ii) The enclosure shall be a structure that is designed and operated in accordance with the following requirements:

(A) The enclosure shall be a structure that is designed and operated with sufficient airflow into the structure to capture the organic vapors emitted from the hazardous waste in the container and vent the vapors through the closed-vent system to the control device.

(B) The enclosure may have permanent or temporary openings to allow worker access; passage of containers through the enclosure by conveyor or other mechanical means; entry of permanent mechanical or electrical equipment; or to direct airflow into the enclosure. The pressure drop across each opening in the enclosure shall be maintained at a pressure below atmospheric pressure such that whenever an open container is placed inside the enclosure no organic vapors released from the container exit the enclosure through the opening. The owner or operator shall determine that an enclosure achieves this condition by measuring the pressure drop across each opening in the enclosure. If the pressure within the enclosure is equal to or greater than atmospheric pressure then the enclosure does not meet the requirements of this section.

(iii) The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 264.1087 of this subpart.

(3) An owner or operator transferring hazardous waste into a container having a design capacity greater than 0.46 m³ shall meet the following requirements:

(i) Hazardous waste transfer by pumping shall be performed using a conveyance system that uses a tube (e.g., pipe, hose) to add the waste into the container. During transfer of the waste into the container, the cover shall remain in place and all container openings shall be maintained in a closed, sealed position except for those openings through which the tube enters the container and as provided for in paragraph (c) of this section. The tube shall be positioned in a manner such that either the:

(A) Tube outlet continuously remains submerged below the waste surface at all times waste is flowing through the tube;

(B) Lower bottom edge of the tube outlet is located at a distance no greater than two inside diameters of the tube or 15.25 cm, whichever distance is greater, from the bottom of the container at all times waste is flowing through the tube; or

(C) Tube is connected to a permanent port mounted on the bottom of the container so that the lower edge of the port opening inside the container is located at a distance equal to or less

than 15.25 cm from the container bottom.

(ii) Hazardous waste transferred by a means other than pumping shall be performed such that during transfer of the waste into the container, the cover remains in place and all container openings are maintained in a closed, sealed position except for those openings through which the hazardous waste is added and as provided for in paragraph (d) of this section.

(c) Each container opening shall be maintained in a closed, sealed position (e.g., covered by a gasketed lid) at all times that hazardous waste is in the container except when it is necessary to use the opening to:

(1) Add, remove, inspect, or sample the material in the container;

(2) Inspect, maintain, repair, or replace equipment located inside the container; or

(3) Vent gases or vapors from a cover located over or enclosing an open container to a closed-vent system connected to a control device that is designed and operated in accordance with the requirements of § 264.1087 of this subpart.

(d) One or more safety devices that vent directly to the atmosphere may be used on the container, cover, enclosure, closed-vent system, or control device provided each device meets all of the following conditions:

(1) The safety device is not used for planned or routine venting of organic vapors from the container, cover, enclosure, or closed-vent system connected to a control device; and

(2) The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the container, cover, enclosure, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

§ 264.1087 Standards: Closed-vent systems and control devices.

(a) This section applies to each closed-vent system and control device installed and operated by the owner or operator to control air emissions in accordance with standards of this subpart.

(b) The closed-vent system shall meet the following requirements:

(1) The closed-vent system shall route the gases, vapors, and fumes emitted from the hazardous waste in the waste

management unit to a control device that meets the requirements specified in paragraph (c) of this section.

(2) The closed-vent system shall be designed and operated in accordance with the requirements specified in § 264.1033(k) of this part.

(3) If the closed-vent system contains one or more bypass devices that could be used to divert all or a portion of the gases, vapors, or fumes from entering the control device, the owner or operator shall meet the following requirements:

(i) For each bypass device except as provided for in paragraph (b)(3)(ii) of this section, the owner or operator shall either:

(A) Install, calibrate, maintain, and operate a flow indicator at the inlet to the bypass device that indicates at least once every 15 minutes whether gas, vapor, or fume flow is present in the bypass device; or

(B) Secure a valve installed at the inlet to the bypass device in the closed position using a car-seal or a lock-and-key type configuration. The owner or operator shall visually inspect the seal or closure mechanism at least once every month to verify that the valve is maintained in the closed position.

(ii) Low leg drains, high point bleeds, analyzer vents, open-ended valves or lines, and safety devices are not subject to the requirements of paragraph (b)(3)(i) of this section.

(c) The control device shall meet the following requirements:

(1) The control device shall be one of the following devices:

(i) A control device designed and operated to reduce the total organic content of the inlet vapor stream vented to the control device by at least 95 percent by weight;

(ii) An enclosed combustion device designed and operated in accordance with the requirements of § 264.1033(c) of this part; or

(iii) A flare designed and operated in accordance with the requirements of § 264.1033(d) of this part.

(2) The control device shall be operating at all times when gases, vapors, or fumes are vented from the waste management unit through the closed-vent system to the control device.

(3) The owner or operator using a carbon adsorption system to comply with paragraph (c)(1) of this section shall operate and maintain the control device in accordance with the following requirements:

(i) Following the initial startup of the control device, all activated carbon in the control device shall be replaced with fresh carbon on a regular basis in

accordance with the requirements of § 264.1033(g) or § 264.1033(h) of this part.

(ii) All carbon removed from the control device shall be managed in accordance with the requirements of § 264.1033(m) of this part.

(4) An owner or operator using a control device other than a thermal vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system to comply with paragraph (c)(1) of this section shall operate and maintain the control device in accordance with the requirements of § 264.1033(j) of this part.

(5) The owner or operator shall demonstrate that a control device achieves the performance requirements of paragraph (c)(1) of this section as follows:

(i) An owner or operator shall demonstrate using either a performance test as specified in paragraph (c)(5)(iii) of this section or a design analysis as specified in paragraph (c)(5)(iv) of this section the performance of each control device except for the following:

(A) A flare;

(B) A boiler or process heater with a design heat input capacity of 44 megawatts or greater;

(C) A boiler or process heater into which the vent stream is introduced with the primary fuel;

(D) A boiler or process heater burning hazardous waste for which the owner or operator has been issued a final permit under 40 CFR part 270 and designs and operates the unit in accordance with the requirements of 40 CFR part 266, subpart H; or

(E) A boiler or process heater burning hazardous waste for which the owner or operator has certified compliance with the interim status requirements of 40 CFR part 266, subpart H.

(ii) An owner or operator shall demonstrate the performance of each flare in accordance with the requirements specified in § 264.1033(e).

(iii) For a performance test conducted to meet the requirements of paragraph (c)(5)(i) of this section, the owner or operator shall use the test methods and procedures specified in § 264.1034(c)(1) through (c)(4).

(iv) For a design analysis conducted to meet the requirements of paragraph (c)(5)(i) of this section, the design analysis shall meet the requirements specified in § 264.1035(b)(4)(iii).

(v) The owner or operator shall demonstrate that a carbon adsorption system achieves the performance requirements of paragraph (c)(1) of this section based on the total quantity of organics vented to the atmosphere from all carbon adsorption system equipment

that is used for organic adsorption, organic desorption or carbon regeneration, organic recovery, and carbon disposal.

(6) If the owner or operator and the Regional Administrator do not agree on a demonstration of control device performance using a design analysis then the disagreement shall be resolved using the results of a performance test performed by the owner or operator in accordance with the requirements of paragraph (c)(5)(iii) of this section. The Regional Administrator may choose to have an authorized representative observe the performance test.

§ 264.1088 Inspection and monitoring requirements.

(a) This section applies to an owner or operator using air emission controls in accordance with the requirements of § 264.1084 through § 264.1087 of this subpart.

(b) Each cover used in accordance with requirements of § 264.1084 through § 264.1086 of this subpart shall be visually inspected and monitored for detectable organic emissions by the owner or operator using the procedure specified in 40 CFR 265.1089(f)(1) through (f)(7) except as follows:

(1) An owner or operator is exempted from performing the cover inspection and monitoring requirements specified in 40 CFR 265.1089(f)(1) through (f)(7) for the following tank covers:

(i) A tank internal floating roof that is inspected and monitored in accordance with the requirements of § 264.1091 of this subpart; or

(ii) A tank external floating roof that is inspected and monitored in accordance with the requirements of § 264.1091 of this subpart.

(2) If a tank is buried partially or entirely underground, an owner or operator is required to perform the cover inspection and monitoring requirements specified in 40 CFR 265.1089(f)(1) through (f)(7) only for those portions of the tank cover or tank body (e.g. fill ports; access hatches, gauge wells, etc.) that extend to or above the ground-surface and can be opened to the atmosphere.

(3) An owner or operator is exempted from performing the cover inspection and monitoring requirements specified in 40 CFR 265.1089(f)(1) through (f)(7) for a container that meets all requirements specified in either § 264.1086(b)(1)(ii) or § 264.1086(b)(1)(iii) of this subpart.

(4) An owner or operator is exempted from performing the cover inspection and monitoring requirements specified in 40 CFR 265.1089(f)(1) through (f)(7)

for an enclosure used to control air emissions from containers in accordance with the requirements of § 264.1086(b)(2) of this subpart.

(c) Each closed-vent system used in accordance with the requirements of § 264.1087 shall be inspected and monitored by the owner or operator in accordance with the procedure specified in § 264.1033(k).

(d) Each control device used in accordance with the requirements of § 264.1087 of this subpart shall be inspected and monitored by the owner or operator in accordance with the procedures specified in § 264.1033(f) and § 264.1033(i).

(e) The owner or operator shall develop and implement a written plan and schedule to perform all inspection and monitoring requirements of this section. The owner or operator shall incorporate this plan and schedule into the facility inspection plan required under § 264.15.

§ 264.1089 Recordkeeping requirements.

(a) Each owner or operator of a facility subject to requirements in this subpart shall record and maintain the following information as applicable:

(1) Documentation for each cover installed on a tank in accordance with the requirements of § 264.1084(b)(2) or § 264.1084(b)(3) of this subpart that includes information prepared by the owner or operator or provided by the cover manufacturer or vendor describing the cover design, and certification by the owner or operator that the cover meets the applicable design specifications as listed in 40 CFR 265.1091(c).

(2) Documentation for each floating membrane cover installed on a surface impoundment in accordance with the requirements of § 264.1085(c) of this subpart that includes information prepared by the owner or operator or provided by the cover manufacturer or vendor describing the cover design, and certification by the owner or operator that the cover meets the specifications listed in 40 CFR 265.1086(e).

(3) Documentation for each enclosure used to control air emissions from containers in accordance with the requirements of § 264.1086(b)(2)(i) of this subpart that includes information prepared by the owner or operator or provided by the manufacturer or vendor describing the enclosure design, and certification by the owner or operator that the enclosure meets the specifications listed in § 264.1086(b)(2)(ii) of this subpart.

(4) Documentation for each closed-vent system and control device installed

in accordance with the requirements of § 264.1087 of this subpart that includes:

(i) Certification that is signed and dated by the owner or operator stating that the control device is designed to operate at the performance level documented by a design analysis as specified in paragraph (a)(4)(ii) of this section or by performance tests as specified in paragraph (a)(4)(iii) of this section when the tank, surface impoundment, or container is or would be operating at capacity or the highest level reasonably expected to occur.

(ii) If a design analysis is used, then design documentation as specified in § 264.1035(b)(4). The documentation shall include information prepared by the owner or operator or provided by the control device manufacturer or vendor that describes the control device design in accordance with § 264.1035(b)(4)(iii) and certification by the owner or operator that the control equipment meets the applicable specifications.

(iii) If performance tests are used, then a performance test plan as specified in § 264.1035(b)(3) and all test results.

(iv) Information as required by § 264.1035(c)(1) and (c)(2).

(5) Records for all Method 27 tests performed by the owner or operator for each container used to meet the requirements of § 264.1086(b)(1)(iii) of this subpart.

(6) Records for all visual inspections conducted in accordance with the requirements of § 264.1088 of this subpart.

(7) Records for all monitoring for detectable organic emissions conducted in accordance with the requirements of § 264.1088 of this subpart.

(8) Records of the date of each attempt to repair a leak, repair methods applied, and the date of successful repair.

(9) Records for all continuous monitoring conducted in accordance with the requirements of § 264.1088 of this subpart.

(10) Records of the management of carbon removed from a carbon adsorption system conducted in accordance with § 264.1087(c)(3)(ii) of this subpart.

(11) Records for all inspections of each cover installed on a tank in accordance with the requirements of § 264.1084(b)(2) or § 264.1084(b)(3) of this subpart that includes information as listed in 40 CFR 265.1091(c).

(b) An owner or operator electing to use air emission controls for a tank in accordance with the conditions specified in § 264.1084(c) of this subpart shall record the following information:

(1) Date and time each waste sample is collected for direct measurement of maximum organic vapor pressure in accordance with § 264.1083(c) of this subpart.

(2) Results of each determination of the maximum organic vapor pressure of the waste in a tank performed in accordance with § 264.1083(c) of this subpart.

(3) Records specifying the tank dimensions and design capacity.

(c) An owner or operator electing to use air emission controls for a tank in accordance with the requirements of § 264.1091 of this subpart shall record the information required by § 264.1091(c) of this subpart.

(d) An owner or operator electing not to use air emission controls for a particular tank, surface impoundment, or container subject to this subpart in accordance with the conditions specified in § 264.1082(c) of this subpart shall record the information used by the owner or operator for each waste determination (e.g., test results, measurements, calculations, and other documentation) in the facility operating log. If analysis results for waste samples are used for the waste determination, then the owner or operator shall record the date, time, and location that each waste sample is collected in accordance with applicable requirements of § 264.1083 of this subpart.

(e) An owner or operator electing to comply with requirements in accordance with § 264.1082(c)(2)(v) or § 264.1082(c)(2)(vi) of this subpart shall record the identification number for the incinerator, boiler, or industrial furnace in which the hazardous waste is treated.

(f) An owner or operator designating a cover as unsafe to inspect and monitor pursuant to 40 CFR 265.1089(f)(5) or difficult to inspect and monitor pursuant to 40 CFR 265.1089(f)(6) shall record in a log that is kept in the facility operating record the following information:

(1) A list of identification numbers for tanks with covers that are designated as unsafe to inspect and monitor in accordance with the requirements of 40 CFR 265.1089(f)(5), an explanation for each cover stating why the cover is unsafe to inspect and monitor, and the plan and schedule for inspecting and monitoring each cover.

(2) A list of identification numbers for tanks with covers that are designated as difficult to inspect and monitor in accordance with the requirements of 40 CFR 265.1089(f)(6), an explanation for each cover stating why the cover is difficult to inspect and monitor, and the plan and schedule for inspecting and monitoring each cover.

(g) All records required by paragraphs (a) through (f) of this section except as required in paragraphs (a)(1) through (a)(4) of this section shall be maintained in the operating record for a minimum of 3 years. All records required by paragraphs (a)(1) through (a)(4) of this section shall be maintained in the operating record until the air emission control equipment is replaced or otherwise no longer in service.

(h) The owner or operator of a facility that is subject to this subpart and to the control device standards in 40 CFR part 60, subpart VV or 40 CFR part 61, subpart V may elect to demonstrate compliance with the applicable sections of this subpart by documentation either pursuant to this subpart, or pursuant to the provisions of 40 CFR part 60, subpart VV or 40 CFR part 61, subpart V, to the extent that the documentation required by 40 CFR parts 60 or 61 duplicates the documentation required by this section.

§ 264.1090 Reporting requirements.

(a) Each owner or operator managing hazardous waste in a tank, surface impoundment, or container exempted from using air emission controls under the provisions of § 264.1082(c) shall report to the Regional Administrator each occurrence when hazardous waste is placed in the waste management unit in noncompliance with the conditions specified in § 264.1082(c)(1) or (c)(2) of this subpart, as applicable. Examples of such occurrences include placing in the waste management unit a hazardous waste having an average VO concentration equal to or greater than 100 ppmw at the point of waste origination; or placing in the waste management unit a treated hazardous waste which fails to meet the applicable conditions specified in § 264.1082(c)(2)(i) through (c)(2)(v) of this subpart. The owner or operator shall submit a written report within 15 calendar days of the time that the owner or operator becomes aware of the occurrence. The written report shall contain the EPA identification number, facility name and address, a description of the noncompliance event and the cause, the dates of the noncompliance, and the actions taken to correct the noncompliance and prevent recurrence of the noncompliance. The report shall be signed and dated by an authorized representative of the owner or operator.

(b) Each owner or operator using air emission controls on a tank in accordance with the requirements § 264.1084(c) of this subpart shall report to the Regional Administrator each occurrence when hazardous waste is

managed in the tank in noncompliance with the conditions specified in § 264.1084(c)(1) through (c)(4) of this subpart. The owner or operator shall submit a written report within 15 calendar days of the time that the owner or operator becomes aware of the occurrence. The written report shall contain the EPA identification number, facility name and address, a description of the noncompliance event and the cause, the dates of the noncompliance, and the actions taken to correct the noncompliance and prevent recurrence of the noncompliance. The report shall be signed and dated by an authorized representative of the owner or operator.

(c) Each owner or operator using a control device in accordance with the requirements of § 264.1087 of this subpart shall submit a semiannual written report to the Regional Administrator excepted as provided for in paragraph (d) of this section. The report shall describe each occurrence during the previous 6-month period when a control device is operated continuously for 24 hours or longer in noncompliance with the applicable operating values defined in § 264.1035(c)(4) or when a flare is operated with visible emissions as defined in § 264.1033(d). The written report shall include the EPA identification number, facility name and address, and an explanation why the control device could not be returned to compliance within 24 hours, and actions taken to correct the noncompliance. The report shall be signed and dated by an authorized representative of the owner or operator.

(d) A report to the Regional Administrator in accordance with the requirements of paragraph (c) of this section is not required for a 6-month period during which all control devices subject to this subpart are operated by the owner or operator such that during no period of 24 hours or longer did a control device operate continuously in noncompliance with the applicable operating values defined in § 264.1035(c)(4) or a flare operate with visible emissions as defined in § 264.1033(d).

§ 264.1091 Alternative control requirements for tanks.

(a) This section applies to owners and operators of tanks electing to comply with § 264.1084(b)(2) or § 264.1084(b)(3) of this subpart.

(1) The owner or operator electing to comply with § 264.1084(b)(2) of this subpart shall design, install, operate, and maintain a fixed roof and internal floating roof that meet the requirements

specified in 40 CFR 265.1091(a)(1)(i) through (a)(1)(ix).

(2) The owner or operator electing to comply with § 264.1084(b)(3) of this subpart shall design, install, operate, and maintain an external floating roof that meets the requirements specified in 40 CFR 265.1091(a)(2)(i) through (a)(2)(iii).

(b) The owner or operator shall inspect and monitor the control equipment in accordance with the following requirements:

(1) For a tank equipped with a fixed roof and internal floating roof in accordance with the requirements of paragraph (a)(1) of this section, the owner or operator shall perform the inspection and monitoring requirements specified in 40 CFR 265.1091(b)(1).

(2) For a tank equipped with an external floating roof in accordance with the requirements of paragraph (a)(2) of this section, the owner or operator shall perform the inspection and monitoring requirements specified in 40 CFR 265.1091(b)(2).

(c) The owner or operator shall record the following information in the operating record in accordance with the requirements of § 264.1089(a)(1) and (a)(11) of this subpart:

(1) For a tank equipped with a fixed roof and internal floating roof in accordance with the requirements of paragraph (a)(1) of this section, the owner or operator shall record the information listed in 40 CFR 265.1091(c)(1).

(2) For a tank equipped with an external floating roof in accordance with the requirements of paragraph (a)(2) of this section, the owner or operator shall record the information listed in 40 CFR 265.1091(c)(2).

PART 265—INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

21. The authority citation for part 265 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, 6925, and 6935.

Subpart A—General

22. Section 265.1(b) is amended by revising the first sentence to read as follows:

§ 265.1 Purpose, scope, and applicability.

(b) Except as provided in § 265.1080(b), the standards of this part, and of 40 CFR 264.552 and 40 CFR 264.553, apply to owners and operators of facilities that treat, store or dispose of

hazardous waste who have fully complied with the requirements for interim status under section 3005(e) of RCRA and § 270.10 of this chapter until either a permit is issued under section 3005 of RCRA or until applicable part 265 closure and post-closure responsibilities are fulfilled, and to those owners and operators of facilities in existence on November 19, 1980 who have failed to provide timely notification as required by section 3010(a) of RCRA and/or failed to file Part A of the permit application as required by 40 CFR 270.10 (e) and (g). * * *

Subpart B—General Facility Standards

§ 265.13 [Amended]

23. In § 265.13, paragraph (b)(6) is amended by adding "265.1084," after the phrase "as specified in §§ 265.200, 265.225, 265.252, 265.273, 265.314, 265.341, 265.375, 265.402, 265.1034(d), 265.1063(d)."

24. In § 265.13, paragraph (b)(8) is added to read as follows:

§ 265.13 General waste analysis.

(b) * * *

(8) For owners and operators seeking an exemption to the air emission standards of Subpart CC of this part in accordance with § 265.1083—

(i) The procedures and schedules for waste sampling and analysis, and the analysis of test data to verify the exemption.

(ii) Each generator's notice and certification of the volatile organic concentration in the waste if the waste is received from offsite.

* * *

§ 265.15 [Amended]

25. In § 265.15, paragraph (b)(4) is amended by removing the word "and" after the phrase "frequencies called for in §§ 265.174, 265.193, 265.195, 265.226, 265.260, 265.278, 265.304, 265.347, 265.377, 265.403, 265.1033, 265.1052, 265.1053," and adding "265.1089, and 265.1091(b)," after "265.1058."

Subpart E—Manifest System, Recordkeeping, and Reporting

26. Section 265.73 is amended by revising paragraphs (b)(3) and (b)(6) to read as follows:

§ 265.73 Operating record.

* * *

(b) * * *

(3) Records and results of waste analysis, waste determinations, and trial

tests performed as specified in §§ 265.13, 265.200, 265.225, 265.252, 265.273, 265.314, 265.341, 265.375, 265.402, 265.1034, 265.1063, 265.1084, 268.4(a), and 268.7 of this chapter.

* * *

(6) Monitoring, testing or analytical data when required by §§ 265.19, 265.90, 265.94, 265.191, 265.193, 265.195, 265.222, 265.223, 265.226, 265.255, 265.259, 265.260, 265.276, 265.278, 265.280(d)(1), 265.302 through 265.304, 265.347, 265.377, 265.1034(c) through 265.1034(f), 265.1035, 265.1063(d) through 265.1063(i), 265.1064, 265.1089, 265.1090, and 265.1091.

27. Section 265.77 is amended by revising paragraph (d) to read as follows:

§ 265.77 Additional reports.

* * *

(d) As otherwise required by Subparts AA, BB, and CC of this part.

Subpart I—Use and Management of Containers

28. Section 265.178 is added to read as follows:

§ 265.178 Air emission standards.

The owner or operator shall manage all hazardous waste placed in a container in accordance with the requirements of subpart CC of this part.

Subpart J—Tank Systems

29. Section 265.202 is added to read as follows:

§ 265.202 Air emission standards.

The owner or operator shall manage all hazardous waste placed in a tank in accordance with the requirements of subparts AA, BB, and CC of this part.

Subpart K—Surface Impoundments

30. Section 265.231 is added to read as follows:

§ 265.231 Air emission standards.

The owner or operator shall manage all hazardous waste placed in a surface impoundment in accordance with the requirements of subpart CC of this part.

Subpart AA—Air Emission Standards for Process Vents

31. Section 265.1033 is amended by revising paragraph (j)(2) and adding paragraph (l) to read as follows:

§ 265.1033 Standards: Closed-vent systems and control devices.

* * *

(j) * * *

(2) Closed-vent systems shall be monitored to determine compliance with this section during the initial leak detection monitoring, which shall be conducted by the date that the facility becomes subject to the provisions of this section, annually, and at other times as requested by the Regional Administrator. For the annual leak detection monitoring after the initial leak detection monitoring, the owner or operator is not required to monitor those closed-vent system components which continuously operate in vacuum service or those closed-vent system joints, seams, or other connections that are permanently or semi-permanently sealed (e.g., a welded joint between two sections of metal pipe or a bolted and gasketed pipe flange).

* * *

(l) The owner or operator using a carbon adsorption system shall document that all carbon removed from the control device is managed in one of the following manners:

(1) Regenerated or reactivated in a thermal treatment unit that is permitted under subpart X of 40 CFR part 264 or subpart P of this part;

(2) Incinerated by a process that is permitted under subpart O of 40 CFR part 264 or subpart O of this part; or

(3) Burned in a boiler or industrial furnace that is permitted under subpart H of part 266 of this chapter.

32. In 40 CFR part 265, subpart CC is added to read as follows:

Subpart CC—Air Emission Standards for Tanks, Surface Impoundments, and Containers

Sec.

265.1080 Applicability.
265.1081 Definitions.
265.1082 Schedule for implementation of air emission standards.
265.1083 Standards: General.
265.1084 Waste determination procedures.
265.1085 Standards: Tanks.
265.1086 Standards: Surface impoundments.
265.1087 Standards: Containers.
265.1088 Standards: Closed-vent systems and control devices.
265.1089 Inspection and monitoring requirements.
265.1090 Recordkeeping requirements.
265.1091 Alternative tank emission control requirements.

Subpart CC—Air Emission Standards for Tanks, Surface Impoundments, and Containers

§ 265.1080 Applicability.

(a) The requirements of this subpart apply to owners and operators of all facilities that treat, store, or dispose of hazardous waste in tanks, surface impoundments, or containers subject to

either subparts I, J, or K of this part except as § 265.1 and paragraph (b) of this section provide otherwise.

(b) The requirements of this subpart do not apply to the following waste management units at the facility:

(1) A waste management unit that holds hazardous waste placed in the unit before June 5, 1995, and in which no hazardous waste is added to the unit on or after June 5, 1995.

(2) A container that has a design capacity less than or equal to 0.1 m³.

(3) A tank in which an owner or operator has stopped adding hazardous waste and the owner or operator has begun implementing or completed closure pursuant to an approved closure plan.

(4) A surface impoundment in which an owner or operator has stopped adding hazardous waste (except to implement an approved closure plan) and the owner or operator has begun implementing or completed closure pursuant to an approved closure plan.

(5) A waste management unit that is used solely for on-site treatment or storage of hazardous waste that is generated as the result of implementing remedial activities required under the RCRA corrective action authorities of 3004(u), 3004(v) or 3008(h), CERCLA authorities, or similar Federal or State authorities.

(6) A waste management unit that is used solely for the management of radioactive mixed waste in accordance with all applicable regulations under the authority of the Atomic Energy Act and the Nuclear Waste Policy Act.

(c) For the owner and operator of a facility subject to this subpart who has received a final permit under RCRA section 3005 prior to June 5, 1995, the following requirements apply:

(1) The requirements of 40 CFR part 264, subpart CC shall be incorporated into the permit when the permit is reissued in accordance with the requirements of 40 CFR 124.15 or reviewed in accordance with the requirements of 40 CFR 270.50(d).

(2) Until the date when the permit is reissued in accordance with the requirements of 40 CFR 124.15 or reviewed in accordance with the requirements of 40 CFR 270.50(d), the owner and operator is subject to the requirements of this subpart.

§ 265.1081 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given to them in the Act and parts 260 through 266 of this chapter.

Average volatile organic concentration or *average VO concentration* means the mass-weighted

average volatile organic concentration of a hazardous waste as determined in accordance with the requirements of § 265.1084 of this subpart.

Cover means a device or system which is placed on or over a hazardous waste such that the entire hazardous waste surface area is enclosed and sealed to reduce air emissions to the atmosphere. A cover may have openings such as access hatches, sampling ports, and gauge wells that are necessary for operation, inspection, maintenance, or repair of the unit on which the cover is installed provided that each opening is closed and sealed when not in use. Examples of covers include a fixed roof installed on a tank, a floating membrane cover installed on a surface impoundment, a lid installed on a drum, and an enclosure in which an open container is placed during waste treatment.

External floating roof means a pontoon or double-deck type floating roof that rests on the surface of a hazardous waste being managed in a tank that has no fixed roof.

Fixed roof means a rigid cover that is installed in a stationary position so that it does not move with fluctuations in the level of the hazardous waste placed in a tank.

Floating membrane cover means a cover consisting of a synthetic flexible membrane material that rests upon and is supported by the hazardous waste being managed in a surface impoundment.

Floating roof means a pontoon-type or double-deck type cover that rests upon and is supported by the hazardous waste being managed in a tank, and is equipped with a closure seal or seals to close the space between the cover edge and the tank wall.

Internal floating roof means a floating roof that rests or floats on the surface (but not necessarily in complete contact with it) of a hazardous waste being managed in a tank that has a fixed roof.

Liquid-mounted seal means a foam or liquid-filled primary seal mounted in contact with the hazardous waste between the tank wall and the floating roof continuously around the circumference of the tank.

Maximum organic vapor pressure means the equilibrium partial pressure exerted by the hazardous waste contained in a tank determined at the temperature equal to either: (1) the local maximum monthly average temperature as reported by the National Weather Service when the hazardous waste is stored or treated at ambient temperature; or (2) the highest calendar-month average temperature of the hazardous waste when the hazardous

waste is stored at temperatures above the ambient temperature or when the hazardous waste is stored or treated at temperatures below the ambient temperature.

No detectable organic emissions means no escape of organics from a device or system to the atmosphere as determined by an instrument reading less than 500 parts per million by volume (ppmv) above the background level at each joint, fitting, and seal when measured in accordance with the requirements of Method 21 in 40 CFR part 60, appendix A, and by no visible openings or defects in the device or system such as rips, tears, or gaps.

Point of waste origination means as follows:

(1) When the facility owner or operator is the generator of the hazardous waste, the point of waste origination means the point where a solid waste produced by a system, process, or waste management unit is determined to be a hazardous waste as defined in 40 CFR part 261.

[Note: In this case, this term is being used in a manner similar to the use of the term "point of generation" in air standards established for waste management operations under authority of the Clean Air Act in 40 CFR parts 60, 61, and 63].

(2) When the facility owner and operator are not the generator of the hazardous waste, point of waste origination means the point where the owner or operator accepts delivery or takes possession of the hazardous waste.

Point of waste treatment means the point where a hazardous waste exits a waste management unit used to destroy, degrade, or remove organics in the hazardous waste.

Vapor-mounted seal means a foam-filled primary seal mounted continuously around the circumference of the tank so that there is an annular vapor space underneath the seal. The annular vapor space is bounded by the bottom of the primary seal, the tank wall, the hazardous waste surface, and the floating roof.

Volatile organic concentration or *VO concentration* means the fraction by weight of organic compounds in a hazardous waste expressed in terms of parts per million (ppmw) as determined by direct measurement using Method 25D or by knowledge of the waste in accordance with the requirements of § 265.1084 of this subpart.

Waste determination means performing all applicable procedures in accordance with the requirements of § 265.1084 of this subpart to determine whether a hazardous waste meets standards specified in this subpart.

Examples of a waste determination include performing the procedures in accordance with the requirements of § 265.1084 of this subpart to determine the average VO concentration of a hazardous waste at the point of waste origination; the average VO concentration of a hazardous waste at the point of waste treatment and comparing the results to the exit concentration limit specified for the process used to treat the hazardous waste; determining the organic reduction efficiency and the organic biodegradation efficiency for a biological process used to treat a hazardous waste and comparing the results to the applicable standards; or the maximum volatile organic vapor pressure for a hazardous waste in a tank and comparing the results to the applicable standards.

Waste stabilization process means any physical or chemical process used to either reduce the mobility of hazardous constituents in a hazardous waste or eliminate free liquids as determined by Test Method 9095 (Paint Filter Liquids Test) in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846, Third Edition, September 1986, as amended by Update I, November 15, 1992 (incorporated by reference—refer to § 260.11 of this chapter). A waste stabilization process includes mixing the hazardous waste with binders or other materials, and curing the resulting hazardous waste and binder mixture. Other synonymous terms used to refer to this process are "waste fixation" or "waste solidification."

§ 265.1082 Schedule for implementation of air emission standards.

(a) Owners or operators of facilities existing on June 5, 1995, and subject to subparts I, J, and K of this part shall meet the following requirements:

(1) Install and begin operation of all control equipment required by this subpart by June 5, 1995, except as provided for in paragraph (a)(2) of this section.

(2) When control equipment required by this subpart cannot be installed and in operation by June 5, 1995, the owner or operator shall:

(i) Install and begin operation of the control equipment as soon as possible but no later than December 8, 1997.

(ii) Prepare an implementation schedule that includes the following information: specific calendar dates for award of contracts or issuance of purchase orders for the control equipment, initiation of on-site installation of the control equipment, completion of the control equipment

installation, and performance of any testing to demonstrate that the installed equipment meets the applicable standards of this subpart.

(iii) For facilities subject to the recordkeeping requirements of § 265.73 of this part, the owner or operator shall enter the implementation schedule specified in paragraph (a)(2)(ii) of this section in the operating record no later than June 5, 1995.

(iv) For facilities not subject to § 265.73 of this part, the owner or operator shall enter the implementation schedule specified in paragraph (a)(2)(ii) of this section in a permanent, readily available file located at the facility no later than June 5, 1995.

(b) Owners or operators of facilities in existence on the effective date of statutory or regulatory amendments under the Act that render the facility subject to subparts I, J, or K of this part shall meet the following requirements:

(1) Install and begin operation of all control equipment required by this subpart by the effective date of the amendment except as provided for in paragraph (b)(2) of this section.

(2) When control equipment required by this subpart cannot be installed and begin operation by the effective date of the amendment, the owner or operator shall:

(i) Install and operate the control equipment as soon as possible but no later than 30 months after the effective date of the amendment.

(ii) For facilities subject to the recordkeeping requirements of § 265.73, enter and maintain the implementation schedule specified in paragraph (a)(2)(ii) of this section in the operating record no later than the effective date of the amendment, or

(iii) For facilities not subject to § 265.73, the owner or operator shall enter and maintain the implementation schedule specified in paragraph (a)(2)(ii) of this section in a permanent, readily available file located at the facility site no later than the effective date of the amendment.

(c) The Regional Administrator may elect to extend the implementation date for control equipment at a facility, on a case by case basis, to a date later than December 8, 1997, when special circumstances that are beyond the facility owner's or operator's control delay installation or operation of control equipment and the owner or operator has made all reasonable and prudent attempts to comply with the requirements of this subpart.

§ 265.1083 Standards: General.

(a) This section applies to the management of hazardous waste in

tanks, surface impoundments, and containers subject to this subpart.

(b) The owner or operator shall control air emissions from each waste management unit in accordance with standards specified in § 265.1085 through § 265.1088 of this subpart, as applicable to the waste management unit, except as provided for in paragraph (c) of this section.

(c) A waste management unit is exempted from standards specified in § 265.1085 through § 265.1088 of this subpart provided that all hazardous waste placed in the waste management unit is determined by the owner or operator to meet either of the following conditions:

(1) The average VO concentration of the hazardous waste at the point of waste origination is less than 100 parts per million by weight (ppmw). The average VO concentration shall be determined by the procedures specified in § 265.1084(a) of this subpart.

(2) The organic content of the hazardous waste has been reduced by an organic destruction or removal process that achieves any one of the following conditions:

(i) A process that removes or destroys the organics contained in the hazardous waste to a level such that the average VO concentration of the hazardous waste at the point of waste treatment is less than the exit concentration limit (C) established for the process. The average VO concentration of the hazardous waste at the point of waste treatment and the exit concentration limit for the process shall be determined using the procedures specified in § 265.1084(b) of this subpart.

(ii) A process that removes or destroys the organics contained in the hazardous waste to a level such that the organic reduction efficiency (R) for the process is equal to or greater than 95 percent, and the average VO concentration of the hazardous waste at the point of waste treatment is less than 50 ppmw. The organic reduction efficiency for the process and the average VO concentration of the hazardous waste at the point of waste treatment shall be determined using the procedures specified in § 265.1084(b) of this subpart.

(iii) A process that removes or destroys the organics contained in the hazardous waste to a level such that the actual organic mass removal rate (MR) for the process is greater than the required organic mass removal rate (RMR) established for the process. The required organic mass removal rate and the actual organic mass removal rate for the process shall be determined using

the procedures specified in § 265.1084(b) of this subpart.

(iv) A biological process that destroys or degrades the organics contained in the hazardous waste, such that either of the following conditions is met:

(A) The organic reduction efficiency (R) for the process is equal to or greater than 95 percent, and the organic biodegradation efficiency (R_{bio}) for the process is equal to or greater than 95 percent. The organic reduction efficiency and the organic biodegradation efficiency for the process shall be determined in accordance with the procedures specified in § 265.1084(b) of this subpart.

(B) The total actual organic mass biodegradation rate (MR_{bio}) for all hazardous waste treated by the process is equal to or greater than the required organic mass removal rate (RMR). The required organic mass removal rate and the actual organic mass biodegradation rate for the process shall be determined using the procedures specified in § 265.1084(b) of this subpart.

(v) A process that removes or destroys the organics contained in the hazardous waste and meets all of the following conditions:

(A) All of the materials entering the process are hazardous wastes.

(B) From the point of waste origination through the point where the hazardous waste enters the process, the hazardous waste is continuously managed in waste management units which use air emission controls in accordance with the standards specified in § 265.1085 through § 265.1088 of this subpart, as applicable to the waste management unit.

(C) The average VO concentration of the hazardous waste at the point of waste treatment is less than the lowest average VO concentration at the point of waste origination determined for each of the individual hazardous waste streams entering the process or 100 ppmw, whichever value is lower. The average VO concentration of each individual hazardous waste stream at the point of waste origination shall be determined using the procedure specified in § 265.1084(a) of this subpart. The average VO concentration of the hazardous waste at the point of waste treatment shall be determined using the procedure specified in § 265.1084(b) of this subpart.

(vi) A hazardous waste incinerator for which the owner or operator has either:

(A) Been issued a final permit under 40 CFR part 270, and designs and operates the unit in accordance with the requirements of 40 CFR part 264, subpart O; or

(B) Has certified compliance with the interim status requirements of subpart O of this part.

(vii) A boiler or industrial furnace for which the owner or operator has either:

(A) Been issued a final permit under 40 CFR part 270, and designs and operates the unit in accordance with the requirements of 40 CFR part 266, subpart H; or

(B) Has certified compliance with the interim status requirements of 40 CFR part 266, subpart H.

(d) When a process is used for the purpose of treating a hazardous waste to meet one of the sets of conditions specified in paragraphs (c)(2)(i) through (c)(2)(v) of this section, each material removed from or exiting the process that is not a hazardous waste but has an average VO concentration equal to or greater than 100 ppmw shall be managed in a waste management unit in accordance with the requirements of paragraph (b) of this section.

(e) The Regional Administrator may at any time perform or request that the owner or operator perform a waste determination for a hazardous waste managed in a tank, surface impoundment, or container exempted from using air emission controls under the provisions of this section as follows:

(1) The waste determination for average VO concentration of a hazardous waste at the point of waste origination shall be performed using direct measurement in accordance with the applicable requirements of § 265.1084(a) of this subpart. The waste determination for a hazardous waste at the point of waste treatment shall be performed in accordance with the applicable requirements of § 265.1084(b) of this subpart.

(2) In a case when the owner or operator is requested to perform the waste determination, the Regional Administrator may elect to have an authorized representative observe the collection of the hazardous waste samples used for the analysis.

(3) In a case when the results of the waste determination performed or requested by the Regional Administrator do not agree with the results of a waste determination performed by the owner or operator using knowledge of the waste, then the results of the waste determination performed in accordance with the requirements of paragraph (e)(1) of this section shall be used to establish compliance with the requirements of this subpart.

(4) In a case when the owner or operator has used an averaging period greater than 1 hour for determining the average VO concentration of a hazardous waste at the point of waste

origination, the Regional Administrator may elect to establish compliance with this subpart by performing or requesting that the owner or operator perform a waste determination using direct measurement based on waste samples collected within a 1-hour period as follows:

(i) The average VO concentration of the hazardous waste at the point of waste origination shall be determined by direct measurement in accordance with the requirements of § 265.1084(a) of this subpart.

(ii) Results of the waste determination performed or requested by the Regional Administrator showing that the average VO concentration of the hazardous waste at the point of waste origination is equal to or greater than 100 ppmw shall constitute noncompliance with this subpart except in a case as provided for in paragraph (e)(4)(iii) of this section.

(iii) For the case when the average VO concentration of the hazardous waste at the point of waste origination previously has been determined by the owner or operator using an averaging period greater than 1 hour to be less than 100 ppmw but because of normal operating process variations the VO concentration of the hazardous waste determined by direct measurement for any given 1-hour period may be equal to or greater than 100 ppmw, information that was used by the owner or operator to determine the average VO concentration of the hazardous waste (e.g., test results, measurements, calculations, and other documentation) and recorded in the facility records in accordance with the requirements of § 265.1084(a) and § 265.1090 of this subpart shall be considered by the Regional Administrator together with the results of the waste determination performed or requested by the Regional Administrator in establishing compliance with this subpart.

§ 265.1084 Waste determination procedures.

(a) Waste determination procedure for volatile organic (VO) concentration of a hazardous waste at the point of waste origination.

(1) An owner or operator shall determine the average VO concentration at the point of waste origination for each hazardous waste placed in a waste management unit exempted under the provisions of § 265.1083(c)(1) of this subpart from using air emission controls in accordance with standards specified in § 265.1085 through § 265.1088 of this subpart, as applicable to the waste management unit.

(2) When the facility owner or operator is the generator of the hazardous waste, the owner or operator shall determine the average VO concentration of the hazardous waste using either direct measurement as specified in paragraph (a)(5) of this section or knowledge of the waste as specified in paragraph (a)(6) of this section for each hazardous waste generated as follows:

(i) When the hazardous waste is generated as part of a continuous process, the owner or operator shall:

(A) Perform an initial waste determination of the average VO concentration of the waste stream before the first time any portion of the material in the waste stream is placed in a waste management unit subject to this subpart, and thereafter update the information used for the waste determination at least once every 12 months following the date of the initial waste determination; and

(B) Perform a new waste determination whenever changes to the source generating the waste stream are reasonably likely to cause the average VO concentration of the hazardous waste to increase to a level that is equal to or greater than the applicable VO concentration limits specified in § 265.1083 of this subpart.

(ii) When the hazardous waste is generated as part of a batch process that is performed repeatedly but not necessarily continuously, the owner or operator shall:

(A) Perform an initial waste determination of the average VO concentration for one or more representative waste batches generated by the process before the first time any portion of the material in the batches is placed in a waste management unit subject to this subpart, and thereafter update the information used for the waste determination at least once every 12 months following the date of the initial waste determination; and

(B) Perform a new waste determination whenever changes to the process generating the waste batches are reasonably likely to cause the average VO concentration of the hazardous waste to increase to a level that is equal to or greater than the applicable VO concentration limits specified in § 265.1083 of this subpart.

(3) When the facility owner and operator is not the generator of the hazardous waste, the owner or operator shall determine the average VO concentration of the hazardous waste using either direct measurement as specified in paragraph (a)(5) of this section or knowledge of the waste as specified in paragraph (a)(6) of this

section for each hazardous waste entering the facility as follows:

(i) When the hazardous waste enters the facility as a continuous flow of material through a pipeline or other means (e.g., wastewater stream), the owner or operator shall:

(A) Perform an initial waste determination of the waste stream before the first time any portion of the material in the waste stream is placed in a waste management unit subject to this subpart, and thereafter update the information used for the waste determination at least once every 12 months following the date of the initial waste determination; and

(B) Perform a new waste determination whenever changes to the source generating the waste stream are reasonably likely to cause the average VO concentration of the hazardous waste to increase to a level that is equal to or greater than the applicable VO concentration limits specified in § 265.1083 of this subpart.

(ii) When the hazardous waste enters the facility in a container, the owner or operator shall perform a waste determination for the material held in each container.

(4) For the case when the average VO concentration of the hazardous waste is determined by the owner or operator to be less than 100 ppmw, but because of normal operating variations in the source or process generating the hazardous waste the VO concentration of the hazardous waste may be equal to or greater than 100 ppmw at any given time during the averaging period, the owner or operator shall prepare and enter in the facility operating record information that specifies the following:

(i) The maximum and minimum VO concentration values for the hazardous waste that occur during that averaging period used for the waste determination;

(ii) The operating conditions or circumstances under which the VO concentration of the hazardous waste will be equal to or greater than 100 ppmw, and;

(iii) The information and calculations used by the owner or operator to determine the average VO concentration of the hazardous waste.

(5) Procedure for using direct measurement to determine average VO concentration of a hazardous waste at the point of waste origination.

(i) The owner or operator shall identify and record the point of waste origination for the hazardous waste. All waste samples used to determine the average VO concentration of the hazardous waste shall be collected at this point.

(ii) The owner or operator shall designate and record the averaging period to be used for determining the average VO concentration for the hazardous waste. The averaging period shall not exceed 1 year. An initial waste determination shall be performed for each averaging period.

(iii) The owner or operator shall identify each discrete quantity of the material composing the hazardous waste represented by the averaging period designated in paragraph (a)(5)(ii) of this section. An example of a discrete quantity of material composing a hazardous waste generated as part of a continuous process is the quantity of material generated during a process operating mode defined by a specific set of operating conditions which are normal for the process. An example of a discrete quantity of material composing a hazardous waste generated as part of a batch process that is performed repeatedly but not necessarily continuously is the total quantity of material composing a single batch generated by the process. An example of a discrete quantity of material composing a hazardous waste delivered to a facility in a container is the total quantity of material held in the container.

(iv) The following procedure shall be used measure the VO concentration for each discrete quantity of material identified in paragraph (a)(5)(iii) of this section:

(A) A sufficient number of samples, but no less than four samples, shall be collected to represent the organic composition for the entire discrete quantity of hazardous waste being tested. All of the samples shall be collected within a 1-hour period. Sufficient information shall be prepared and recorded to document the waste quantity represented by the samples and, as applicable, the operating conditions for the source or process generating the hazardous waste represented by the samples.

(B) Each sample shall be collected in accordance with the requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication, No. SW-846, Third Edition, September 1986, as amended by Update I, November 15, 1992 (incorporated by reference—refer to § 260.11 of this chapter).

(C) Each collected sample shall be prepared and analyzed in accordance with the requirements of Method 25D in 40 CFR part 60, appendix A.

(D) The measured VO concentration for the discrete quantity of hazardous waste shall be determined by using the

results for all samples analyzed in accordance with paragraph (a)(5)(iv)(C) of this section and the following equation:

$$C = \frac{1}{n} \times \sum_{i=1}^n C_i$$

where:

C=Measured VO concentration of the discrete quantity of hazardous waste, ppmw.

i=Individual sample "i" of the hazardous waste collected in accordance with the requirements of SW-846.

n=Total number of samples of hazardous waste collected (at least 4) within a 1-hour period.

C_i=VO concentration measured by Method 25D for sample "i", ppmw.

(v) The average VO concentration of the hazardous waste shall be determined using the following procedure:

(A) When the facility owner or operator is the generator of the hazardous waste, a sufficient number of VO concentration measurements for the hazardous waste shall be performed in accordance with the requirements of paragraph (a)(5)(iv) of this section to represent the complete range of hazardous waste organic compositions and quantities that occur during the entire averaging period due to normal variations in the operating conditions for each process operating mode identified for the source or process generating the hazardous waste.

(B) When the facility owner or operator is not the generator of the hazardous waste, a sufficient number of VO concentration measurements for the hazardous waste shall be performed in accordance with the requirements of paragraph (a)(5)(iv) of this section to represent the complete range of hazardous waste organic compositions and quantities that occur in the hazardous waste as received at the facility during the entire averaging period.

(C) The average VO concentration of the hazardous waste at the point of waste origination shall be calculated by using the results for all VO measurements performed in accordance with paragraph (a)(5)(iv) of this section and the following equation:

$$C_{ave} = \frac{1}{Q_T} \times \sum_{j=1}^m (Q_j \times C_j)$$

where:

C_{ave}=Average VO concentration of the hazardous waste at the point of waste origination, ppmw.

j=Individual discrete quantity "j" of the hazardous waste for which a VO concentration measurement is determined in accordance with the requirements of paragraph (a)(5)(iv) of this section.

m=Total number of VO concentration measurements determined in accordance with the requirements of paragraph (a)(5)(iv) of this section for the averaging period.

Q_j=Mass of the discrete quantity of the hazardous waste represented by C_j, kg.

Q_T=Total mass of the hazardous waste for the averaging period, kg.

C_j=Measured VO concentration of discrete quantity "j" for the hazardous waste determined in accordance with the requirements of paragraph (a)(5)(iv) of this section, ppmw.

(6) Procedure for using knowledge of the waste to determine the average VO concentration of a hazardous waste at the point of waste origination.

(i) The owner or operator shall identify and record the point of waste origination for the hazardous waste. All information used to determine the average VO concentration of the hazardous waste shall be based on the hazardous waste composition at this point.

(ii) The owner or operator shall designate and record the averaging period to be used for determining the average VO concentration for the hazardous waste. The averaging period shall not exceed 1 year. An initial waste determination shall be performed for each averaging period.

(iii) The owner or operator shall prepare and record sufficient information that documents the average VO concentration for the hazardous waste. Information may be used that is prepared by either the facility owner or operator or by the generator of the hazardous waste. Examples of information that may be used as the basis for knowledge of the waste include: organic material balances for the source or process generating the waste; VO concentration measurements for the same type of waste performed in accordance with the procedure specified in paragraph (a)(5)(iv) of this section; previous individual organic constituent test data for the waste that are still applicable to the current waste management practices; documentation that the waste is generated by a process for which no organics-containing materials are used; previous test data for other locations managing the same type of waste; or other knowledge based on manifests, shipping papers, or waste certification notices.

(iv) If test data other than VO concentration measurements performed in accordance with the procedure specified in paragraph (a)(5)(iv) of this section are used as the basis for knowledge of the waste, then the owner or operator shall document the test method, sampling protocol, and the means by which sampling variability and analytical variability are accounted for in the determination of the average VO concentration. For example, an owner or operator may use individual organic constituent concentration test data that are validated in accordance with Method 301 in appendix A of 40 CFR part 63 as the basis for knowledge of the waste.

(b) Waste determination procedures for treated hazardous waste.

(1) An owner or operator shall perform the applicable waste determination for each treated hazardous waste placed in a waste management unit exempted under the provisions of § 265.1083(c)(2) of this subpart from using air emission controls in accordance with standards specified in § 265.1085 through § 265.1088 of this subpart, as applicable to the waste management unit.

(2) The owner or operator shall perform a waste determination for each discrete quantity of treated hazardous waste as follows:

(i) When the hazardous waste is treated by a continuous process, the owner or operator shall:

(A) Perform an initial waste determination for the treated waste stream before the first time any portion of the material in the waste stream is placed in a waste management unit subject to this subpart, and thereafter update the information used for the waste determination at least once every 12 months following the date of the initial waste determination; and

(B) Perform a new waste determination whenever changes to the hazardous waste streams fed to the process are reasonably likely to cause the characteristics of the hazardous waste at the point of waste treatment to change to levels that fail to achieve the applicable conditions specified in § 265.1083(c)(2) of this subpart.

(ii) When the hazardous waste is treated by a batch process that is performed repeatedly but not necessarily continuously, the owner or operator shall:

(A) Perform an initial waste determination for the treated hazardous waste in one or more representative batches treated by the process, and thereafter update the information used for the waste determination at least once

every 12 months following the date of the initial waste determination; and

(B) Perform a new waste determination whenever changes to the hazardous waste treated by the process are reasonably likely to cause the characteristics of the hazardous waste at the point of waste treatment to change to levels that fail to achieve the applicable conditions specified in § 265.1083(c)(2) of this subpart.

(3) The owner or operator shall designate and record the specific provision in § 265.1083(c)(2) of this subpart for which the waste determination is being performed. The waste determination for the treated hazardous waste shall be performed using the applicable procedures specified in paragraphs (b)(4) through (b)(10) of this section.

(4) Procedure to determine the average VO concentration of a hazardous waste at the point of waste treatment.

(i) The owner or operator shall identify and record the point of waste treatment for the hazardous waste. All waste samples used to determine the average VO concentration of the hazardous waste shall be collected at this point.

(ii) The owner or operator shall designate and record the averaging period to be used for determining the average VO concentration for the hazardous waste. The averaging period shall not exceed 1 year. An initial waste determination shall be performed for each averaging period.

(iii) The owner or operator shall identify each discrete quantity of the material composing the hazardous waste represented by the averaging period designated in paragraph (b)(4)(ii) of this section.

(iv) The following procedure shall be used measure the VO concentration for each discrete quantity of material identified in paragraph (b)(4)(iii) of this section:

(A) A sufficient number of samples, but no less than four samples, shall be collected to represent the organic composition for the entire discrete quantity of hazardous waste being tested. All of the samples shall be collected within a 1-hour period. Sufficient information shall be prepared and recorded to document the waste quantity represented by the samples and, as applicable, the operating conditions for the process treating the hazardous waste represented by the samples.

(B) Each sample shall be collected in accordance with the requirements specified in "Test Methods for Evaluating Solid Waste, Physical/

Chemical Methods," EPA Publication No. SW-846, Third Edition, September 1986, as amended by Update I, November 15, 1992 (incorporated by reference—refer to § 260.11 of this chapter).

(C) Each collected sample shall be prepared and analyzed in accordance with the requirements of Method 25D in 40 CFR part 60, appendix A.

(D) The measured VO concentration for the discrete quantity of hazardous waste shall be determined by using the results for all samples analyzed in accordance with paragraph (b)(4)(iv)(C) of this section and the following equation:

$$C = \frac{1}{n} \times \sum_{i=1}^n C_i$$

where:

C = Measured VO concentration of the discrete quantity of hazardous waste, ppmw.

i = Individual sample "i" of the hazardous waste collected in accordance with the requirements of SW-846.

n = Total number of samples of hazardous waste collected (at least 4) within a 1-hour period.

C_i = VO concentration measured by Method 25D for sample "i", ppmw.

(v) The average VO concentration of the hazardous waste at the point of waste treatment shall be determined using the following procedure:

(A) When the facility owner or operator is the generator of the hazardous waste, a sufficient number of VO concentration measurements for the hazardous waste shall be performed in accordance with the requirements of paragraph (b)(4)(iv) of this section to represent the complete range of hazardous waste organic compositions and quantities treated by the process during the entire averaging period.

(B) The average VO concentration of the hazardous waste at the point of waste treatment shall be calculated by using the results for all VO measurements performed in accordance with paragraph (b)(4)(iv) of this section and the following equation:

$$C_{ave} = \frac{1}{Q_T} \times \sum_{j=1}^m (Q_j \times C_j)$$

where:

C_{ave} = Average VO concentration of the hazardous waste at the point of waste treatment, ppmw.

j = Individual discrete quantity "j" of the hazardous waste for which a VO concentration measurement is determined in accordance with the

requirements of paragraph (b)(4)(iv) of this section.

m = Total number of VO concentration measurements determined in accordance with the requirements of paragraph (b)(4)(iv) of this section for the averaging period.

Q_j = Mass of the discrete quantity of the hazardous waste represented by C_j, kg.

Q_T = Total mass of the hazardous waste for the averaging period, kg.

C_j = Measured VO concentration of discrete quantity "j" for the hazardous waste determined in accordance with the requirements of paragraph (b)(4)(iv) of this section, ppmw.

(5) Procedure to determine the exit concentration limit (C_i) for a treated hazardous waste.

(i) The point of waste origination for each hazardous waste treated by the process at the same time shall be identified.

(ii) If a single hazardous waste stream is identified in paragraph (b)(5)(i) of this section, then the exit concentration limit (C_i) shall be 100 ppmw.

(iii) If more than one hazardous waste stream is identified in paragraph (b)(5)(i) of this section, then the VO concentration of each hazardous waste stream at the point of waste origination shall be determined in accordance with the requirements of paragraph (a) of this section. The exit concentration limit (C_i) shall be calculated by using the results determined for each individual hazardous waste stream and the following equation:

$$C_i = \frac{\sum_{x=1}^m (Q_x \times \bar{C}_x) + \sum_{y=1}^n (Q_y \times 100 \text{ ppmw})}{\sum_{x=1}^m Q_x + \sum_{y=1}^n Q_y}$$

where:

C_i = Exit concentration limit for treated hazardous waste, ppmw.

x = Individual hazardous waste stream "x" that has a VO concentration less than 100 ppmw at the point of waste origination as determined in accordance with the requirements of § 265.1084(a).

y = Individual hazardous waste stream "y" that has a VO concentration equal to or greater than 100 ppmw at the point of waste origination as determined in accordance with the requirements of § 265.1084(a).

m = Total number of "x" hazardous waste streams treated by process.

n = Total number of "y" hazardous waste streams treated by process.

Q_x = Annual mass quantity of hazardous waste stream "x", kg/yr.

Q_y = Annual mass quantity of hazardous waste stream "y", kg/yr.

$\bar{C}_x$ = Average VO concentration of hazardous waste stream "x" at the point of waste origination as determined in accordance with the requirements of § 265.1084(a), ppmw.

(6) Procedure to determine the organic reduction efficiency (R) for a treated hazardous waste.

(i) The organic reduction efficiency for a treatment process shall be determined based on results for a minimum of three consecutive runs. The sampling time for each run shall be 1 hour.

(ii) The point of each hazardous waste stream entering the process and each hazardous waste stream exiting the process that is to be included in the calculation of the organic reduction efficiency for the process shall be identified.

(iii) For each run, the following information shall be determined for each hazardous waste stream identified in paragraph (b)(6)(ii) of this section using the following procedures:

(A) The mass quantity of each hazardous waste stream entering the process (Q_b) and the mass quantity of each hazardous waste stream exiting the process (Q_e) shall be determined.

(B) The VO concentration of each hazardous waste stream entering the process (C_b) during the run shall be measured in accordance with the requirements of paragraphs (a)(5)(iv)(A) through (a)(5)(iv)(D) of this section. The VO concentration of each hazardous waste stream exiting the process (C_e) during the run shall be determined in accordance with the requirements of paragraph (b)(4)(iv) of this section. Samples shall be collected as follows:

(1) For a continuous process, the samples of the hazardous waste entering and samples of the hazardous waste exiting the process shall be collected concurrently.

(2) For a batch process, the samples of the hazardous waste entering the process shall be collected at the time that the hazardous waste is placed in the process. The samples of the hazardous waste exiting the process shall be collected as soon as practicable after the time when the process stops operation or the final treatment cycle ends.

(iv) The waste volatile organic mass flow entering the process (E_b) and the waste volatile organic mass flow exiting the process (E_e) shall be calculated by using the results determined in

accordance with paragraph (b)(6)(iii) of this section and the following equations:

$$E_b = \frac{1}{10^6} \sum_{j=1}^m (Q_{bj} \times C_{bj})$$

$$E_e = \frac{1}{10^6} \sum_{j=1}^m (Q_{ej} \times C_{ej})$$

where:

E_b = Waste volatile organic mass flow exiting process, kg/hr.

E_e = Waste volatile organic mass flow entering process, kg/hr.

m = Total number of runs (at least 3)

j = Individual run "j"

Q_{bj} = Mass quantity of hazardous waste entering process during run "j", kg/hr.

Q_{ej} = Average mass quantity of waste exiting process during run "j", kg/hr.

C_{bj} = Measured VO concentration of hazardous waste exiting process during run "j" as determined in accordance with the requirements of § 265.1084(b)(4)(iv), ppmw.

C_{ej} = Measured VO concentration of hazardous waste entering process during run "j" as determined in accordance with the requirements of § 265.1084(a)(5)(iv)(A) through (a)(5)(iv)(D), ppmw.

(v) The organic reduction efficiency of the process shall be calculated by using the results determined in accordance with paragraph (b)(6)(iv) of this section and the following equation:

$$R = \frac{E_b - E_e}{E_b} \times 100\%$$

where:

R = Organic reduction efficiency, percent.

E_b = Waste volatile organic mass flow entering process as determined in accordance with the requirements of paragraph (b)(6)(iv) of this section, kg/hr.

E_e = Waste volatile organic mass flow exiting process as determined in accordance with the requirements of paragraph (b)(6)(iv) of this section, kg/hr.

(7) Procedure to determine the organic biodegradation efficiency (R_{bio}) for a treated hazardous waste.

(i) The fraction of organics biodegraded (F_{bio}) shall be determined using the procedure specified in 40 CFR part 63, appendix C of this chapter.

(ii) The organic biodegradation efficiency shall be calculated by using the following equation:

$$R_{bio} = F_{bio} \times 100\%$$

where:

R_{bio} = Organic biodegradation efficiency, percent.

F_{bio} = Fraction of organic biodegraded as determined in accordance with the requirements of paragraph (b)(7)(i) of this section.

(8) Procedure to determine the required organic mass removal rate (RMR) for a treated hazardous waste.

(i) The point of waste origination for each hazardous waste treated by the process at the same time shall be identified.

(ii) For each hazardous waste stream identified in paragraph (b)(8)(i) of this section, the VO concentration of the hazardous waste stream at the point of waste origination shall be determined in accordance with the requirements of paragraph (a) of this section.

(iii) For each individual hazardous waste stream that has a volatile organic concentration equal to or greater than 100 ppmw at the point of waste origination as determined in accordance with the requirements of paragraph (b)(8)(ii) of this section, the average volumetric flow rate of hazardous waste at the point of waste origination and the density of the hazardous waste stream shall be determined.

(iv) The required organic mass removal rate for the hazardous waste shall be calculated by using the results determined for each individual hazardous waste stream in accordance with the requirements of paragraphs (b)(8)(ii) and (b)(8)(iii) of this section and the following equation:

$$RMR = \sum_{y=1}^n \left[V_y \times k_y \times \frac{(\bar{C}_y - 100 \text{ ppmw})}{10^6} \right]$$

where:

RMR = Required organic mass removal rate, kg/hr.

y = Individual hazardous waste stream "y" that has a volatile organic concentration equal to or greater than 100 ppmw at the point of waste origination as determined in accordance with the requirements of § 265.1084(a).

n = Total number of "y" hazardous waste streams treated by process.

V_y = Average volumetric flow rate of hazardous waste stream "y" at the point of waste origination, m³/hr.

k_y = Density of hazardous waste stream "y", kg/m³.

$\bar{C}_y$ = Average VO concentration of hazardous waste stream "y" at the point of waste origination as determined in accordance with the requirements of § 265.1084(a), ppmw.

(9) Procedure to determine the actual organic mass removal rate (MR) for a treated hazardous waste.

(i) The actual organic mass removal rate shall be determined based on results for a minimum of three consecutive runs. The sampling time for each run shall be 1 hour.

(ii) The waste volatile organic mass flow entering the process (E_e) and the waste volatile organic mass flow exiting the process (E_a) shall be determined in accordance with the requirements of paragraph (b)(6)(iv) of this section.

(iii) The actual organic mass removal rate shall be calculated by using the results determined in accordance with the requirements of paragraph (b)(9)(ii) of this section and the following equation:

$$MR = E_e - E_a$$

where:

MR = Actual organic mass removal rate, kg/hr.

E_e = Waste volatile organic mass flow entering process as determined in accordance with the requirements of paragraph (b)(6)(iv) of this section, kg/hr.

E_a = Waste volatile organic mass flow exiting process as determined in accordance with the requirements of paragraph (b)(6)(iv) of this section, kg/hr.

(10) Procedure to determine the actual organic mass biodegradation rate (MR_{bio}) for a treated hazardous waste.

(i) The actual organic mass biodegradation rate shall be determined based on results for a minimum of three consecutive runs. The sampling time for each run shall be 1 hour.

(ii) The waste organic mass flow entering the process (E_e) shall be determined in accordance with the requirements of paragraph (b)(6)(iv) of this section.

(iii) The fraction of organic biodegraded (F_{bio}) shall be determined using the procedure specified in 40 CFR part 63, appendix C.

(iv) The actual organic mass biodegradation rate shall be calculated by using the mass flow rates and fraction of organic biodegraded determined in accordance with the requirements of paragraphs (b)(10)(ii) and (b)(10)(iii) of this section and the following equation:

$$MR_{bio} = E_e \times F_{bio}$$

where:

MR_{bio} = Actual organic mass biodegradation rate, kg/hr.

E_e = Waste organic mass flow entering process as determined in accordance with the requirements of paragraph (b)(6)(iv) of this section, kg/hr.

F_{bio} = Fraction of organic biodegraded as determined in accordance with the requirements of paragraph (b)(10)(iii) of this section.

(c) Procedure to determine the maximum organic vapor pressure of a hazardous waste in a tank.

(1) An owner or operator shall determine the maximum organic vapor pressure for each hazardous waste placed in a tank using air emission controls in accordance with standards specified in § 265.1085(c) of this subpart.

(2) An owner or operator shall use either direct measurement as specified in paragraph (c)(3) of this section or knowledge of the waste as specified by paragraph (c)(4) of this section to determine the maximum organic vapor pressure which is representative of the hazardous waste composition stored or treated in the tank.

(3) To determine the maximum organic vapor pressure of the hazardous waste by direct measurement, the following procedure shall be used:

(i) Representative samples of the waste contained in the tank shall be collected. Sampling shall be conducted in accordance with the requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846, Third Edition, September 1986, as amended by Update 1, November 15, 1992 (incorporated by reference—refer to § 260.11 of this chapter).

(ii) Any appropriate one of the following methods may be used to analyze the samples and compute the maximum organic vapor pressure:

(A) Method 25E in 40 CFR part 60, appendix A;

(B) Methods described in American Petroleum Institute Publication 2517, Third Edition, February 1989, "Evaporative Loss from External Floating-Roof Tanks," (incorporated by reference—refer to § 260.11 of this chapter);

(C) Methods obtained from standard reference texts;

(D) ASTM Method 2879-92 (incorporated by reference—refer to § 260.11 of this chapter); or

(E) Any other method approved by the Regional Administrator.

(4) To determine the maximum organic vapor pressure of the hazardous waste by knowledge, sufficient information shall be prepared and recorded that documents the maximum organic vapor pressure of the hazardous waste in the tank. Examples of information that may be used include: documentation that the waste is

generated by a process for which no organics-containing materials are used; or that the waste is generated by a process for which at other locations it previously has been determined by direct measurement that the waste maximum organic vapor pressure is less than the maximum vapor pressure limit for the appropriate design capacity category specified for the tank.

§ 265.1085 Standards: Tanks.

(a) This section applies to owners and operators of tanks subject to this subpart into which any hazardous waste is placed except for the following tanks:

(1) A tank in which all hazardous waste entering the tank meets the conditions specified in § 265.1023(c) of this subpart; or

(2) A tank used for biological treatment of hazardous waste in accordance with the requirements of § 265.1083(c)(2)(iv) of this subpart.

(b) The owner or operator shall place the hazardous waste into one of the following tanks:

(1) A tank equipped with a cover (e.g., a fixed roof) that is vented through a closed-vent system to a control device in accordance with the requirements specified in paragraph (d) of this section;

(2) A tank equipped with a fixed roof and internal floating roof in accordance with the requirements of § 265.1091 of this subpart;

(3) A tank equipped with an external floating roof in accordance with the requirements of § 265.1091 of this subpart; or

(4) A pressure tank that is designed to operate as a closed system such that the tank operates with no detectable organic emissions at all times that hazardous waste is in the tank except as provided for in paragraph (g) of this section.

(c) As an alternative to complying with paragraph (b) of this section, an owner or operator may place hazardous waste in a tank equipped with a cover (e.g., a fixed roof) meeting the requirements specified in paragraph (d)(1) of this section when the hazardous waste is determined to meet all of the following conditions:

(1) The hazardous waste is neither mixed, stirred, agitated, nor circulated within the tank by the owner or operator using a process that results in splashing, frothing, or visible turbulent flow on the waste surface during normal process operations;

(2) The hazardous waste in the tank is not heated by the owner or operator except during conditions requiring that the waste be heated to prevent the waste from freezing or to maintain adequate

waste flow conditions for continuing normal process operations;

(3) The hazardous waste in the tank is not treated by the owner or operator using a waste stabilization process or a process that produces an exothermic reaction; and

(4) The maximum organic vapor pressure of the hazardous waste in the tank as determined using the procedure specified in § 265.1084(c) of this subpart is less than the following applicable value:

(i) If the tank design capacity is equal to or greater than 151 m³, then the maximum organic vapor pressure shall be less than 5.2 kPa;

(ii) If the tank design capacity is equal to or greater than 75 m³ but less than 151 m³, then the maximum organic vapor pressure shall be less than 27.6 kPa; or

(iii) If the tank design capacity is less than 75 m³, then the maximum organic vapor pressure shall be less than 76.6 kPa.

(d) To comply with paragraph (b)(1) of this section, the owner or operator shall design, install, operate, and maintain a cover that vents the organic vapors emitted from hazardous waste in the tank through a closed-vent system connected to a control device.

(1) The cover shall be designed and operated to meet the following requirements:

(i) The cover and all cover openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable organic emissions when all cover openings are secured in a closed, sealed position.

(ii) Each cover opening shall be secured in a closed, sealed position (e.g., covered by a gasketed lid or cap) at all times that hazardous waste is in the tank except as provided for in paragraph (f) of this section.

(2) The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 265.1088 of this subpart.

(e) The owner and operator shall install, operate, and maintain enclosed pipes or other closed systems for the transfer of hazardous waste as described in paragraph (e)(1) or (e)(2) of this section. The EPA considers a drain system that meets the requirements of 40 CFR 61.346(a)(1) or 40 CFR 61.346(b)(1) through (b)(3) to be a closed system.

(1) Transfer all hazardous waste to the tank from another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions

specified in § 265.1083(c) of this subpart; and

(2) Transfer all hazardous waste from the tank to another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 265.1083(c) of this subpart.

(f) Each cover opening shall be secured in a closed, sealed position (e.g., covered by a gasketed lid) at all times that hazardous waste is in the tank except when it is necessary to use the cover opening to:

(1) Add, remove, inspect, or sample the material in the tank;

(2) Inspect, maintain, repair, or replace equipment located inside the tank; or

(3) Vent gases or vapors from the tank to a closed-vent system connected to a control device that is designed and operated in accordance with the requirements of § 265.1088 of this subpart.

(g) One or more safety devices which vent directly to the atmosphere may be used on the tank, cover, closed-vent system, or control device provided each safety device meets all of the following conditions:

(1) The safety device is not used for planned or routine venting of organic vapors from the tank or the closed-vent system connected to a control device; and

(2) The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the tank, cover, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

§ 265.1086 Standards: surface impoundments.

(a) This section applies to owners and operators of surface impoundments subject to this subpart into which any hazardous waste is placed except for the following surface impoundments:

(1) A surface impoundment in which all hazardous waste entering the surface impoundment meets the conditions specified in § 265.1083(c) of this subpart; or

(2) A surface impoundment used for biological treatment of hazardous waste in accordance with the requirements of § 265.1083(c)(2)(iv) of this subpart.

(b) The owner or operator shall place the hazardous waste into a surface

impoundment equipped with a cover (e.g., an air-supported structure or a rigid cover) that is vented through a closed-vent system to a control device meeting the requirements specified in paragraph (d) of this section.

(c) As an alternative to complying with paragraph (b) of this section, an owner or operator may place hazardous waste in a surface impoundment equipped with a floating membrane cover meeting the requirements specified in paragraph (e) of this section when the hazardous waste is determined to meet all of the following conditions:

(1) The hazardous waste is neither mixed, stirred, agitated, nor circulated within the surface impoundment by the owner or operator using a process that results in splashing, frothing, or visible turbulent flow on the waste surface during normal process operations;

(2) The hazardous waste in the surface impoundment is not heated by the owner or operator; and

(3) The hazardous waste in the surface impoundment is not treated by the owner or operator using a waste stabilization process or a process that produces an exothermic reaction.

(d) To comply with paragraph (b)(1) of this section, the owner or operator shall design, install, operate, and maintain a cover that vents the organic vapors emitted from hazardous waste in the surface impoundment through a closed-vent system connected to a control device.

(1) The cover shall be designed, installed, operated, and maintained to meet the following requirements:

(i) The cover and all cover openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable organic emissions when all cover openings are secured in a closed, sealed position.

(ii) Each cover opening shall be secured in the closed, sealed position (e.g., covered by a gasketed lid or cap) at all times that hazardous waste is in the surface impoundment except as provided for in paragraph (g) of this section.

(iii) The closed-vent system and control device shall be designed and operated in accordance with § 265.1088 of this subpart.

(e) To comply with paragraph (c) of this section, the owner or operator shall design, install, operate, and maintain a floating membrane cover that meets all of the following requirements:

(1) The floating membrane cover shall be designed, installed, and operated such that at all times when hazardous waste is in the surface impoundment, the entire surface area of the hazardous

waste is enclosed by the cover, and any air spaces underneath the cover are not vented to the atmosphere except during conditions specified in paragraph (h) of this section.

(2) The floating membrane cover and all cover openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable organic emissions when all cover openings are secured in a closed, sealed position.

(3) Each cover opening shall be secured in a closed, sealed position (e.g., covered by a gasketed lid or cap) at all times that hazardous waste is in the surface impoundment except as provided for in paragraphs (g)(1) through (g)(3) of this section; and

(4) The synthetic membrane material used for the floating membrane cover shall be either:

(i) High density polyethylene with a thickness no less than 2.5 mm; or

(ii) A material or a composite of different materials determined to have the following properties:

(A) Organic permeability properties that are equivalent to those of the material specified in paragraph (e)(4)(i) of this section; and

(B) Chemical and physical properties that maintain the material integrity for as long as the cover is in use. Factors that shall be considered in selecting the material include: the effects of contact with the waste managed in the impoundment, weather exposure, and cover installation and operation practices.

(3) The owner or operator shall install, operate, and maintain enclosed pipes or other closed systems for the transfer of hazardous waste as described in paragraph (f)(1) or (f)(2) of this section. The EPA considers a drain system that meets the requirements of 40 CFR 61.346(a)(1) or 40 CFR 61.346(b)(1) through (b)(3) to be a closed system.

(1) Transfer all hazardous waste to the surface impoundment from another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 265.1083(c) of this subpart; and

(2) Transfer all hazardous waste from the surface impoundment to another tank, surface impoundment, or container subject to this subpart except for those hazardous wastes that meet the conditions specified in § 265.1083(c) of this subpart.

(g) Each cover opening shall be secured in the closed, sealed position (e.g., covered by a gasketed lid or cap) at all times that hazardous waste is in the surface impoundment except when

it is necessary to use the cover opening to:

(1) Add, remove, inspect, or sample the material in the surface impoundment;

(2) Inspect, maintain, repair, or replace equipment located underneath the cover;

(3) Remove treatment residues from the surface impoundment in accordance with the requirements of 40 CFR 268.4; or

(4) Vent gases or vapors from the surface impoundment to a closed-vent system connected to a control device that is designed and operated in accordance with the requirements of § 265.1088 of this subpart.

(h) One or more safety devices that vent directly to the atmosphere may be installed on the cover, closed-vent system, or control device provided each device meets all of the following conditions:

(1) The safety device is not used for planned or routine venting of organic vapors from the surface impoundment or the closed-vent system connected to a control device; and

(2) The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the cover, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

§ 265.1087 Standards: Containers.

(a) This section applies to the owners and operators of containers having design capacities greater than 0.1 m³ subject to this subpart into which any hazardous waste is placed except for a container in which all hazardous waste entering the container meets the conditions specified in § 265.1083(c) of this subpart.

(b) An owner or operator shall manage hazardous waste in containers using the following procedures:

(1) The owner or operator shall place the hazardous waste into one of the following containers except when a container is used for hazardous waste treatment as required by paragraph (b)(2) of this section:

(i) A container that is equipped with a cover which operates with no detectable organic emissions when all container openings (e.g., lids, bungs, hatches, and sampling ports) are secured in a closed, sealed position. The owner or operator shall determine that

a container operates with no detectable emissions by testing each opening on the container for leaks in accordance with Method 21 in 40 CFR part 60, appendix A the first time any portion of the hazardous waste is placed into the container. If a leak is detected and cannot be repaired immediately, the hazardous waste shall be removed from the container and the container not used to meet the requirements of this paragraph until the leak is repaired and the container is retested.

(ii) A container having a design capacity less than or equal to 0.46 m³ that is equipped with a cover and complies with all applicable Department of Transportation regulations on packaging hazardous waste for transport under 49 CFR part 178.

(A) A container that is managed in accordance with the requirements of 49 CFR part 178 for the purpose of complying with this subpart is not subject to any exceptions to the 49 CFR part 178 regulations, except as noted in paragraph (b)(1)(ii)(B) of this section.

(B) A lab pack that is managed in accordance with the requirements of 49 CFR part 178 for the purpose of complying with this subpart may comply with the exceptions for combination packagings specified in 49 CFR 173.12(b).

(iii) A container that is attached to or forms a part of any truck, trailer, or railcar, and that has been demonstrated within the preceding 12 months to be organic vapor tight when all container openings are in a closed, sealed position (e.g., the container hatches or lids are gasketed and latched). For the purpose of meeting the requirements of this paragraph, a container is organic vapor tight if the container sustains a pressure change of not more than 750 pascals within 5 minutes after it is pressurized to a minimum of 4,500 pascals. This condition is to be demonstrated using the pressure test specified in Method 27 of 40 CFR part 60, appendix A, and a pressure measurement device which has a precision of ± 2.5 mm water and which is capable of measuring above the pressure at which the container is to be tested for vapor tightness.

(2) An owner or operator treating hazardous waste in a container by either a waste stabilization process, any process that requires the addition of heat to the waste, or any process that produces an exothermic reaction shall meet the following requirements:

(i) Whenever it is necessary for the container to be open during the treatment process, the container shall be located inside an enclosure that is

vented through a closed-vent system to a control device.

(ii) The enclosure shall be a structure that is designed and operated in accordance with the following requirements:

(A) The enclosure shall be a structure that is designed and operated with sufficient airflow into the structure to capture the organic vapors emitted from the hazardous waste in the container and vent the vapors through the closed-vent system to the control device.

(B) The enclosure may have permanent or temporary openings to allow worker access; passage of containers through the enclosure by conveyor or other mechanical means; entry of permanent mechanical or electrical equipment; or to direct airflow into the enclosure. The pressure drop across each opening in the enclosure shall be maintained at a pressure below atmospheric pressure such that whenever an open container is placed inside the enclosure no organic vapors released from the container exit the enclosure through the opening. The owner or operator shall determine that an enclosure achieves this condition by measuring the pressure drop across each opening in the enclosure. If the pressure within the enclosure is equal to or greater than atmospheric pressure then the enclosure does not meet the requirements of this section.

(iii) The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 265.1088 of this subpart.

(3) An owner or operator transferring hazardous waste into a container having a design capacity greater than 0.46 m³ shall meet the following requirements:

(i) Hazardous waste transfer by pumping shall be performed using a conveyance system that uses a tube (e.g., pipe, hose) to add the waste into the container. During transfer of the waste into the container, the cover shall remain in place and all container openings shall be maintained in a closed, sealed position except for those openings through which the tube enters the container and as provided for in paragraph (c) of this section. The tube shall be positioned in a manner such that either the:

(A) Tube outlet continuously remains submerged below the waste surface at all times waste is flowing through the tube;

(B) Lower bottom edge of the tube outlet is located at a distance no greater than two inside diameters of the tube or 15.25 cm, whichever distance is greater, from the bottom of the container at all

times waste is flowing through the tube; or

(C) Tube is connected to a permanent port mounted on the bottom of the container so that the lower edge of the port opening inside the container is located at a distance equal to or less than 15.25 cm from the container bottom.

(ii) Hazardous waste transferred by a means other than pumping shall be performed such that during transfer of the waste into the container, the cover remains in place and all container openings are maintained in a closed, sealed position except for those openings through which the hazardous waste is added and as provided for in paragraph (d) of this section.

(c) Each container opening shall be maintained in a closed, sealed position (e.g., covered by a gasketed lid) at all times that hazardous waste is in the container except when it is necessary to use the opening to:

(1) Add, remove, inspect, or sample the material in the container;

(2) Inspect, maintain, repair, or replace equipment located inside the container; or

(3) Vent gases or vapors from a cover located over or enclosing an open container to a closed-vent system connected to a control device that is designed and operated in accordance with the requirements of § 265.1088 of this subpart.

(d) One or more safety devices that vent directly to the atmosphere may be used on the container, cover, enclosure, closed-vent system, or control device provided each device meets all of the following conditions:

(1) The safety device is not used for planned or routine venting of organic vapors from the container, cover, enclosure, or closed-vent system connected to a control device; and

(2) The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the container, cover, enclosure, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.

§ 265.1088 Standards: Closed-vent systems and control devices.

(a) This section applies to each closed-vent system and control device installed and operated by the owner or operator to control air emissions in

accordance with standards of this subpart.

(b) The closed-vent system shall meet the following requirements:

(1) The closed-vent system shall route the gases, vapors, and fumes emitted from the hazardous waste in the waste management unit to a control device that meets the requirements specified in paragraph (c) of this section.

(2) The closed-vent system shall be designed and operated in accordance with the requirements specified in § 265.1033(j) of this part.

(3) If the closed-vent system contains one or more bypass devices that could be used to divert all or a portion of the gases, vapors, or fumes from entering the control device, the owner or operator shall meet the following requirements:

(i) For each bypass device except as provided for in paragraph (b)(3)(ii) of this section, the owner or operator shall either:

(A) Install, calibrate, maintain, and operate a flow indicator at the inlet to the bypass device that indicates at least once every 15 minutes whether gas, vapor, or fume flow is present in the bypass device; or

(B) Secure the valve installed at the inlet to the bypass device in the closed position using a car-seal or a lock-and-key type configuration. The owner or operator shall visually inspect the seal or closure mechanism at least once every month to verify that the valve is maintained in the closed position.

(ii) Low leg drains, high point bleeds, analyzer vents, open-ended valves or lines, and safety devices are not subject to the requirements of paragraph (b)(3)(i) of this section.

(c) The control device shall meet the following requirements:

(1) The control device shall be one of the following devices:

(i) A control device designed and operated to reduce the total organic content of the inlet vapor stream vented to the control device by at least 95 percent by weight;

(ii) An enclosed combustion device designed and operated in accordance with the requirements of § 265.1033(c); or

(iii) A flare designed and operated in accordance with the requirements of § 265.1033(d).

(2) The control device shall be operating at all times when gases, vapors, or fumes are vented from the waste management unit through the closed-vent system to the control device.

(3) The owner or operator using a carbon adsorption system to comply with paragraph (c)(1) of this section

shall operate and maintain the control device in accordance with the following requirements:

(i) Following the initial startup of the control device, all activated carbon in the control device shall be replaced with fresh carbon on a regular basis in accordance with the requirements of § 265.1033(g) or § 265.1033(h).

(ii) All carbon removed from the control device shall be managed in accordance with the requirements of § 265.1033(l).

(4) An owner or operator using a control device other than a thermal vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system to comply with paragraph (c)(1) of this section shall operate and maintain the control device in accordance with the requirements of § 265.1033(i).

(5) The owner or operator shall demonstrate that a control device achieves the performance requirements of paragraph (c)(1) of this section as follows:

(i) An owner or operator shall demonstrate using either a performance test as specified in paragraph (c)(5)(iii) of this section or a design analysis as specified in paragraph (c)(5)(iv) of this section the performance of each control device except for the following:

(A) A flare;

(B) A boiler or process heater with a design heat input capacity of 44 megawatts or greater;

(C) A boiler or process heater into which the vent stream is introduced with the primary fuel;

(D) A boiler or process heater burning hazardous waste for which the owner or operator has been issued a final permit under 40 CFR part 270 and designs and operates the unit in accordance with the requirements of 40 CFR part 266, subpart H; or

(E) A boiler or process heater burning hazardous waste for which the owner or operator has certified compliance with the interim status requirements of 40 CFR part 266, subpart H.

(ii) An owner or operator shall demonstrate the performance of each flare in accordance with the requirements specified in § 265.1033(e).

(iii) For a performance test conducted to meet the requirements of paragraph (c)(5)(i) of this section, the owner or operator shall use the test methods and procedures specified in § 265.1034(c)(1) through (c)(4).

(iv) For a design analysis conducted to meet the requirements of paragraph (c)(5)(i) of this section, the design analysis shall meet the requirements specified in § 265.1035(b)(4)(iii).

(v) The owner or operator shall demonstrate that a carbon adsorption system achieves the performance requirements of paragraph (c)(1) of this section based on the total quantity of organics vented to the atmosphere from all carbon adsorption system equipment that is used for organic adsorption, organic desorption or carbon regeneration, organic recovery, and carbon disposal.

(6) If the owner or operator and the Regional Administrator do not agree on a demonstration of control device performance using a design analysis then the disagreement shall be resolved using the results of a performance test performed by the owner or operator in accordance with the requirements of paragraph (c)(5)(iii) of this section. The Regional Administrator may choose to have an authorized representative observe the performance test.

§ 265.1089 Inspection and monitoring requirements.

(a) This section applies to an owner or operator using air emission controls in accordance with the requirements of § 265.1085 through § 265.1088 of this subpart.

(b) Each cover used in accordance with requirements of § 265.1085 through § 265.1087 of this subpart shall be visually inspected and monitored for detectable organic emissions by the owner or operator using the procedure specified in paragraph (f) of this section except as follows:

(1) An owner or operator is exempted from performing the cover inspection and monitoring requirements specified in paragraph (f) of this section for the following tank covers:

(i) A tank internal floating roof that is inspected and monitored in accordance with the requirements of § 265.1091 of this subpart; or

(ii) A tank external floating roof that is inspected and monitored in accordance with the requirements of § 265.1091 of this subpart.

(2) If a tank is buried partially or entirely underground, an owner or operator is required to perform the cover inspection and monitoring requirements specified in paragraph (f) of this section only for those portions of the tank cover and those connections to the tank cover or tank body (e.g. fill ports, access hatches, gauge wells, etc.) that extend to or above the ground surface and can be opened to the atmosphere.

(3) An owner or operator is exempted from performing the cover inspection and monitoring requirements specified in paragraph (f) of this section for a container that meets all requirements

specified in either § 265.1087(b)(1)(ii) or § 265.1087(b)(1)(iii) of this subpart.

(4) An owner or operator is exempted from performing the cover inspection and monitoring requirements specified in paragraph (f) of this section for an enclosure used to control air emissions from containers in accordance with the requirements of § 265.1087(b)(2) of this subpart.

(c) Each closed-vent system used in accordance with the requirements of § 265.1088 of this subpart shall be inspected and monitored by the owner or operator in accordance with the procedure specified in § 265.1033(j).

(d) Each control device used in accordance with the requirements of § 265.1088 of this subpart shall be inspected and monitored by the owner or operator in accordance with the procedure specified in § 265.1033(f).

(e) The owner or operator shall develop and implement a written plan and schedule to perform all inspection and monitoring requirements of this section. The owner or operator shall incorporate this plan and schedule into the facility inspection plan required under 40 CFR 265.15.

(f) Inspection and monitoring of a cover in accordance with the requirements of paragraph (b) of this section shall be performed as follows:

(1) The cover and all cover openings shall be initially visually inspected and monitored for detectable organic emissions on or before the date that the tank, surface impoundment, or container using the cover becomes subject to the provisions of this subpart and at other times as requested by the Regional Administrator.

(2) At least once every 6 months following the initial visual inspection and monitoring for detectable organic emissions required under paragraph (f)(1) of this section, the owner and operator shall visually inspect and monitor the cover and each cover opening except for following cover openings:

(i) A cover opening that has continuously remained in a closed, sealed position for the entire period since the last time the cover opening was visually inspected and monitored for detectable emissions;

(ii) A cover opening that is designated as unsafe to inspect and monitor in accordance with paragraph (f)(5) of this section;

(iii) A cover opening on a cover installed and placed in operation before December 6, 1994, that is designated as difficult to inspect and monitor in accordance with paragraph (f)(6) of this section.

(3) To visually inspect a cover, the owner or operator shall view the entire cover surface and each cover opening in a closed, sealed position for evidence of any defect that may affect the ability of the cover or cover opening to continue to operate with no detectable organic emissions. A visible hole, gap, tear, or split in the cover surface or a cover opening is defined as a leak which shall be repaired in accordance with paragraph (f)(7) of this section.

(4) To monitor a cover for detectable organic emissions, the owner or operator shall use the following procedure:

(i) Method 21 in 40 CFR part 60, appendix A to test each cover seal and cover connection for detectable organic emissions. Seals on floating membrane covers shall be monitored around the entire perimeter of the cover at locations spaced no greater than 3 meters apart.

(ii) For all cover connections and seals except for the seals around a rotating shaft that passes through a cover opening, if the monitoring instrument indicates detectable organic emissions (i.e., an instrument concentration reading greater than 500 ppmv plus the background level), then a leak is detected. Each detected leak shall be repaired in accordance with paragraph (f)(7) of this section.

(iii) For the seals around a rotating shaft that passes through a cover opening, if the monitoring instrument indicates a concentration reading greater than 10,000 ppmv, then a leak is detected. Each detected leak shall be repaired in accordance with paragraph (f)(7) of this section.

(5) An owner or operator may designate a cover as an unsafe to inspect and monitor cover if all of the following conditions are met:

(i) The owner or operator determines that inspection or monitoring of the cover would expose a worker to dangerous, hazardous, or other unsafe conditions.

(ii) The owner or operator develops and implements a written plan and schedule to inspect the cover using the procedure specified in paragraph (f)(3) of this section and monitor the cover using the procedure specified in paragraph (f)(4) of this section as frequently as practicable during those times when a worker can safely access the cover.

(6) An owner or operator may designate a cover installed and placed in operation before December 6, 1994, as a difficult to inspect and monitor cover if all of the following conditions are met:

(i) The owner or operator determines that inspection or monitoring the cover

requires elevating a worker to a height greater than 2 meters above a support surface; and

(ii) The owner and operator develops and implements a written plan and schedule to inspect the cover using the procedure specified in paragraph (f)(3) of this section, and to monitor the cover using the procedure specified in paragraph (f)(4) of this section at least once per calendar year.

(7) When a leak is detected by either of the methods specified in paragraph (f)(3) or (f)(4) of this section, the owner or operator shall repair the leak in the following manner:

(i) The owner or operator shall make a first attempt at repairing the leak no later than 5 calendar days after the leak is detected. Repair of the leak shall be completed as soon as practicable, but no later than 15 calendar days after the leak is detected. If repair of the leak cannot be completed within the 15-day period, except as provided in paragraph (f)(7)(ii) of this section, then the owner or operator shall not add hazardous waste to the tank, surface impoundment, or container on which the cover is installed until the repair of the leak is completed.

(ii) Repair of a leak detected on a cover installed on a tank or surface impoundment may be delayed beyond 15 calendar days if the owner or operator determines that both of the following conditions occur:

(A) Repair of the leak requires first emptying the contents of the tank or surface impoundment; and

(B) Temporary removal of the tank or surface impoundment from service will result in the unscheduled cessation of production from the process unit or operation of the waste management unit that is generating the hazardous waste managed in the tank or surface impoundment.

(iii) Repair of a leak determined by the owner or operator to meet the conditions specified in paragraph (f)(7)(ii) of this section shall be performed at the next time the process, system, or waste management unit that is generating the hazardous waste managed in the tank or surface impoundment stops operation for any reason.

§ 265.1090 Recordkeeping requirements.

(a) Each owner or operator of a facility subject to requirements in this subpart shall record and maintain the following information as applicable:

(1) Documentation for each cover installed on a tank in accordance with the requirements of § 265.1085(b)(2) or § 265.1085(b)(3) of this subpart that includes information prepared by the

owner or operator or provided by the cover manufacturer or vendor describing the cover design, and certification by the owner or operator that the cover meets the applicable design specifications as listed in § 265.1091(c) of this subpart.

(2) Documentation for each floating membrane cover installed on a surface impoundment in accordance with the requirements of § 265.1086(c) of this subpart that includes information prepared by the owner or operator or provided by the cover manufacturer or vendor describing the cover design, and certification by the owner or operator that the cover meets the specifications listed in § 265.1086(e) of this subpart.

(3) Documentation for each enclosure used to control air emissions from containers in accordance with the requirements of § 265.1087(b)(2)(i) of this subpart that includes information prepared by the owner or operator or provided by the manufacturer or vendor describing the enclosure design, and certification by the owner or operator that the enclosure meets the specifications listed in § 265.1087(b)(2)(ii) of this subpart.

(4) Documentation for each closed-vent system and control device installed in accordance with the requirements of § 265.1088 of this subpart that includes:

(i) Certification that is signed and dated by the owner or operator stating that the control device is designed to operate at the performance level documented by a design analysis as specified in paragraph (a)(4)(ii) of this section or by performance tests as specified in paragraph (a)(4)(iii) of this section when the tank, surface impoundment, or container is or would be operating at capacity or the highest level reasonably expected to occur.

(ii) If a design analysis is used, then design documentation as specified in § 265.1035(b)(4). The documentation shall include information prepared by the owner or operator or provided by the control device manufacturer or vendor that describes the control device design in accordance with § 265.1035(b)(4)(iii) and certification by the owner or operator that the control equipment meets the applicable specifications.

(iii) If performance tests are used, then a performance test plan as specified in § 265.1035(b)(3) and all test results.

(iv) Information as required by § 265.1035(c)(1) and § 265.1035(c)(2).

(5) Records for all Method 27 tests performed by the owner or operator for each container used to meet the requirements of § 265.1087(b)(1)(iii) of this subpart.

(6) Records for all visual inspections conducted in accordance with the requirements of § 265.1089 of this subpart.

(7) Records for all monitoring for detectable organic emissions conducted in accordance with the requirements of § 265.1089 of this subpart.

(8) Records of the date of each attempt to repair a leak, repair methods applied, and the date of successful repair.

(9) Records for all continuous monitoring conducted in accordance with the requirements of § 265.1089 of this subpart.

(10) Records of the management of carbon removed from a carbon adsorption system conducted in accordance with § 265.1088(c)(3)(ii) of this subpart.

(11) Records for all inspections of each cover installed on a tank in accordance with the requirements of § 265.1085(b)(2) or § 265.1085(b)(3) of this subpart that includes information as listed in § 265.1091(c) of this subpart.

(b) An owner or operator electing to use air emission controls for a tank in accordance with the conditions specified in § 265.1085(c) of this subpart shall record the following information:

(1) Date and time each waste sample is collected for direct measurement of maximum organic vapor pressure in accordance with § 265.1084(c) of this subpart.

(2) Results of each determination for the maximum organic vapor pressure of the waste in the tank performed in accordance with § 265.1084(c) of this subpart.

(3) Records specifying the tank dimensions and design capacity.

(c) An owner or operator electing to use air emission controls for a tank in accordance with the requirements of § 265.1091 of this subpart shall record the information required by § 265.1091(c) of this subpart.

(d) An owner or operator electing not to use air emission controls for a particular tank, surface impoundment, or container subject to this subpart in accordance with the conditions specified in § 265.1083(c) of this subpart shall record the information used by the owner or operator for each waste determination (e.g., test results, measurements, calculations, and other documentation) in the facility operating log. If analysis results for waste samples are used for the waste determination, then the owner or operator shall record the date, time, and location that each waste sample is collected in accordance with applicable requirements of § 265.1084 of this subpart.

(e) An owner or operator electing to comply with requirements in

accordance with § 265.1083(c)(2)(vi) or § 265.1083(c)(2)(v) of this subpart shall record the identification number for the incinerator, boiler, or industrial furnace in which the hazardous waste is treated.

(f) An owner or operator designating a cover as unsafe to inspect and monitor pursuant to § 265.1089(f)(5) of this subpart or difficult to inspect and monitor pursuant to § 265.1089(f)(6) of this subpart shall record in a log that is kept in the facility operating record the following information:

(1) A list of identification numbers for tanks with covers that are designated as unsafe to inspect and monitor in accordance with the requirements of § 265.1089(f)(5) of this subpart, an explanation for each cover stating why the cover is unsafe to inspect and monitor, and the plan and schedule for inspecting and monitoring each cover.

(2) A list of identification numbers for tanks with covers that are designated as difficult to inspect and monitor in accordance with the requirements of § 265.1089(f)(6) of this subpart, an explanation for each cover stating why the cover is difficult to inspect and monitor, and the plan and schedule for inspecting and monitoring each cover.

(g) All records required by paragraphs (a) through (f) of this section except as required in paragraphs (a)(1) through (a)(4) of this section shall be maintained in the operating record for a minimum of 3 years. All records required by paragraphs (a)(1) through (a)(4) of this section shall be maintained in the operating record until the air emission control equipment is replaced or otherwise no longer in service.

(h) The owner or operator of a facility that is subject to this subpart and to the control device standards in 40 CFR part 60, subpart VV, or 40 CFR part 61, subpart V, may elect to demonstrate compliance with the applicable sections of this subpart by documentation either pursuant to this subpart, or pursuant to the provisions of 40 CFR part 60, subpart VV or 40 CFR part 61, subpart V, to the extent that the documentation required by 40 CFR parts 60 or 61 duplicates the documentation required by this section.

§ 265.1091 Alternative tank emissions control requirements.

(a) This section applies to owners and operators of tanks electing to comply with § 265.1085(b)(2) or (b)(3) of this subpart.

(1) The owner or operator electing to comply with § 265.1085(b)(2) of this subpart shall design, install, operate, and maintain a fixed roof and internal floating roof that meet the following requirements.

(i) The fixed roof shall comply with the requirements of § 265.1085(d)(1) of this subpart. The internal floating roof shall rest or float on the waste surface (but not necessarily in complete contact with it) inside a tank that has a fixed roof. The internal floating roof shall be floating on the waste surface at all times, except during initial fill and during those intervals when the tank is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.

(ii) Each internal floating roof shall be equipped with one of the following closure devices between the wall of the tank and the edge of the internal floating roof:

(A) A foam- or liquid-filled seal mounted in contact with the waste (liquid-mounted seal). A liquid-mounted seal means a foam- or liquid-filled seal mounted in contact with the waste between the wall of the tank and the floating roof continuously around the circumference of the tank.

(B) Two seals mounted one above the other so that each forms a continuous closure that completely covers the space between the wall of the tank and the edge of the internal floating roof. The lower seal may be vapor-mounted, but both shall be continuous.

(C) A mechanical shoe seal. A mechanical shoe seal is a metal sheet held vertically against the wall of the tank by springs or weighted levers and is connected by braces to the floating roof. A flexible coated fabric (envelope) spans the annular space between the metal sheet and the floating roof.

(iii) Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the waste surface.

(iv) Each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains is to be equipped with a cover or lid which is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket. Covers on each access hatch and automatic gauge float well shall be bolted except when they are in use.

(v) Automatic bleeder vents shall be equipped with a gasket and are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.

(vi) Rim space vents shall be equipped with a gasket and are to be set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting.

(vii) Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening.

(viii) Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover.

(ix) Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.

(2) The owner or operator electing to comply with § 265.1085(b)(3) of this subpart shall design, install, operate, and maintain an external floating roof that meets the following requirements:

(i) Each external floating roof shall be equipped with a closure device between the wall of the tank and the roof edge. The closure device is to consist of two seals, one above the other. The lower seal is referred to as the primary seal, and the upper seal is referred to as the secondary seal.

(A) The primary seal shall be either a mechanical shoe seal or a liquid-mounted seal. Except as provided in paragraph (b)(2)(iv) of this section, the seal shall completely cover the annular space between the edge of the floating roof and tank wall.

(B) The secondary seal shall completely cover the annular space between the external floating roof and the wall of the tank in a continuous fashion except as allowed in paragraph (b)(2)(iv) of this section.

(ii) Except for automatic bleeder vents and rim space vents, each opening in a noncontact external floating roof shall provide a projection below the waste surface. Except for automatic bleeder vents, rim space vents, roof drains, and leg sleeves, each opening in the roof is to be equipped with a gasketed cover, seal, or lid that is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. Automatic bleeder vents are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports. Rim vents are to be set to open when the roof is being floated off the roof leg supports or at the manufacturer's recommended setting. Automatic bleeder vents and rim space vents are to be gasketed. Each emergency roof drain is to be provided with a slotted membrane fabric cover

that covers at least 90 percent of the area of the opening.

(iii) The roof shall be floating on the waste at all times (i.e., off the roof leg supports) except during initial fill until the roof is lifted off leg supports and when the tank is completely emptied and subsequently refilled. The process of filling, emptying, or refilling when the roof is resting on the leg supports shall be continuous and shall be accomplished as rapidly as possible.

(3) The owner or operator may elect to comply with § 265.1085(b)(2) or (b)(3) of this subpart using an alternative means of emission limitation for which a Federal Register notice has been published in accordance with the requirements of 40 CFR 60.114b permitting its use as an alternative means for the purpose of compliance with 40 CFR 60.112b.

(b) Monitoring and inspection of the control equipment described in paragraph (a) of this section shall be conducted as follows:

(1) After installation, owners and operators of internal floating roofs shall:

(i) Visually inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service), prior to filling the tank with waste. If there are holes, tears, or other openings in the primary seal, the secondary seal, or the seal fabric, or defects in the internal floating roof, or both, the owner or operator shall repair the items before filling the tank.

(ii) For tanks equipped with a liquid-mounted or mechanical shoe primary seal, visually inspect the internal floating roof and the primary seal or the secondary seal (if one is in service) through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If the internal floating roof is not resting on the surface of the waste inside the tank, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, the owner or operator shall repair the items or empty and remove the tank from service within 45 days. If a failure that is detected during inspections required in this paragraph cannot be repaired within 45 days and if the tank cannot be emptied within 45 days, a 30-day extension may be requested from the Regional Administrator. Such a request for an extension shall document that alternate capacity is unavailable and specify a schedule of actions the owner or operator will take that will assure that the control equipment will be repaired or the tank will be emptied as soon as possible.

(iii) For tanks equipped with a double-seal system as specified in paragraph (a)(1)(i)(B) of this section:

(A) Visually inspect the tank as specified in paragraph (b)(1)(iv) of this section at least every 5 years; or

(B) Visually inspect the tank as specified in paragraph (b)(1)(ii) of this section.

(iv) Visually inspect the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes, and sleeve seals (if any) each time the tank is emptied and degassed. If the internal floating roof has defects; the primary seal has holes, tears, or other openings in the seal or the seal fabric; or the secondary seal has holes, tears, or other openings in the seal or the seal fabric; or the gaskets no longer close off the waste surfaces from the atmosphere; or the slotted membrane has more than 10 percent open area, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the tank with waste. In no event shall inspections conducted in accordance with this provision occur at intervals greater than 10 years in the case of tanks conducting the annual visual inspection as specified in paragraph (b)(1)(ii) of this section, and at intervals no greater than 5 years in the case of tanks specified in paragraph (b)(1)(iii) of this section.

(v) Notify the Regional Administrator in writing at least 30 days prior to the filling or refilling of each tank for which an inspection is required by paragraphs (b)(1)(i) and (b)(1)(iv) of this section to afford the Regional Administrator the opportunity to have an observer present. If the inspection required by paragraph (b)(1)(iv) of this section is not planned and the owner or operator could not have known about the inspection 30 days in advance of refilling the tank, the owner or operator shall notify the Regional Administrator at least 7 days prior to the refilling of the tank. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, this notification, including the written documentation, may be made in writing and sent by express mail so that it is received by the Regional Administrator at least 7 days prior to the refilling.

(2) After installation, the owner or operator of an external floating roof shall:

(i) Determine the gap areas and maximum gap widths between the primary seal and the wall of the tank and between the secondary seal and the

wall of the tank according to the following frequency:

(A) Measurements of gaps between the tank wall and the primary seal (seal gaps) shall be performed during the hydrostatic testing of the tank or within 60 days of the initial fill with waste and at least once every 5 years thereafter.

(B) Measurements of gaps between the tank wall and the secondary seal shall be performed within 60 days of the initial fill with waste and at least once per year thereafter.

(C) If any tank ceases to hold waste for a period of 1 year or more, subsequent introduction of waste into the tank shall be considered an initial fill for the purposes of paragraphs (b)(2)(i)(A) and (b)(2)(i)(B) of this section.

(ii) Determine the gap widths and areas in the primary and secondary seals individually by the following procedures:

(A) Measure seal gaps, if any, at one or more floating roof levels when the roof is floating off the roof leg supports.

(B) Measure seal gaps around the entire circumference of the tank in each place where a 0.32-cm diameter uniform probe passes freely (without forcing or binding against the seal) between the seal and the wall of the tank and measure the circumferential distance of each such location.

(C) Determine the total surface area of each gap described in paragraph (b)(2)(ii)(B) of this section by using probes of various widths to measure accurately the actual distance from the tank wall to the seal and multiplying each such width by its respective circumferential distance.

(iii) Add the gap surface area of each gap location for the primary seal and the secondary seal individually and divide the sum for each seal by the nominal diameter of the tank and compare each ratio to the respective standards in paragraph (b)(2)(iv) of this section.

(iv) Make necessary repairs or empty the tank within 45 days of identification in any inspection for seals not meeting the following requirements:

(A) The accumulated area of gaps between the tank wall and the mechanical shoe or liquid-mounted primary seal shall not exceed 212 cm² per meter of tank diameter, and the width of any portion of any gap shall not exceed 3.81 cm.

(1) One end of the mechanical shoe is to extend into the waste contained in the tank, and the other end is to extend a minimum vertical distance of 61 cm above the waste surface.

(2) There are to be no holes, tears, or other openings in the shoe, seal fabric, or seal envelope.

(B) The secondary seal is to meet the following requirements:

(1) The secondary seal is to be installed above the primary seal so that it completely covers the space between the roof edge and the tank wall except as provided in paragraph (b)(2)(ii)(C) of this section.

(2) The accumulated area of gaps between the tank wall and the secondary seal shall not exceed 21.2 cm² per meter of tank diameter, and the width of any portion of any gap shall not exceed 1.27 cm.

(3) There are to be no holes, tears, or other openings in the seal or seal fabric.

(v) If a failure that is detected during inspections required in paragraph (b)(2)(i) of this section cannot be repaired within 45 days and if the tank cannot be emptied within 45 days, a 30-day extension may be requested from the Regional Administrator. Such extension request shall include a demonstration of the unavailability of alternate capacity and a specification of a schedule that will assure that the control equipment will be repaired or the tank will be emptied as soon as possible.

(vi) Notify the Regional Administrator 30 days in advance of any gap measurements required by paragraph (b)(2)(i) of this section to afford the Regional Administrator the opportunity to have an observer present.

(vii) Visually inspect the external floating roof, the primary seal, secondary seal, and fittings each time the vessel is emptied and degassed.

(A) If the external floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before filling or refilling the tank with waste.

(B) For all the inspections required by paragraph (b)(2)(vii) of this section, the owner or operator shall notify the Regional Administrator in writing at least 30 days prior to the filling or refilling of each tank to afford the Regional Administrator the opportunity to inspect the tank prior to refilling. If the inspection required by paragraph (b)(2)(vii) of this section is not planned and the owner or operator could not have known about the inspection 30 days in advance of refilling the tank, the owner or operator shall notify the Regional Administrator at least 7 days prior to the refilling of the tank.

Notification shall be made by telephone immediately followed by written documentation demonstrating why the

inspection was unplanned.

Alternatively, this notification, including the written documentation, may be made in writing and sent by express mail so that it is received by the Regional Administrator at least 7 days prior to the refilling.

(c) Owners and operators who elect to install and operate the control equipment in paragraph (a) of this section shall include the following information in the operating record in accordance with the requirements of § 265.1090(a)(1) and (a)(11) of this subpart:

(1) Internal floating roof.

(i) Documentation that describes the control equipment design and certifies that the control equipment meets the specifications of paragraphs (a)(1) and (b)(1) of this section.

(ii) Records of each inspection performed as required by paragraphs (b)(1)(i) through (b)(1)(iv) of this section. Each record shall identify the tank on which the inspection was performed and shall contain the date the tank was inspected and the observed condition of each component of the control equipment (seals, internal floating roof, and fittings).

(iii) If any of the conditions described in paragraph (b)(1)(ii) of this section are detected during the annual visual inspection required by paragraph (b)(1)(ii) of this section, the records shall identify the tank, the nature of the defects, and the date the tank was emptied or the nature of and date the repair was made.

(iv) After each inspection required by paragraph (b)(1)(iii) of this section that finds holes or tears in the seal or seal fabric, or defects in the internal floating roof, or other control equipment defects listed in paragraph (b)(1)(ii) of this section, the records shall identify the tank and the reason it did not meet the specifications of paragraph (a)(1) or (b)(1)(iii) of this section and describe each repair made.

(2) External floating roof.

(i) Documentation that describes the control equipment design and certifies that the control equipment meets the specifications of paragraphs (a)(2) and (b)(2)(ii) through (b)(2)(iv) of this section.

(ii) Records of each gap measurement performed as required by paragraph (b)(2) of this section. Each record shall identify the tank in which the measurement was performed, the date of measurement, the raw data obtained in the measurement, and the calculations described in paragraphs (b)(2)(ii) and (b)(2)(iii) of this section.

(iii) Records for each seal gap measurement that detects gaps

exceeding the limitations specified by paragraph (b)(2)(iv) of this section that identifies the tank, the date the tank was emptied or the repairs made, and the nature of the repair.

PART 270—EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE MANAGEMENT PROGRAM

33. The authority citation for part 270 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912, 6925, 6927, 6939, and 6974.

Subpart A—General Information

34. Section 270.4 is amended by revising paragraphs (a)(2), and (a)(3) and by adding paragraph (a)(4) to read as follows:

§ 270.4 Effect of a permit

- (a) * * *
- (2) Are promulgated under part 268 of this chapter restricting the placement of hazardous wastes in or on the land;
- (3) Are promulgated under part 264 of this chapter regarding leak detection systems for new and replacement surface impoundment, waste pile, and landfill units, and lateral expansions of surface impoundment, waste pile, and landfill units. The leak detection system requirements include double liners, CQA programs, monitoring, action leakage rates, and response action plans, and will be implemented through the procedures of § 270.42 Class 1 permit modifications; or
- (4) Are promulgated under subparts AA, BB, or CC of part 265 of this chapter limiting air emissions.

Subpart B—Permit Application

35. Section 270.14 is amended by revising paragraph (b)(5) to read as follows:

§ 270.14 Contents of Part B: General requirements

- (b) * * *
- (5) A copy of the general inspection schedule required by § 264.15(b). Include where applicable, as part of the inspection schedule, specific requirements in §§ 264.174, 245.193(i); 264.195, 264.226, 264.254, 264.273, 264.303, 264.502, 264.1033, 264.1052,

264.1053, 264.1058, 264.1088, and 264.1091.

36. Section 270.15 is amended by adding paragraph (e) to read as follows:

§ 270.15 Specific Part B information requirements for containers

(e) Information on air emission control equipment as required in § 270.27.

37. Section 270.16 is amended by adding paragraph (k) to read as follows:

§ 270.16 Specific Part B information requirements for tank systems

(k) Information on air emission control equipment as required in § 270.27.

38. Section 270.17 is amended by adding paragraph (j) to read as follows:

§ 270.17 Specific Part B information requirements for surface impoundments

(j) Information on air emission control equipment as required in § 270.27.

39. Part 270 subpart B is amended by adding § 270.27 to read as follows:

§ 270.27 Specific Part B information requirements for air emission controls for tanks, surface impoundments, and containers

(a) Except as otherwise provided in § 264.1 of this chapter, owners and operators of tanks, surface impoundments, or containers that use air emission controls in accordance with the requirements of 40 CFR part 264, subpart CC shall provide the following additional information:

- (1) Documentation for each cover installed on a tank subject to § 264.1084(b)(2) or § 264.1084(b)(3) of this chapter that includes information prepared by the owner or operator or provided by the cover manufacturer or vendor describing the cover design, and certification by the owner or operator that the cover meets the applicable design specifications as listed in § 265.1091(c) of this chapter.
- (2) Identification of each container area subject to the requirements of 40 CFR part 264, subpart CC and certification by the owner or operator that the requirements of this subpart are met.
- (3) Documentation for each enclosure used to control air emissions from containers in accordance with the

requirements of § 264.1086(b)(2)(i) of this chapter that includes information prepared by the owner or operator or provided by the manufacturer or vendor describing the enclosure design, and certification by the owner or operator that the enclosure meets the specifications listed in § 265.1087(b)(2)(ii) of this chapter.

(4) Documentation for each floating membrane cover installed on a surface impoundment in accordance with the requirements of § 264.1085(c) of this chapter that includes information prepared by the owner or operator or provided by the cover manufacturer or vendor describing the cover design, and certification by the owner or operator that the cover meets the specifications listed in § 265.1086(e) of this chapter.

(5) Documentation for each closed-vent system and control device installed in accordance with the requirements of § 264.1087 of this chapter that includes design and performance information as specified in § 270.24 (c) and (d).

(6) An emission monitoring plan for both Method 21 and control device monitoring methods. This plan shall include the following information: monitoring point(s); monitoring methods for control devices; monitoring frequency; procedures for documenting exceedances; and procedures for mitigating noncompliances.

(7) When an owner or operator of a facility subject to 40 CFR part 265, subpart CC cannot comply with 40 CFR part 264, subpart CC by the date of permit issuance, the schedule of implementation required under § 265.1082 of this chapter.

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

40. The authority citation for part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), and 6926.

Subpart A—Requirements for Final Authorization

41. Section 271.1(j) is amended by adding the following entry to Table 1 in chronological order by date of publication:

§ 271.1 Purpose and scope.

(j) * * *

TABLE 1—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of regulation	Federal Register reference	Effective date
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and

W_{me} —mass emission rate of the same POHC present in exhaust emissions prior to release to the atmosphere.

(2) An incinerator burning hazardous wastes FO20, FO21, FO22, FO23, FO26, or FO27 must achieve a destruction and removal efficiency (DRE) of 99.9999% for each principal organic hazardous constituent (POHC) designated (under §264.342) in its permit. This performance must be demonstrated on POHCs that are more difficult to incinerate than tetra-, penta-, and hexachlorodibenzo-*p*-dioxins and dibenzofurans. DRE is determined for each POHC from the equation in §264.343(a)(1). In addition, the owner or operator of the incinerator must notify the Regional Administrator of his intent to incinerate hazardous wastes FO20, FO21, FO22, FO23, FO26, or FO27.

(b) An incinerator burning hazardous waste and producing stack emissions of more than 1.8 kilograms per hour (4 pounds per hour) of hydrogen chloride (HCl) must control HCl emissions such that the rate of emission is no greater than the larger of either 1.8 kilograms per hour or 1% of the HCl in the stack gas prior to entering any pollution control equipment.

(c) An incinerator burning hazardous waste must not emit particulate matter in excess of 180 milligrams per dry standard cubic meter (0.08 grains per dry standard cubic foot) when corrected for the amount of oxygen in the stack gas according to the formula:

$$P_c = P_m \times \frac{14}{21 - Y}$$

Where P_c is the corrected concentration of particulate matter, P_m is the measured concentration of particulate matter, and Y is the measured concentration of oxygen in the stack gas, using the Orsat method for oxygen analysis of dry flue gas, presented in part 60, appendix A (Method 3), of this chapter. This correction procedure is to be used by all hazardous waste incinerators except those operating under conditions of oxygen enrichment. For these facilities, the Regional Administrator will select an appro-

priate correction procedure, to be specified in the facility permit.

(d) For purposes of permit enforcement, compliance with the operating requirement's specified in the permit (under §264.345) will be regarded as compliance with this section. However, evidence that compliance with those permit conditions is insufficient to ensure compliance with the performance requirements of this section may be "information" justifying modification, revocation, or reissuance of a permit under §270.41 of this chapter.

[46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27532, June 24, 1982; 48 FR 14236, Apr. 1, 1983; 50 FR 2065, Jan. 14, 1985]

§264.344 Hazardous waste incinerator permits.

(a) The owner or operator of a hazardous waste incinerator may burn only wastes specified in his permit and only under operating conditions specified for those wastes under §264.345, except:

(1) In approved trial burns under §270.62 of this chapter; or

(2) Under exemptions created by §264.340.

(b) Other hazardous wastes may be burned only after operating conditions have been specified in a new permit or a 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 §270.19 of this chapter.

(c) The permit for a new hazardous waste incinerator must establish appropriate conditions for each of the applicable requirements of this subpart, including but not limited to allowable waste feeds and operating conditions necessary to meet the requirements of §264.345, sufficient to comply with the following standards:

(1) For the period beginning with initial introduction of hazardous waste to the incinerator and ending with initiation of the trial burn, and only for the minimum time required to establish operating conditions required in paragraph (c)(2) of this section, not to exceed a duration of 720 hours operating time for treatment of hazardous waste, the operating requirements must be those most likely to ensure compliance

with the performance standards of §264.343, based on the Regional Administrator's engineering judgment. The Regional Administrator may extend the duration of this period once for up to 720 additional hours when good cause for the extension is demonstrated by the applicant.

(2) For the duration of the trial burn, the operating requirements must be sufficient to demonstrate compliance with the performance standards of §264.343 and must be in accordance with the approved trial burn plan;

(3) For the period immediately following completion of the trial burn, and only for the minimum period sufficient to allow sample analysis, data computation, and submission of the trial burn results by the applicant, and review of the trial burn results and modification of the facility permit by the Regional Administrator, the operating requirements must be those most likely to ensure compliance with the performance standards of §264.343, based on the Regional Administrator's engineering judgment.

(4) For the remaining duration of the permit, the operating requirements must be those demonstrated, in a trial burn or by alternative data specified in §270.19(c) of this chapter, as sufficient to ensure compliance with the performance standards of §264.343.

[46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27532, June 24, 1982; 48 FR 14236, Apr. 1, 1983; 50 FR 4614, Jan. 31, 1985]

§264.345 Operating requirements.

(a) An incinerator must be operated in accordance with operating requirements specified in the permit. Those will be specified on a case-by-case basis as those demonstrated (in a trial burn or in alternative data as specified in §264.344(b) and included with part B of a facility's permit application) to be sufficient to comply with the performance standards of §264.343.

(b) Each set of operating requirements will specify the composition of the waste feed (including acceptable variations in the physical or chemical properties of the waste feed which will not affect compliance with the performance requirement of §264.343) to which the operating requirements apply. For each such waste feed, the

permit will specify acceptable operating limits including the following conditions:

- (1) Carbon monoxide (CO) level in the stack exhaust gas;
- (2) Waste feed rate;
- (3) Combustion temperature;
- (4) An appropriate indicator of combustion gas velocity;
- (5) Allowable variations in incinerator system design or operating procedures; and
- (6) Such other operating requirements as are necessary to ensure that the performance standards of §264.343 are met.

(c) During start-up and shut-down of an incinerator, hazardous waste (except wastes exempted in accordance with §264.340) must not be fed into the incinerator unless the incinerator is operating within the conditions of operation (temperature, air feed rate, etc.) specified in the permit.

(d) Fugitive emissions from the combustion zone must be controlled by:

- (1) Keeping the combustion zone totally sealed against fugitive emissions; or
- (2) Maintaining a combustion zone pressure lower than atmospheric pressure; or
- (3) 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.

(e) An incinerator must be operated with a functioning system to automatically cut off waste feed to the incinerator when operating conditions deviate from limits established under paragraph (a) of this section.

(f) An incinerator must cease operation when changes in waste feed, incinerator design, or operating conditions exceed limits designated in its permit.

[46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27532, June 24, 1982; 50 FR 4614, Jan. 31, 1985]

§264.346 [Reserved]

§264.347 Monitoring and inspections.

(a) The owner or operator must conduct, as a minimum, the following

(d) Incompatible wastes, as defined in § 260.10 of this chapter, must not be placed in the same outside container.

(e) Reactive wastes, other than cyanide- or sulfide-bearing waste as defined in § 261.23(a)(5) of this chapter, must be treated or rendered non-reactive prior to packaging in accordance with paragraphs (a) through (d) of this section. Cyanide- and sulfide-bearing reactive waste may be packed in accordance with paragraphs (a) through (d) of this section without first being treated or rendered non-reactive.

(f) Such disposal is in compliance with the requirements of part 268. Persons who incinerate lab packs according to the requirements in 40 CFR 268.42(c)(1) may use fiber drums in place of metal outer containers. Such fiber drums must meet the DOT specifications in 49 CFR 173.12 and be overpacked according to the requirements in paragraph (b) of this section.

[47 FR 32365, July 26, 1982, as amended at 55 FR 22365, June 1, 1990; 57 FR 5460, Nov. 18, 1992]

§ 264.317 Special requirements for hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27.

(a) Hazardous Wastes FO20, FO21, FO22, FO23, FO26, and FO27 must not be placed in a landfill unless the owner or operator operates the landfill in accordance with a management plan for these wastes that is approved by the Regional Administrator pursuant to the standards set out in this paragraph, and in accord with all other applicable requirements of this part. The factors to be considered are:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through the soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring requirements.

(b) The Regional Administrator may determine that additional design, operating, and monitoring requirements

are necessary for landfills managing hazardous wastes FO20, FO21, FO22, FO23, FO26, and FO27 in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

[50 FR 2004, Jan. 14, 1985]

Subpart O—Incinerators

§ 264.340 Applicability.

(a) The regulations of this subpart apply to owners and operators of hazardous waste incinerators (as defined in § 260.10 of this chapter), except as § 264.1 provides otherwise.

(b) After consideration of the waste analysis included with part B of the permit application, the Regional Administrator, in establishing the permit conditions, must exempt the applicant from all requirements of this subpart except § 264.341 (Waste analysis) and § 264.351 (Closure).

(1) If the Regional Administrator finds that the waste to be burned is:

(i) Listed as a hazardous waste in part 261, subpart D, of this chapter solely because it is ignitable (Hazard Code D), corrosive (Hazard Code C), or both; or

(ii) Listed as a hazardous waste in part 261, subpart D, of this chapter solely because it is reactive (Hazard Code R) for characteristics other than those listed in § 261.23(a) (4) and (5), and will not be burned when other hazardous wastes are present in the combustion zone; or

(iii) A hazardous waste solely because it possesses the characteristic of ignitability, corrosivity, or both, as determined by the test for characteristics of hazardous wastes under part 261, subpart C, of this chapter; or

(iv) A hazardous waste solely because it possesses any of the reactivity characteristics described by § 261.23(a) (1), (2), (3), (6), (7), and (8) of this chapter, and will not be burned when other hazardous wastes are present in the combustion zone; and

(2) If the waste analysis shows that the waste contains none of the hazardous constituents listed in part 261, appendix VIII, of this chapter, which

Environmental Protection Agency

would reasonably be expected to be in the waste.

(c) If the waste to be burned is one which is described by paragraphs (b)(1)(i), (ii), (iii), or (iv) of this section and contains insignificant concentrations of the hazardous constituents listed in part 261, appendix VIII, of this chapter, then the Regional Administrator may, in establishing permit conditions, exempt the applicant from all requirements of this subpart, except § 264.341 (Waste analysis) and § 264.351 (Closure), after consideration of the waste analysis included with part B of the permit application, unless the Regional Administrator finds that the waste will pose a threat to human health and the environment when burned in an incinerator.

(d) The owner or operator of an incinerator may conduct trial burns subject only to the requirements of § 270.62 of this chapter (Short term and incinerator permits).

[46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27532, June 24, 1982; 48 FR 14295, Apr. 1, 1983; 50 FR 665, Jan. 4, 1985; 50 FR 49263, Nov. 20, 1985; 56 FR 7207, Feb. 21, 1991]

§ 264.341 Waste analysis.

(a) As a portion of the trial burn plan required by § 270.62 of this chapter, or with part B of the permit application, the owner or operator must have included an analysis of the waste feed sufficient to provide all information required by § 270.62(b) or § 270.19 of this chapter. Owners or operators of new hazardous waste incinerators must provide the information required by § 270.62(c) or § 270.19 of this chapter to the greatest extent possible.

(b) Throughout normal operation the owner or operator must conduct sufficient waste analysis to verify that waste feed to the incinerator is within the physical and chemical composition limits specified in his permit (under § 264.345(b)).

[46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27532, June 24, 1982; 48 FR 14295, Apr. 1, 1983; 48 FR 30115, June 30, 1983; 50 FR 4514, Jan. 31, 1985]

§ 264.342 Principal organic hazardous constituents (POHCs).

(a) Principal Organic Hazardous Constituents (POHCs) in the waste feed

must be treated to the extent required by the performance standard of § 264.343.

(b)(1) One or more POHCs will be specified in the facility's permit, from among those constituents listed in part 261, appendix VIII of this chapter, for each waste feed to be burned. This specification will be based on the degree of difficulty of incineration of the organic constituents in the waste and on their concentration or mass in the waste feed, considering the results of waste analyses and trial burns or alternative data submitted with part B of the facility's permit application. Organic constituents which represent the greatest degree of difficulty of incineration will be those most likely to be designated as POHCs. Constituents are more likely to be designated as POHCs if they are present in large quantities or concentrations in the waste.

(2) Trial POHCs will be designated for performance of trial burns in accordance with the procedure specified in § 270.62 of this chapter for obtaining trial burn permits.

[46 FR 7678, Jan. 23, 1981, as amended at 48 FR 14295, Apr. 1, 1983]

§ 264.343 Performance standards.

An incinerator burning hazardous waste must be designed, constructed, and maintained so that, when operated in accordance with operating requirements specified under § 264.345, it will meet the following performance standards:

(a)(1) Except as provided in paragraph (a)(2) of this section, an incinerator burning hazardous waste must achieve a destruction and removal efficiency (DRE) of 99.99% for each principal organic hazardous constituent (POHC) designated (under § 264.342) in its permit for each waste feed. DRE is determined for each POHC from the following equation:

$$DRE = \frac{(W_{in} - W_{out})}{W_{in}} \times 100\%$$

where:

W_{in} = mass feed rate of one principal organic hazardous constituent (POHC) in the waste stream feeding the incinerator

monitoring while incinerating hazardous waste:

- (1) Combustion temperature, waste feed rate, and the indicator of combustion gas velocity specified in the facility permit must be monitored on a continuous basis.
- (2) CO must be monitored on a continuous basis at a point in the incinerator downstream of the combustion zone and prior to release to the atmosphere.
- (3) Upon request by the Regional Administrator, sampling and analysis of the waste and exhaust emissions must be conducted to verify that the operating requirements established in the permit achieve the performance standards of § 264.343.
- (b) The incinerator and associated equipment (pumps, valves, conveyors, pipes, etc.) must be subjected to thorough visual inspection, at least daily, for leaks, spills, fugitive emissions, and signs of jampering.
- (c) The emergency waste feed cutoff system and associated alarms must be tested at least weekly to verify operability unless the applicant demonstrates to the Regional Administrator that weekly inspections will unduly restrict or upset operations and that less frequent inspection will be adequate. At a minimum, operational testing must be conducted at least monthly.
- (d) This monitoring and inspection data must be recorded and the records must be placed in the operating log required by § 264.73.

46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27533, June 24, 1982; 50 FR 4514, Jan. 31, 1985

§ 264.348--264.350 [Reserved]

§ 264.351 Closure.

At closure the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber wa-

ters, and scrubber sludges) from the incinerator site.

[Comment: At closure, as throughout the operating period, unless the owner or operator can demonstrate, in accordance with § 261.3(d) of this chapter, that the residue removed from the incinerator is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with applicable requirements of parts 262 through 266 of this chapter.]

[46 FR 7678, Jan. 23, 1981]

Subparts P-R (Reserved)

Subpart S--Corrective Action for Solid Waste Management Units

§ 264.552 Corrective Action Management Units (CAMU).

(a) For the purpose of implementing remedies under § 264.101 or RCRA Section 3008(h), the Regional Administrator may designate an area at the facility as a corrective action management unit, as defined in § 260.10, in accordance with the requirements of this section. One or more CAMUs may be designated at a facility.

(1) Placement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes.

(2) Consolidation or placement of remediation wastes into or within a CAMU does not constitute creation of a unit subject to minimum technology requirements.

(b)(1) The Regional Administrator may designate a regulated unit (as defined in § 264.90(a)(2)) as a CAMU, or may incorporate a regulated unit into a CAMU, if:

- (1) The regulated unit is closed or closing, meaning it has begun the closure process under § 264.113 or § 265.113; and
- (11) Inclusion of the regulated unit will enhance implementation of effective, protective and reliable remedial actions for the facility.

(2) The subpart F, G, and H requirements and the unit-specific requirements of part 264 or 265 that applied to that regulated unit will continue to apply to that portion of the CAMU after incorporation into the CAMU.

(c) The Regional Administrator shall designate a CAMU in accordance with the following:

- (1) The CAMU shall facilitate the implementation of reliable, effective, protective, and cost-effective remedies;
- (2) Waste management activities associated with the CAMU shall not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or hazardous constituents;
- (3) The CAMU shall include uncontaminated areas of the facility, only if including such areas for the purpose of managing remediation waste is more protective than management of such wastes at contaminated areas of the facility;
- (4) Areas within the CAMU, where wastes remain in place after closure of the CAMU, shall be managed and contained so as to minimize future releases, to the extent practicable;
- (5) The CAMU shall expedite the timing of remedial activity implementation, when appropriate and practicable;
- (6) The CAMU shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU; and
- (7) The CAMU shall, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure of the CAMU.

(d) The owner/operator shall provide sufficient information to enable the Regional Administrator to designate a CAMU in accordance with the criteria in § 264.552.

(e) The Regional Administrator shall specify, in the permit or order, requirements for CAMUs to include the following:

- (1) The areal configuration of the CAMU.
- (2) Requirements for remediation waste management to include the spec-

ification of applicable design, operation and closure requirements.

(3) Requirements for ground water monitoring that are sufficient to:

- (1) Continue to detect and to characterize the nature, extent, concentration, direction, and movement of existing releases of hazardous constituents in ground water from sources located within the CAMU; and
- (11) Detect and subsequently characterize releases of hazardous constituents to ground water that may occur from areas of the CAMU in which wastes will remain in place after closure of the CAMU.

(4) Closure and post-closure requirements.

(1) Closure of corrective action management units shall:

- (A) Minimize the need for further maintenance; and
- (B) Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, for areas where wastes remain in place, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, to surface waters, or to the atmosphere.

(11) Requirements for closure of CAMUs shall include the following, as appropriate and as deemed necessary by the Regional Administrator for a given CAMU:

(A) Requirements for excavation, removal, treatment or containment of wastes;

(B) For areas in which wastes will remain after closure of the CAMU, requirements for capping of such areas; and

(C) Requirements for removal and decontamination of equipment, devices, and structures used in remediation waste management activities within the CAMU.

(11) In establishing specific closure requirements for CAMUs under § 264.552(c), the Regional Administrator shall consider the following factors:

- (A) CAMU characteristics;
- (B) Volume of wastes which remain in place after closure;
- (C) Potential for releases from the CAMU;

(k) After being removed from the treatment vessel, treated wood from pressure and non-pressure processes must be held on the drip pad until drippage has ceased. The owner or operator must maintain records sufficient to document that all treated wood is held on the pad following treatment in accordance with this requirement.

(l) Collection and holding units associated with run-on and run-off control systems must be emptied or otherwise managed as soon as possible after storms to maintain design capacity of the system.

(m) Throughout the active life of the drip pad and as specified in the permit, if the owner or operator detects a condition that may have caused or has caused a release of hazardous waste, the condition must be repaired within a reasonably prompt period of time following discovery, in accordance with the following procedures:

(1) Upon detection of a condition that may have caused or has caused a release of hazardous waste (e.g., upon detection of leakage in the leak detection system), the owner or operator must:

(i) Enter a record of the discovery in the facility operating log;

(ii) Immediately remove the portion of the drip pad affected by the condition from service;

(iii) Determine what steps must be taken to repair the drip pad and clean up any leakage from below the drip pad, and establish a schedule for accomplishing the repairs;

(iv) Within 24 hours after discovery of the condition, notify the Regional Administrator of the condition and, within 10 working days, provide written notice to the Regional Administrator with a description of the steps that will be taken to repair the drip pad and clean up any leakage, and the schedule for accomplishing this work.

(2) The Regional Administrator will review the information submitted, make a determination regarding whether the pad must be removed from service completely or partially until repairs and clean up are complete and notify the owner or operator of the determination and the underlying rationale in writing.

(3) Upon completing all repairs and clean up, the owner or operator must notify the Regional Administrator in writing and provide a certification signed by an independent, qualified registered professional engineer that the repairs and clean up have been completed according to the written plan submitted in accordance with paragraph (m)(1)(iv) of this section.

(n) Should a permit be necessary, the Regional Administrator will specify in the permit all design and operating practices that are necessary to ensure that the requirements of this section are satisfied.

(o) The owner or operator must maintain, as part of the facility operating log, documentation of past operating and waste handling practices. This must include identification of preservative formulations used in the past, a description of dripage management practices, and a description of treated wood storage and handling practices.

[56 FR 30106, July 1, 1991, as amended at 57 FR 5901, Feb. 18, 1992; 57 FR 61503, Dec. 24, 1992]

§ 264.574 Inspections.

(a) During construction or installation, liners and cover systems (e.g., membranes, sheets, or coatings) must be inspected for uniformity, damage and imperfections (e.g., holes, cracks, thin spots, or foreign materials). Immediately after construction or installation, liners must be inspected and certified as meeting the requirements of § 264.573 of this subpart by an independent, qualified, registered professional engineer. This certification must be maintained at the facility as part of the facility operating record. After installation, liners and covers must be inspected to ensure tight seams and joints and the absence of tears, punctures, or blisters.

(b) While a drip pad is in operation, it must be inspected weekly and after storms to detect evidence of any of the following:

(1) Deterioration, malfunctions or improper operation of run-on and runoff control systems;

(2) The presence of leakage in and proper functioning of leak detection system.

Environmental Protection Agency

(3) Deterioration or cracking of the drip pad surface.

NOTE: See § 264.573(c) for remedial action required if deterioration or leakage is detected.

§ 264.575 Closure.

(a) At closure, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (pad, liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leakage, and manage them as hazardous waste.

(b) If, after removing or decontaminating all residues and making all reasonable efforts to effect removal or decontamination of contaminated components, subsoils, structures, and equipment as required in paragraph (a) of this section, the owner or operator finds that not all contaminated subsoils can be practicably removed or decontaminated, he must close the facility and perform post-closure care in accordance with closure and post-closure care requirements that apply to landfills (§ 264.310). For permitted units, the requirement to have a permit continues throughout the post-closure period. In addition, for the purpose of closure, post-closure, and financial responsibility, such a drip pad is then considered to be landfill and the owner or operator must meet all of the requirements for landfills specified in subparts C and H of this part.

(c)(1) The owner or operator of an existing drip pad, as defined in § 264.570 of this subpart, that does not comply with the liner requirements of § 264.573(b)(1) must:

(i) Include in the closure plan for the drip pad under § 264.112 both a plan for complying with paragraph (a) of this section and a contingent plan for complying with paragraph (b) of this section in case not all contaminated subsoils can be practicably removed at closure; and

(ii) Prepare a contingent post-closure plan under § 264.118 of this part for complying with paragraph (b) of this section in case not all contaminated subsoils can be practicably removed at closure.

(2) The cost estimates calculated under §§ 264.112 and 264.144 of this part for closure and post-closure care of a drip pad subject to this paragraph must include the cost of complying with the contingent closure plan, but are not required to include the cost of expected closure under paragraph (a) of this section.

Subpart X—Miscellaneous Units

SOURCE: 62 FR 46964, Dec. 10, 1997, unless otherwise noted.

§ 264.600 Applicability.

The requirements in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units, except as § 264.1 provide otherwise.

§ 264.601 Environmental performance standards.

A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit. Permit terms and provisions shall include those requirements of subparts I through O of this part, part 270, and part 146 that are appropriate for the miscellaneous unit being permitted. Protection of human health and the environment includes, but is not limited to:

(a) Prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in the ground water or subsurface environment, considering:

(1) The volume and physical and chemical characteristics of the waste in the unit, including its potential for migration through soil, liners, or other containing structures;

(2) The hydrologic and geologic characteristics of the unit and the surrounding area;

(3) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground water;

(4) The quantity and direction of ground-water flow;

(5) The proximity to and withdrawal rates of current and potential groundwater users;

(6) The patterns of land use in the region;

(7) The potential for deposition or migration of waste constituents into subsurface physical structures, and into the root zone of food-chain crops and other vegetation;

(8) The potential for health risks caused by human exposure to waste constituents; and

(9) The potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;

(b) Prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in surface water, or wetlands or on the soil surface considering:

(1) The volume and physical and chemical characteristics of the waste in the unit;

(2) The effectiveness and reliability of containing, confining, and collecting systems and structures in preventing migration;

(3) The hydrologic characteristics of the unit and the surrounding area, including the topography of the land around the unit;

(4) The patterns of precipitation in the region;

(5) The quantity, quality, and direction of ground-water flow;

(6) The proximity of the unit to surface waters;

(7) The current and potential uses of nearby surface waters and any water quality standards established for those surface waters;

(8) The existing quality of surface waters and surface soils, including other sources of contamination and their cumulative impact on surface waters and surface soils;

(9) The patterns of land use in the region;

(10) The potential for health risks caused by human exposure to waste constituents; and

(11) The potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents.

(c) Prevention of any release that may have adverse effects on human health or the environment due to migration of waste constituents in the air, considering:

(1) The volume and physical and chemical characteristics of the waste in the unit, including its potential for the emission and dispersal of gases, aerosols and particulates;

(2) The effectiveness and reliability of systems and structures to reduce or prevent emissions of hazardous constituents to the air;

(3) The operating characteristics of the unit;

(4) The atmospheric, meteorologic, and topographic characteristics of the unit and the surrounding area;

(5) The existing quality of the air, including other sources of contamination and their cumulative impact on the air;

(6) The potential for health risks caused by human exposure to waste constituents; and

(7) The potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents.

§ 264.602 **Monitoring, analysis, inspection, response, reporting, and corrective action.**

Monitoring, testing, analytical data, inspections, response, and reporting procedures and frequencies must ensure compliance with §§ 264.601, 264.15, 264.33, 264.76, 264.78, 264.77, and 264.101 as well as meet any additional requirements needed to protect human health and the environment as specified in the permit.

§ 264.603 **Post-closure care.**

A miscellaneous unit that is a disposal unit must be maintained in a manner that complies with § 264.601 during the post-closure care period. In addition, if a treatment or storage unit

has contaminated soils or ground water that cannot be completely removed or decontaminated during closure, then that unit must also meet the requirements of § 264.601 during post-closure care. The post-closure plan under § 264.118 must specify the procedures that will be used to satisfy this requirement.

Subparts Y—Z (Reserved)

Subpart AA—Air Emission Standards for Process Vents

SOURCE: 55 FR 25494, June 21, 1990, unless otherwise noted.

§ 264.1030 Applicability.

(a) The regulations in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous wastes (except as provided in § 264.1).

(b) Except for §§ 264.1034 (d) and (e), this subpart applies to process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10-ppmw, if these operations are conducted in:

(1) Units that are subject to the permitting requirements of part 270, or

(2) Hazardous waste recycling units that are located on hazardous waste management facilities otherwise subject to the permitting requirements of part 270.

(c) If the owner or operator of process vents subject to the requirements of §§ 264.1032 through 264.1036 has received a permit under section 3005 of RCRA prior to December 21, 1990 the requirements of §§ 264.1032 through 264.1036 must be incorporated when the permit is reissued under § 124.16 or reviewed under § 270.50.

[NOTE: The requirements of §§ 264.1032 through 264.1036 apply to process vents on hazardous waste recycling units previously exempt under § 261.6(c)(1). Other exemptions under §§ 261.4, 263.34, and 264.1(g) are not affected by these requirements.]

[55 FR 25494, June 21, 1990, as amended at 60 FR 19290, Apr. 26, 1995]

§ 264.1031 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and parts 260-266.

Air stripping operation is a desorption operation employed to transfer one or more volatile components from a liquid mixture into a gas (air) either with or without the application of heat to the liquid. Packed towers, spray towers, and bubble-cap, sieve, or valve-type plate towers are among the process configurations used for contacting the air and a liquid.

Bottoms receiver means a container or tank used to receive and collect the heavier bottoms fractions of the distillation feed stream that remain in the liquid phase.

Closed-vent system means a system that is not open to the atmosphere and that is composed of piping, connections, and, if necessary, flow-inducing devices that transport gas or vapor from a piece or pieces of equipment to a control device.

Condenser means a heat-transfer device that reduces a thermodynamic fluid from its vapor phase to its liquid phase.

Connector means flanged, screwed, welded, or other joined fittings used to connect two pipelines or a pipeline and a piece of equipment. For the purposes of reporting and recordkeeping, connector means flanged fittings that are not covered by insulation or other materials that prevent location of the fittings.

Continuous recorder means a data-recording device recording an instantaneous data value at least once every 15 minutes.

Control device means an enclosed combustion device, vapor recovery system, or flare. Any device the primary function of which is the recovery or capture of solvents or other organics for use, reuso, or sale (e.g., a primary condenser on a solvent recovery unit) is not a control device.

Control device shutdown means the cessation of operation of a control device for any purpose.

Distillate receiver means a container or tank used to receive and collect liquid material (condensed) from the overhead condenser of a distillation

unit and from which the condensed liquid is pumped to larger storage tanks or other process units.

Distillation operation means an operation, either batch or continuous, separating one or more feed stream(s) into two or more exit streams, each exit stream having component concentrations different from those in the feed stream(s). The separation is achieved by the redistribution of the components between the liquid and vapor phase as they approach equilibrium within the distillation unit.

Double block and bleed system means two block valves connected in series with a bleed valve or line that can vent the line between the two block valves. *Equipment* means each valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, or flange, and any control devices or systems required by this subpart.

Flame zone means the portion of the combustion chamber in a boiler occupied by the flame envelope.

Flow indicator means a device that indicates whether gas flow is present in a vent stream.

First attempt at repair means to take rapid action for the purpose of stopping or reducing leakage of organic material to the atmosphere using best practices.

Fractionation operation means a distillation operation or method used to separate a mixture of several volatile components of different boiling points in successive stages, each stage removing from the mixture some proportion of one of the components.

Hazardous waste management unit shutdown means a work practice or operational procedure that stops operation of a hazardous waste management unit or part of a hazardous waste management unit. An unscheduled work practice or operational procedure that stops operation of a hazardous waste management unit or part of a hazardous waste management unit for less than 24 hours is not a hazardous waste management unit shutdown. The use of spare equipment and technically feasible bypassing of equipment without stopping operation are not hazardous waste management unit shutdowns.

Hot well means a container for collecting condensate as in a steam condenser serving a vacuum-let or steam-jet ejector.

In gas/vapor service means that the piece of equipment contains or contacts a hazardous waste stream that is in the gaseous state at operating conditions.

In heavy liquid service means that the piece of equipment is not in gas/vapor service or in light liquid service.

In light liquid service means that the piece of equipment contains or contacts a waste stream where the vapor pressure of one or more of the components in the stream is greater than 0.3 kilopascals (kPa) at 20 °C, the total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20 °C is equal to or greater than 20 percent by weight, and the fluid is a liquid at operating conditions.

In situ sampling systems means nonextractive samplers or in-line samplers.

In vacuum service means that equipment is operating at an internal pressure that is at least 5 kPa below ambient pressure.

Malfunction means any sudden failure of a control device or a hazardous waste management unit or failure of a hazardous waste management unit to operate in a normal or usual manner, so that organic emissions are increased.

Open-ended valve or line means any valve, except pressure relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping.

Pressure release means the emission of materials resulting from the system pressure being greater than the set pressure of the pressure relief device.

Process heater means a device that transfers heat liberated by burning fuel to fluids contained in tubes, including all fluids except water that are heated to produce steam.

Process vent means any open-ended pipe or stack that is vented to the atmosphere either directly, through a vacuum-producing system, or through a tank (e.g., distillate receiver, condenser, bottoms receiver, surge control

Environmental Protection Agency

tank, separator tank, or hot well) associated with hazardous waste distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations. *Repaired* means that equipment is adjusted, or otherwise altered, to eliminate a leak.

Sensor means a device that measures a physical quantity or the change in a physical quantity, such as temperature, pressure, flow rate, pH, or liquid level.

Separator tank means a device used for separation of two immiscible liquids.

Solvent extraction operation means an operation or method of separation in which a solid or solution is contacted with a liquid solvent (the two being mutually insoluble) to preferentially dissolve and transfer one or more components into the solvent.

Startup means the setting in operation of a hazardous waste management unit or control device for any purpose.

Steam stripping operation means a distillation operation in which vaporization of the volatile constituents of a liquid mixture takes place by the introduction of steam directly into the charge.

Surge control tank means a large-sized pipe or storage reservoir sufficient to contain the surging liquid discharge of the process tank to which it is connected.

Thin-film evaporation operation means a distillation operation that employs a heating surface consisting of a large diameter tube that may be either straight or tapered, horizontal or vertical. Liquid is spread on the tube wall by a rotating assembly of blades that maintain a close clearance from the wall or actually ride on the film of liquid on the wall.

Vapor incinerator means any enclosed combustion device that is used for destroying organic compounds and does not extract energy in the form of steam or process heat.

Vented means discharged through an opening, typically an open-ended pipe or stack, allowing the passage of a stream of liquids, gases, or fumes into the atmosphere. The passage of liquids, gases, or fumes is caused by mechanical

cal means such as compressors or vacuum-producing systems or by process-related means such as evaporation produced by heating and not caused by tank loading and unloading (working losses) or by natural means such as diurnal temperature changes.

§ 264.1032 Standards: Process vents.

(a) The owner or operator of a facility with process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations managing hazardous wastes with organic concentrations of at least 10 ppmw shall either:

(1) Reduce total organic emissions from all affected process vents at the facility below 1.4 kg/h (3 lb/h) and 2.8 Mg/yr (3.1 tons/yr), or

(2) Reduce, by use of a control device, total organic emissions from all affected process vents at the facility by 95 weight percent.

(b) If the owner or operator installs a closed-vent system and control device to comply with the provisions of paragraph (a) of this section the closed-vent system and control device must meet the requirements of § 264.1033.

(c) Determinations of vent emissions and emission reductions or total organic compound concentrations achieved by add-on control devices may be based on engineering calculations or performance tests. If performance tests are used to determine vent emissions, emission reductions, or total organic compound concentrations achieved by add-on control devices, the performance tests must conform with the requirements of § 264.1033(c).

(d) When an owner or operator and the Regional Administrator do not agree on determinations of vent emissions and/or emission reductions or total organic compound concentrations achieved by add-on control devices based on engineering calculations, the procedures in § 264.1033(c) shall be used to resolve the disagreement.

§ 264.1033 Standards: Closed-vent systems and control devices.

(a)(1) Owners or operators of closed-vent systems and control devices used to comply with provisions of this part

shall comply with the provisions of this section.

(2) The owner or operator of an existing facility who cannot install a closed-vent system and control device to comply with the provisions of this subpart on the effective date that the facility becomes subject to the provisions of this subpart must prepare an implementation schedule that includes dates by which the closed-vent system and control device will be installed and in operation. The controls must be installed as soon as possible, but the implementation schedule may allow up to 18 months after the effective date that the facility becomes subject to this subpart for installation and startup. All units that begin operation after December 21, 1990, must comply with the rules immediately (i.e., must have control devices installed and operating on startup of the affected unit); the 2-year implementation schedule does not apply to these units.

(b) A control device involving vapor recovery (e.g., a condenser or adsorber) shall be designed and operated to recover the organic vapors vented to it with an efficiency of 95 weight percent or greater unless the total organic emission limits of § 264.1032(a)(1) for all affected process vents can be attained at an efficiency less than 95 weight percent.

(c) An enclosed combustion device (e.g., a vapor incinerator, boiler, or process heater) shall be designed and operated to reduce the organic emissions vented to it by 95 weight percent or greater; to achieve a total organic compound concentration of 20 ppmv, expressed as the sum of the actual compounds, not carbon equivalents, on a dry basis corrected to 3 percent oxygen; or to provide a minimum residence time of 0.50 seconds at a minimum temperature of 760 °C. If a boiler or process heater is used as the control device, then the vent stream shall be introduced into the flame zone of the boiler or process heater.

(d)(1) A flare shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (e)(1) of this section, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

(2) A flare shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f)(2)(iii) of this section.

(3) A flare shall be used only if the net heating value of the gas being combusted is 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or if the net heating value of the gas being combusted is 7.45 MJ/scm (200 Btu/scf) or greater if the flare is nonassisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (e)(2) of this section.

(4)(i) A steam-assisted or nonassisted flare shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (e)(3) of this section, less than 18.3 m/s (60 ft/s), except as provided in paragraphs (d)(4) (ii) and (iii) of this section.

(ii) A steam-assisted or nonassisted flare designed for and operated with an exit velocity, as determined by the methods specified in paragraph (e)(3) of this section, equal to or greater than 18.3 m/s (60 ft/s) but less than 122 m/s (400 ft/s) is allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

(iii) A steam-assisted or nonassisted flare designed for and operated with an exit velocity, as determined by the methods specified in paragraph (e)(3) of this section, less than the velocity, V_{max} , as determined by the method specified in paragraph (e)(4) of this section and less than 122 m/s (400 ft/s) is allowed.

(5) An air-assisted flare shall be designed and operated with an exit velocity less than the velocity, V_{max} , as determined by the method specified in paragraph (e)(6) of this section.

(6) A flare used to comply with this section shall be steam-assisted, air-assisted, or nonassisted.

(e)(1) Reference Method 22 in 40 CFR part 60 shall be used to determine the compliance of a flare with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.

(2) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K \left[\sum_{i=1}^n C_i H_i \right]$$

where:

H_T = Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to 1 mol is 20 °C;

K = Constant, 1.74×10^{-7} (1/ppm) (g mol/scm) (MJ/kcal) where standard temperature for (g mol/scm) is 20 °C;

C_i = Concentration of sample component i in ppm on a wet basis, as measured for organics by Reference Method 18 in 40 CFR part 60 and measured for hydrogen and carbon monoxide by ASTM D 1946-82 (incorporated by reference as specified in § 260.11); and

H_i = Net heat of combustion of sample component i , kcal/g mol at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D 2392-83 (incorporated by reference as specified in § 260.11) if published values are not available or cannot be calculated.

(3) The actual exit velocity of a flare shall be determined by dividing the volumetric flow rate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D in 40 CFR part 60 as appropriate, by the unobstructed (free) cross-sectional area of the flare tip.

(4) The maximum allowed velocity in m/s, V_{max} , for a flare complying with paragraph (d)(4)(iii) of this section shall be determined by the following equation:

$$\text{Log}_{10}(V_{max}) = (H_T + 28.8) / 31.7$$

where:

28.8 = Constant,

31.7 = Constant,

H_T = The net heating value as determined in paragraph (e)(2) of this section.

(5) The maximum allowed velocity in m/s, V_{max} , for an air-assisted flare shall be determined by the following equation:

$$V_{max} = 8.706 + 0.7084 (H_T)$$

where:

8.706 = Constant,

0.7084 = Constant,

H_T = The net heating value as determined in paragraph (e)(2) of this section.

(f) The owner or operator shall monitor and inspect each control device re-

quired to comply with this section to ensure proper operation and maintenance of the control device by implementing the following requirements:

(1) Install, calibrate, maintain, and operate according to the manufacturer's specifications a flow indicator that provides a record of vent stream flow from each affected process vent to the control device at least once every hour. The flow indicator sensor shall be installed in the vent stream at the nearest feasible point to the control device inlet but before the point at which the vent streams are combined.

(2) Install, calibrate, maintain, and operate according to the manufacturer's specifications a device to continuously monitor control device operation as specified below:

(i) For a thermal vapor incinerator, a temperature monitoring device equipped with a continuous recorder. The device shall have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. The temperature sensor shall be installed at a location in the combustion chamber downstream of the combustion zone.

(ii) For a catalytic vapor incinerator, a temperature monitoring device equipped with a continuous recorder. The device shall be capable of monitoring temperature at two locations and have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. One temperature sensor shall be installed in the vent stream at the nearest feasible point to the catalyst bed inlet and a second temperature sensor shall be installed in the vent stream at the nearest feasible point to the catalyst bed outlet.

(iii) For a flare, a heat sensing monitoring device equipped with a continuous recorder that indicates the continuous ignition of the pilot flame.

(iv) For a boiler or process heater having a design heat input capacity less than 44 MW, a temperature monitoring device equipped with a continuous recorder. The device shall have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. The temperature sensor shall be installed at a location

in the furnace downstream of the combustion zone.

(v) For a boiler or process heater having a design heat input capacity greater than or equal to 44 MW, a monitoring device equipped with a continuous recorder to measure a parameter(s) that indicates good combustion operating practices are being used.

(vi) For a condenser, either:

(A) A monitoring device equipped with a continuous recorder to measure the concentration level of the organic compounds in the exhaust vent stream from the condenser, or

(B) A temperature monitoring device equipped with a continuous recorder. The device shall be capable of monitoring temperature at two locations and have an accuracy of ± 1 percent of the temperature being monitored in $^{\circ}\text{C}$ or ± 0.5 $^{\circ}\text{C}$, whichever is greater. One temperature sensor shall be installed at a location in the exhaust vent stream from the condenser, and a second temperature sensor shall be installed at a location in the coolant fluid exiting the condenser.

(vii) For a carbon adsorption system that regenerates the carbon bed directly in the control device such as a fixed-bed carbon adsorber, either:

(A) A monitoring device equipped with a continuous recorder to measure the concentration level of the organic compounds in the exhaust vent stream from the carbon bed, or

(B) A monitoring device equipped with a continuous recorder to measure a parameter that indicates the carbon bed is regenerated on a regular, predetermined time cycle.

(3) Inspect the readings from each monitoring device required by paragraphs (i)(1) and (2) of this section at least once each operating day to check control device operation and, if necessary, immediately implement the corrective measures necessary to ensure the control device operates in compliance with the requirements of this section.

(g) An owner or operator using a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly onsite in the control device shall replace the existing carbon in the control device with fresh carbon at a regular, predetermined time interval that is no longer than the carbon service life established as a requirement of § 264.1035(b)(4)(iii)(F).

(h) An owner or operator using a carbon adsorption system such as a carbon canister that does not regenerate the carbon bed directly onsite in the control device shall replace the existing carbon in the control device with fresh carbon on a regular basis by using one of the following procedures:

(1) Monitor the concentration level of the organic compounds in the exhaust vent stream from the carbon adsorption system on a regular schedule, and replace the existing carbon with fresh carbon immediately when carbon breakthrough is indicated. The monitoring frequency shall be daily or at an interval no greater than 20 percent of the time required to consume the total carbon working capacity established as a requirement of § 264.1035(b)(4)(iii)(G), whichever is longer.

(2) Replace the existing carbon with fresh carbon at a regular, predetermined time interval that is less than the design carbon replacement interval established as a requirement of § 264.1035(b)(4)(iii)(G).

(i) An alternative operational or process parameter may be monitored if it can be demonstrated that another parameter will ensure that the control device is operated in conformance with these standards and the control device's design specifications.

(j) An owner or operator of an affected facility seeking to comply with the provisions of this part by using a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system is required to develop documentation including sufficient information to describe the control device operation and identify the process parameter or parameters that indicate proper operation and maintenance of the control device.

(k)(1) Closed-vent systems shall be designed for and operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background and by visual

Environmental Protection Agency

inspections, as determined by the methods specified as § 264.1034(b).

(2) Closed-vent systems shall be monitored to determine compliance with this section during the initial leak detection monitoring, which shall be conducted by the date that the facility becomes subject to the provisions of this section, annually, and at other times as requested by the Regional Administrator.

(3) Detectable emissions, as indicated by an instrument reading greater than 500 ppm and visual inspections, shall be controlled as soon as practicable, but not later than 15 calendar days after the emission is detected.

(4) A first attempt at repair shall be made no later than 5 calendar days after the emission is detected.

(i) Closed-vent systems and control devices used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

(55 FR 26494, June 21, 1990, as amended at 56 FR 19290, Apr. 25, 1991)

§ 264.1034 Test methods and procedures.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the test methods and procedures requirements provided in this section.

(b) When a closed-vent system is tested for compliance with no detectable emissions, as required in § 264.1033(k), the test shall comply with the following requirements:

(1) Monitoring shall comply with Reference Method 21 in 40 CFR part 60.

(2) (6) The detection instrument shall meet the performance criteria of Reference Method 21.

(3) The instrument shall be calibrated before use on each day of its use by the procedures specified in Reference Method 21.

(4) Calibration gases shall be:

- (i) Zero air (less than 10 ppm of hydrocarbon in air).
- (ii) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.
- (6) The background level shall be determined as set forth in Reference Method 21.

(5) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.

(6) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(7) The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 ppm for determining compliance.

(c) Performance tests to determine compliance with § 264.1033(a) and with the total organic compound concentration limit of § 264.1033(c) shall comply with the following:

(1) Performance tests to determine total organic compound concentrations and mass flow rates entering and exiting control devices shall be conducted and data reduced in accordance with the following reference methods and calculation procedures:

(i) Method 2 in 40 CFR part 60 for velocity and volumetric flow rate.

(ii) Method 18 in 40 CFR part 60 for organic content.

(iii) Each performance test shall consist of three separate runs; each run conducted for at least 1 hour under the conditions that exist when the hazardous waste management unit is operating at the highest load or capacity level reasonably expected to occur. For the purpose of determining total organic compound concentrations and mass flow rates, the average of results of all runs shall apply. The average shall be computed on a time-weighted basis.

(iv) Total organic mass flow rates shall be determined by the following equation:

$$E_k = Q_{ad} \left\{ \sum_{i=1}^n C_i MW_i \right\} [0.0416] [10^{-6}]$$

where:

E_k = Total organic mass flow rate, kg/h;

Q_{ad} = Volumetric flow rate of gases entering or exiting control device, as determined by Method 2, dscm/h;

n = Number of organic compounds in the vent gas;

C_i = Organic concentration in ppm, dry basis, of compound i in the vent gas, as determined by Method 18;

MW_i = Molecular weight of organic compound i in the vent gas, kg/kg-mol.

0.0416=Conversion factor for molar volume, kg-mol/m³ @ 293 K and 760 mm Hg;
10⁻⁶=Conversion from ppm, ppm⁻¹.

(v) The annual total organic emission rate shall be determined by the following equation:

$$E_A = (E_p)(H)$$

where:

E_A =Total organic mass emission rate, kg/y;
 E_p =Total organic mass flow rate for the process vent, kg/h;
 H =Total annual hours of operations for the affected unit, h.

(vi) Total organic emissions from all affected process vents at the facility shall be determined by summing the hourly total organic mass emission rates (E_p as determined in paragraph (c)(1)(iv) of this section) and by summing the annual total organic mass emission rates (E_A as determined in paragraph (c)(1)(v) of this section) for all affected process vents at the facility.

(2) The owner or operator shall record such process information as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test.

(3) The owner or operator of an affected facility shall provide, or cause to be provided, performance testing facilities as follows:

(i) Sampling ports adequate for the test methods specified in paragraph (c)(1) of this section.

(ii) Safe sampling platform(s).

(iii) Safe access to sampling platform(s).

(iv) Utilities for sampling and testing equipment.

(4) For the purpose of making compliance determinations, the time-weighted average of the results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplacable portion of the sample train, extreme meteorological conditions, or other circumstances beyond the owner or operator's control, compliance may, upon the Regional Administrator's approval, be determined using the average of the results of the two other runs.

mentation of the waste determination is required. Examples of documentation that shall be used to support a determination under this provision include production process information documenting that no organic compounds are used, information that the waste is generated by a process that is identical to a process at the same or another facility that has previously been demonstrated by direct measurement to generate a waste stream having a total organic content less than 10 ppmw, or prior speculation analysis results on the same waste stream where it can also be documented that no process changes have occurred since that analysis that could affect the waste total organic concentration.

(e) The determination that distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations manage hazardous wastes with time-weighted, annual average total organic concentrations less than 10 ppmw shall be made as follows:

(1) By the effective date that the facility becomes subject to the provisions of this subpart or by the date when the waste is first managed in a waste management unit, whichever is later, and

(2) For continuously generated waste, annually, or

(3) Whenever there is a change in the waste being managed or a change in the process that generates or treats the waste.

(f) When an owner or operator and the Regional Administrator do not agree on whether a distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operation manages a hazardous waste with organic concentrations of at least 10 ppmw based on knowledge of the waste, the procedures in Method 8240 may be used to resolve the dispute.

§ 264.1035 Recordkeeping requirements.

(a)(1) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section.

(2) An owner or operator of more than one hazardous waste management unit subject to the provisions of this

subpart may comply with the recordkeeping requirements for these hazardous waste management units in one recordkeeping system if the system identifies each record by each hazardous waste management unit.

(b) Owners and operators must record the following information in the facility operating record:

(1) For facilities that comply with the provisions of § 264.1033(a)(2), an implementation schedule that includes dates by which the closed-vent system and control device will be installed and in operation. The schedule must also include a rationale of why the installation cannot be completed at an earlier date. The implementation schedule must be in the facility operating record by the effective date that the facility becomes subject to the provisions of this subpart.

(2) Up-to-date documentation of compliance with the process vent standards in § 264.1032, including:

(i) Information and data identifying all affected process vents, annual throughput and operating hours of each affected unit, estimated emission rates for each affected vent and for the overall facility (i.e., the total emissions for all affected vents at the facility), and the approximate location within the facility of each affected unit (e.g., identify the hazardous waste management units on a facility plot plan).

(ii) Information and data supporting determinations of vent emissions and emission reductions achieved by add-on control devices based on engineering calculations or source tests. For the purpose of determining compliance, determinations of vent emissions and emission reductions must be made using operating parameter values (e.g., temperatures, flow rates, or vent stream organic compounds and concentrations) that represent the conditions that result in maximum organic emissions, such as when the waste management unit is operating at the highest load or capacity level reasonably expected to occur. If the owner or operator takes any action (e.g., managing a waste of different composition or increasing operating hours of affected waste management units) that would result in an increase in total organic

emissions from affected process vents at the facility, then a new determination is required.

(3) Where an owner or operator chooses to use test data to determine the organic removal efficiency or total organic compound concentration achieved by the control device, a performance test plan. The test plan must include:

(i) A description of how it is determined that the planned test is going to be conducted when the hazardous waste management unit is operating at the highest load or capacity level reasonably expected to occur. This shall include the estimated or design flow rate and organic content of each vent stream and define the acceptable operating ranges of key process and control device parameters during the test program.

(ii) A detailed engineering description of the closed-vent system and control device including:

(A) Manufacturer's name and model number of control device.

(B) Type of control device.

(C) Dimensions of the control device.

(D) Capacity.

(E) Construction materials.

(iii) A detailed description of sampling and monitoring procedures, including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis.

(4) Documentation of compliance with § 264.1033 shall include the following information:

(i) A list of all information references and sources used in preparing the documentation.

(ii) Records, including the dates, of each compliance test required by § 264.1033(k).

(iii) If engineering calculations are used, a design analysis, specifications, drawings, schematics, and piping and instrumentation diagrams based on the appropriate sections of "APTI Course 416: Control of Gaseous Emissions" (incorporated by reference as specified in § 260.11) or other engineering texts acceptable to the Regional Administrator that present basic control device design information. Documentation provided by the control device manu-

facturer or vendor that describes the control device design in accordance with paragraphs (b)(4)(ii)(A) through (b)(4)(ii)(G) of this section may be used to comply with this requirement. The design analysis shall address the vent stream characteristics and control device operation parameters as specified below.

(A) For a thermal vapor incinerator, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperature in the combustion zone and the combustion zone residence time.

(B) For a catalytic vapor incinerator, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperatures across the catalyst bed inlet and outlet.

(C) For a boiler or process heater, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average flame zone temperatures, combustion zone residence time, and description of method and location where the vent stream is introduced into the combustion zone.

(D) For a flare, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also consider the requirements specified in § 264.1033(d).

(E) For a condenser, the design analysis shall consider the vent stream composition, constituent concentrations, flow rate, relative humidity, and temperature. The design analysis shall also establish the design outlet organic compound concentration level, design average temperature of the condenser exhaust vent stream, and design average temperatures of the coolant fluid at the condenser inlet and outlet.

(F) For a carbon adsorption system such as a fixed-bed adsorber that regenerates the carbon bed directly onsite in the control device, the design analysis shall consider the vent stream composition, constituent concentrations, flow rate, relative humidity, and tem-

Environmental Protection Agency

perature. The design analysis shall also establish the design exhaust vent stream organic compound concentration level, number and capacity of carbon beds, type and working capacity of activated carbon used for carbon beds, design total steam flow over the period of each complete carbon bed regeneration cycle, duration of the carbon bed steaming and cooling/drying cycles, design carbon bed temperature after regeneration, design carbon bed regeneration time, and design service life of carbon.

(G) For a carbon adsorption system such as a carbon canister that does not regenerate the carbon bed directly onsite in the control device, the design analysis shall consider the vent stream composition, constituent concentrations, flow rate, relative humidity, and temperature. The design analysis shall also establish the design outlet organic concentration level, capacity of carbon bed, type and working capacity of activated carbon used for carbon bed, and design carbon replacement interval based on the total carbon working capacity of the control device and source operating schedule.

(iv) A statement signed and dated by the owner or operator certifying that the operating parameters used in the design analysis reasonably represent the conditions that exist when the hazardous waste management unit is or would be operating at the highest load or capacity level reasonably expected to occur.

(v) A statement signed and dated by the owner or operator certifying that the control device is designed to operate at an efficiency of 95 percent or greater unless the total organic concentration limit of § 264.1032(a) is achieved at an efficiency less than 95 weight percent or the total organic emission limits of § 264.1032(a) for affected process vents at the facility can be attained by a control device involving vapor recovery at an efficiency less than 95 weight percent. A statement provided by the control device manufacturer or vendor certifying that the control equipment meets the design specifications may be used to comply with this requirement.

(vi) If performance tests are used to demonstrate compliance, all test results.

(c) Design documentation and monitoring, operating, and inspection information for each closed-vent system and control device required to comply with the provisions of this part shall be recorded and kept up-to-date in the facility operating record. The information shall include:

(1) Description and date of each modification that is made to the closed-vent system or control device design.

(2) Identification of operating parameter, description of monitoring device, and diagram of monitoring sensor location or locations used to comply with § 264.1033 (f)(1) and (f)(2).

(3) Monitoring, operating, and inspection information required by paragraphs (f) through (k) of § 264.1033.

(4) Date, time, and duration of each period that occurs while the control device is operating when any monitored parameter exceeds the value established in the control device design analysis as specified below:

(i) For a thermal vapor incinerator designed to operate with a minimum residence time of 0.50 second at a minimum temperature of 760 °C, period when the combustion temperature is below 760 °C.

(ii) For a thermal vapor incinerator designed to operate with an organic emission reduction efficiency of 95 weight percent or greater period when the combustion zone temperature is more than 28 °C below the design average combustion zone temperature established as a requirement of paragraph (b)(4)(ii)(A) of this section.

(iii) For a catalytic vapor incinerator, period when:

(A) Temperature of the vent stream at the catalyst bed inlet is more than 28 °C below the average temperature of the inlet vent stream established as a requirement of paragraph (b)(4)(ii)(B) of this section, or

(B) Temperature difference across the catalyst bed is less than 80 percent of the design average temperature difference established as a requirement of paragraph (b)(4)(ii)(B) of this section.

(iv) For a boiler or process heater, period when:

(A) Flame zone temperature is more than 28 °C below the design average flame zone temperature established as a requirement of paragraph (b)(4)(iii)(C) of this section, or

(B) Position changes where the vent stream is introduced to the combustion zone from the location established as a requirement of paragraph (b)(4)(iii)(C) of this section.

(v) For a flare, period when the pilot flame is not ignited.

(vi) For a condenser that complies with § 264.1033(f)(2)(vi)(A), period when the organic compound concentration level or readings of organic compounds in the exhaust vent stream from the condenser are more than 20 percent greater than the design outlet organic compound concentration level established as a requirement of paragraph (b)(4)(iii)(E) of this section.

(vii) For a condenser that complies with § 264.1033(f)(2)(vi)(B), period when:

(A) Temperature of the exhaust vent stream from the condenser is more than 6 °C above the design average exhaust vent stream temperature established as a requirement of paragraph (b)(4)(iii)(E) of this section; or

(B) Temperature of the coolant fluid exiting the condenser is more than 6 °C above the design average coolant fluid temperature at the condenser outlet established as a requirement of paragraph (b)(4)(iii)(E) of this section.

(viii) For a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly onsite in the control device and complies with § 264.1033(f)(2)(vii)(A), period when the organic compound concentration level or readings of organic compounds in the exhaust vent stream from the carbon bed are more than 20 percent greater than the design exhaust vent stream organic compound concentration level established as a requirement of paragraph (b)(4)(iii)(F) of this section.

(ix) For a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly onsite in the control device and complies with § 264.1033(f)(2)(vii)(B), period when the vent stream continues to flow through the control device beyond the predetermined carbon bed regeneration time established as a require-

ment of paragraph (b)(4)(iii)(F) of this section.

(b) Explanation for each period recorded under paragraph (4) of the cause for control device operating parameter exceeding the design value and the measures implemented to correct the control device operation.

(6) For a carbon adsorption system operated subject to requirements specified in § 264.1033(g) or § 264.1033(h)(2), date when existing carbon in the control device is replaced with fresh carbon.

(7) For a carbon adsorption system operated subject to requirements specified in § 264.1033(h)(1), a log that records:

(1) Date and time when control device is monitored for carbon breakthrough and the monitoring device reading.

(ii) Date when existing carbon in the control device is replaced with fresh carbon.

(8) Date of each control device start-up and shutdown.

(d) Records of the monitoring, operating, and inspection information required by paragraphs (c)(3)-(c)(8) of this section need be kept only 3 years.

(e) For a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system, the Regional Administrator will specify the appropriate record-keeping requirements.

(f) Up-to-date information and data used to determine whether or not a process vent is subject to the requirements in § 264.1032 including supporting documentation as required by § 264.1034(d)(2) when application of the knowledge of the nature of the hazardous waste stream or the process by which it was produced is used, shall be recorded in a log that is kept in the facility operating record.

[55 FR 25494, June 21, 1990, as amended at 56 FR 19290, Apr. 26, 1991]

§ 264.1036 Reporting requirements.

(a) A semiannual report shall be submitted by owners and operators subject to the requirements of this subpart to the Regional Administrator by dates specified by the Regional Administrator. The report shall include the following information:

(1) The Environmental Protection Agency identification number, name, and address of the facility.

(2) For each month during the semi-annual reporting period, dates when the control device exceeded or operated outside of the design specifications as defined in § 264.1035(c)(4) and as indicated by the control device monitoring required by § 264.1033(f) and such exceedances were not corrected within 24 hours, or that a flare operated with visible emissions as defined in § 264.1033(d) and as determined by Method 23 monitoring, the duration and cause of each exceedance or visible emissions, and any corrective measures taken.

(b) If, during the semiannual reporting period, the control device does not exceed or operate outside of the design specifications as defined in § 264.1035(c)(4) for more than 24 hours or a flare does not operate with visible emissions as defined in § 264.1033(d), a report to the Regional Administrator is not required.

§ 264.1037—264.1049 [Reserved]

Subpart BB—Air Emission Standards for Equipment Leaks

Source: 55 FR 25501, June 21, 1990, unless otherwise noted.

§ 264.1050 Applicability.

(a) The regulations in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous wastes (except as provided in § 264.1).

(b) Except as provided in § 264.1064(k), this subpart applies to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight that are managed in:

(1) Units that are subject to the permitting requirements of part 270, or

(2) Hazardous waste recycling units that are located on hazardous waste management facilities otherwise subject to the permitting requirements of part 270.

(c) If the owner or operator of equipment subject to the requirements of § 264.1052 through 264.1065 has received a permit under section 3005 of RRA

prior to December 21, 1990, the requirements of §§ 264.1052 through 264.1055 must be incorporated when the permit is released under § 124.16 or reviewed under § 270.60.

(d) Each piece of equipment to which this subpart applies shall be marked in such a manner that it can be distinguished readily from other pieces of equipment.

(e) Equipment that is in vacuum service is excluded from the requirements of § 264.1052 to § 264.1060 if it is identified as required in § 264.1064(g)(5).

[NOTE: The requirements of §§ 264.1052 through 264.1055 apply to equipment associated with hazardous waste recycling units previously exempt under § 261.6(c)(1). Other exemptions under §§ 231.4, 262.34, and 264.1(g) are not affected by these requirements.]

§ 264.1051 Definitions.

As used in this subpart, all terms shall have the meaning given them in § 264.1031, the Act, and parts 260-266.

§ 264.1052 Standards: Pumps in light liquid service.

(a)(1) Each pump in light liquid service shall be monitored monthly to detect leaks by the methods specified in § 264.1053(b), except as provided in paragraphs (d), (e), and (f) of this section.

(2) Each pump in light liquid service shall be checked by visual inspection each calendar week for indications of liquids dripping from the pump seal.

(b)(1) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(2) If there are indications of liquids dripping from the pump seal, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 264.1059.

(2) A first attempt at repair (e.g., tightening the packing gland) shall be made no later than 5 calendar days after each leak is detected.

(d) Each pump equipped with a dual mechanical seal system that includes a barrier fluid system is exempt from the requirements of paragraph (a) of this section, provided the following requirements are met:

(1) Each dual mechanical seal system must be:

(i) Operated with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure, or

(ii) Equipped with a barrier fluid degassing reservoir that is connected by a closed-vent system to a control device that complies with the requirements of § 264.1060, or

(iii) Equipped with a system that purges the barrier fluid into a hazardous waste stream with no detectable emissions to the atmosphere.

(2) The barrier fluid system must not be a hazardous waste with organic concentrations 10 percent or greater by weight.

(3) Each barrier fluid system must be equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both.

(4) Each pump must be checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seals.

(5)(i) Each sensor as described in paragraph (d)(3) of this section must be checked daily or be equipped with an audible alarm that must be checked monthly to ensure that it is functioning properly.

(ii) The owner or operator must determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(6)(i) If there are indications of liquids dripping from the pump seal or the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined in paragraph (d)(5)(ii) of this section, a leak is detected.

(ii) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 264.1059.

(iii) A first attempt at repair (e.g., relapping the seal) shall be made no later than 5 calendar days after each leak is detected.

(6) Any pump that is designated, as described in § 264.1064(g)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from

the requirements of paragraphs (a), (c), and (d) of this section if the pump meets the following requirements:

(1) Must have no externally actuated shaft penetrating the pump housing.

(2) Must operate with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background as measured by the methods specified in § 264.1063(c).

(3) Must be tested for compliance with paragraph (e)(2) of this section initially upon designation, annually, and at other times as requested by the Regional Administrator.

(f) If any pump is equipped with a closed-vent system capable of capturing and transporting any leakage from the seal or seals to a control device that complies with the requirements of § 264.1060, it is exempt from the requirements of paragraphs (a) through (e) of this section.

[55 FR 25301, June 21, 1990, as amended at 56 FR 19290, Apr. 25, 1991]

§ 264.1053 Standards; Compressors.

(a) Each compressor shall be equipped with a seal system that includes a barrier fluid system and that prevents leakage of total organic emissions to the atmosphere, except as provided in paragraphs (h) and (i) of this section.

(b) Each compressor seal system as required in paragraph (a) of this section shall be:

(1) Operated with the barrier fluid at a pressure that is at all times greater than the compressor stuffing box pressure, or

(2) Equipped with a barrier fluid system that is connected by a closed-vent system to a control device that complies with the requirements of § 264.1060, or

(3) Equipped with a system that purges the barrier fluid into a hazardous waste stream with no detectable emissions to atmosphere.

(c) The barrier fluid must not be a hazardous waste with organic concentrations 10 percent or greater by weight.

(d) Each barrier fluid system as described in paragraphs (a) through (c) of this section shall be equipped with a sensor that will detect failure of the

seal system, barrier fluid system, or both.

(e)(1) Each sensor as required in paragraph (d) of this section shall be checked daily or shall be equipped with an audible alarm that must be checked monthly to ensure that it is functioning properly unless the compressor is located within the boundary of an un-manned plant site, in which case the sensor must be checked daily.

(2) The owner or operator shall determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(f) If the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined under paragraph (e)(2) of this section, a leak is detected.

(g)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 264.1059.

(2) A first attempt at repair (e.g., tightening the packing gland) shall be made no later than 5 calendar days after each leak is detected.

(h) A compressor is exempt from the requirements of paragraphs (a) and (b) of this section if it is equipped with a closed-vent system capable of capturing and transporting any leakage from the seal to a control device that complies with the requirements of paragraph (i) of this section.

(i) Any compressor that is designated, as described in § 264.1064(g)(2), for no detectable emissions as indicated by an instrument reading of less than 500 ppm above background is exempt from the requirements of paragraphs (a) through (h) of this section if the compressor:

(1) Is determined to be operating with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in § 264.1063(c).

(2) Is tested for compliance with paragraph (i)(1) of this section initially upon designation, annually, and at other times as requested by the Regional Administrator.

§ 264.1054 Standards; Pressure relief devices in gas/vapor service.

(a) Except during pressure releases, each pressure relief device in gas/vapor service shall be operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in § 264.1063(c).

(b)(1) After each pressure release, the pressure relief device shall be returned to a condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as soon as practicable, but no later than 5 calendar days after each pressure release, except as provided in § 264.1059.

(2) No later than 5 calendar days after the pressure release, the pressure relief device shall be monitored to confirm the condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in § 264.1063(c).

(c) Any pressure relief device that is equipped with a closed-vent system capable of capturing and transporting leakage from the pressure relief device to a control device as described in § 264.1060 is exempt from the requirements of paragraphs (a) and (b) of this section.

§ 264.1055 Standards; Sampling connecting systems.

(a) Each sampling connection system shall be equipped with a closed purge system or closed-vent system.

(b) Each closed-purge system or closed-vent system as required in paragraph (a) shall:

(1) Return the purged hazardous waste stream directly to the hazardous waste management process line with no detectable emissions to atmosphere, or

(2) Collect and recycle the purged hazardous waste stream with no detectable emissions to atmosphere, or

(3) Be designed and operated to capture and transport all the purged hazardous waste stream to a control device that complies with the requirements of § 264.1060.

(c) *In situ* sampling systems are exempt from the requirements of paragraphs (a) and (b) of this section.

\$264.1056 Standards: Open-ended valves or lines.

(a)(1) Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or a second valve.

(2) The cap, blind flange, plug, or second valve shall seal the open end at all times except during operations requiring hazardous waste stream flow through the open-ended valve or line.

(b) Each open-ended valve or line equipped with a second valve shall be operated in a manner such that the valve on the hazardous waste stream end is closed before the second valve is closed.

(c) When a double block and bleed system is being used, the bleed valve or line may remain open during operations that require venting the line between the block valves but shall comply with paragraph (a) of this section at all other times.

\$264.1057 Standards: Valves in gas/vapor service or in light liquid service.

(a) Each valve in gas/vapor or light liquid service shall be monitored monthly to detect leaks by the methods specified in §264.1063(b) and shall comply with paragraphs (b) through (e) of this section, except as provided in paragraphs (f), (g), and (h) of this section, and §§264.1061 and 264.1062.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) Any valve for which a leak is not detected for two successive months may be monitored the first month of every succeeding quarter, beginning with the next quarter, until a leak is detected.

(2) If a leak is detected, the valve shall be monitored monthly until a leak is not detected for two successive months.

(d)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after the leak is detected, except as provided in §264.1059.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) First attempts at repair include, but are not limited to, the following best practices where practicable:

- (1) Tightening of bonnet bolts.
- (2) Replacement of bonnet bolts.
- (3) Tightening of packing gland nuts.
- (4) Injection of lubricant into lubricated packing.

(f) Any valve that is designated, as described in §264.1064(g)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraph (a) of this section if the valve:

(1) Has no external actuating mechanism in contact with the hazardous waste stream.

(2) Is operated with emissions less than 500 ppm above background as determined by the method specified in §264.1063(c).

(3) Is tested for compliance with paragraph (f)(2) of this section initially upon designation, annually, and at other times as requested by the Regional Administrator.

(g) Any valve that is designated, as described in §264.1064(h)(1), as an unsafe-to-monitor valve is exempt from the requirements of paragraph (a) of this section if:

(1) The owner or operator of the valve determines that the valve is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with paragraph (a) of this section.

(2) The owner or operator of the valve adheres to a written plan that requires monitoring of the valve as frequently as practicable during safe-to-monitor times.

(h) Any valve that is designated, as described in §264.1064(h)(2), as a difficult-to-monitor valve is exempt from the requirements of paragraph (a) of this section if:

(1) The owner or operator of the valve determines that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.

(2) The hazardous waste management unit within which the valve is located was in operation before June 21, 1990.

(3) The owner or operator of the valve follows a written plan that requires monitoring of the valve at least once per calendar year.

Environmental Protection Agency

\$264.1058 Standards: Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors.

(a) Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors shall be monitored within 5 days by the method specified in §264.1063(b) if evidence of a potential leak is found by visual, audible, olfactory, or any other detection method.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in §264.1059.

(2) The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) First attempts at repair include, but are not limited to, the best practices described under §264.1057(e).

\$264.1059 Standards: Delay of repair.

(a) Delay of repair of equipment for which leaks have been detected will be allowed if the repair is technically infeasible without a hazardous waste management unit shutdown. In such a case, repair of this equipment shall occur before the end of the next hazardous waste management unit shutdown.

(b) Delay of repair of equipment for which leaks have been detected will be allowed for equipment that is isolated from the hazardous waste management unit and that does not continue to contain or contact hazardous waste with organic concentrations at least 10 percent by weight.

(c) Delay of repair for valves will be allowed if:

(1) The owner or operator determines that emissions of purged material resulting from immediate repair are greater than the emissions likely to result from delay of repair.

(2) When repair procedures are effected, the purged material is collected and destroyed or recovered in a control device complying with §264.1060.

(d) Delay of repair for pumps will be allowed if:

(1) Repair requires the use of a dual mechanical seal system that includes a barrier fluid system.

(2) Repair is completed as soon as practicable, but not later than 6 months after the leak was detected.

(e) Delay of repair beyond a hazardous waste management unit shutdown will be allowed for a valve if valve assembly replacement is necessary during the hazardous waste management unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the next hazardous waste management unit shutdown will not be allowed unless the next hazardous waste management unit shutdown occurs sooner than 6 months after the first hazardous waste management unit shutdown.

\$264.1060 Standards: Closed-vent systems and control devices.

Owners or operators of closed-vent systems and control devices shall comply with the provisions of §264.1033.

\$264.1061 Alternative standards for valves in gas/vapor service or in light liquid service; percentage of valves allowed to leak.

(a) An owner or operator subject to the requirements of §264.1057 may elect to have all valves within a hazardous waste management unit comply with an alternative standard that allows no greater than 2 percent of the valves to leak.

(b) The following requirements shall be met if an owner or operator decides to comply with the alternative standard of allowing 2 percent of valves to leak:

(1) An owner or operator must notify the Regional Administrator that the owner or operator has elected to comply with the requirements of this section.

(2) A performance test as specified in paragraph (c) of this section shall be conducted initially upon designation, annually, and at other times requested by the Regional Administrator.

(3) If a valve leak is detected, it shall be repaired in accordance with § 264.1057(d) and (e).

(c) Performance tests shall be conducted in the following manner:

(1) All valves subject to the requirements in § 264.1057 within the hazardous waste management unit shall be monitored within 1 week by the methods specified in § 264.1063(b).

(2) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(3) The leak percentage shall be determined by dividing the number of valves subject to the requirements in § 264.1057 for which leaks are detected by the total number of valves subject to the requirements in § 264.1057 within the hazardous waste management unit.

(d) If an owner or operator decides to comply with this section no longer, the owner or operator must notify the Regional Administrator in writing that the work practice standard described in § 264.1057(a) through (e) will be followed.

§ 264.1063 Alternative standards for valves in gas/vapor service or in light liquid service: skip period leak detection and repair.

(a)(1) An owner or operator subject to the requirements of § 264.1057 may elect for all valves within a hazardous waste management unit to comply with one of the alternative work practices specified in paragraphs (b) (2) and (3) of this section.

(2) An owner or operator must notify the Regional Administrator before implementing one of the alternative work practices.

(b)(1) An owner or operator shall comply with the requirements for valves, as described in § 264.1057, except as described in paragraphs (b)(2) and (b)(3) of this section.

(2) After two consecutive quarterly leak detection periods with the percentage of valves leaking equal to or less than 2 percent, an owner or operator may begin to skip one of the quarterly leak detection periods for the valves subject to the requirements in § 264.1057.

(3) After five consecutive quarterly leak detection periods with the percentage of valves leaking equal to or

less than 2 percent, an owner or operator may begin to skip three of the quarterly leak detection periods for the valves subject to the requirements in § 264.1057.

(4) If the percentage of valves leaking is greater than 2 percent, the owner or operator shall monitor monthly in compliance with the requirements in § 264.1057, but may again elect to use this section after meeting the requirements of § 264.1057(c)(1).

§ 264.1063 Test methods and procedures.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the test methods and procedures requirements provided in this section.

(b) Leak detection monitoring, as required in § 264.1052-264.1062, shall comply with the following requirements:

(1) Monitoring shall comply with Reference Method 21 in 40 CFR part 60.

(2) The detection instrument shall meet the performance criteria of Reference Method 21.

(3) The instrument shall be calibrated before use on each day of its use by the procedures specified in Reference Method 21.

(4) Calibration gases shall be:

(i) Zero air (less than 10 ppm of hydrocarbon in air).

(ii) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.

(5) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(c) When equipment is tested for compliance with no detectable emissions, as required in § 264.1052(e), 264.1063(1), 264.1064, and 264.1057(c), the test shall comply with the following requirements:

(1) The requirements of paragraphs (b)(1) through (4) of this section shall apply.

(2) The background level shall be determined as set forth in Reference Method 21.

(3) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as

Environmental Protection Agency

possible as described in Reference Method 21.

(4) The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 ppm for determining compliance.

(d) In accordance with the waste analysis plan required by § 264.13(b), an owner or operator of a facility must determine, for each piece of equipment, whether the equipment contains or contacts a hazardous waste with organic concentration that equals or exceeds 10 percent by weight using the following:

(1) Methods described in ASTM Methods D 2287-88, E 169-87, E 168-88, E 260-85 (incorporated by reference under § 260.11);

(2) Method 9060 or 8240 of SW-846 (incorporated by reference under § 260.11); or

(3) Application of the knowledge of the nature of the hazardous waste stream or the process by which it was produced. Documentation of a waste determination by knowledge is required. Examples of documentation that shall be used to support a determination under this provision include production process information documenting that no organic compounds are used, information that the waste is generated by a process that is identical to a process at the same or another facility that has previously been demonstrated by direct measurement to have a total organic content less than 10 percent, or prior specification analysis results on the same waste stream where it can also be documented that no process changes have occurred since that analysis that could affect the waste total organic concentration.

(e) If an owner or operator determines that a piece of equipment contains or contacts a hazardous waste with organic concentrations at least 10 percent by weight, the determination can be revised only after following the procedures in paragraph (d)(1) or (d)(2) of this section.

(f) When an owner or operator and the Regional Administrator do not agree on whether a piece of equipment contains or contacts a hazardous waste with organic concentrations at least 10 percent by weight, the procedures in

paragraph (d)(1) or (d)(2) of this section can be used to resolve the dispute.

(g) Samples used in determining the percent organic content shall be representative of the highest total organic content hazardous waste that is expected to be contained in or contact the equipment.

(h) To determine if pumps or valves are in light liquid service, the vapor pressures of constituents may be obtained from standard reference texts or may be determined by ASTM D-2879-86 (incorporated by reference under § 260.11).

(i) Performance tests to determine if a control device achieves 95 weight percent organic emission reduction shall comply with the procedures of § 264.1034(c)(1) through (c)(4).

§ 264.1064 Recordkeeping requirements.

(a)(1) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section.

(2) An owner or operator of more than one hazardous waste management unit subject to the provisions of this subpart may comply with the recordkeeping requirements for these hazardous waste management units in one recordkeeping system if the system identifies each record by each hazardous waste management unit.

(b) Owners and operators must record the following information in the facility operating record:

(1) For each piece of equipment to which subpart BB of part 264 applies:

(i) Equipment identification number and hazardous waste management unit identification.

(ii) Approximate locations within the facility (e.g., identify the hazardous waste management unit on a facility plot plan).

(iii) Type of equipment (e.g., a pump or pipeline valve).

(iv) Percent-by-weight total organics in the hazardous waste stream at the equipment.

(v) Hazardous waste state at the equipment (e.g., gas/vapor or liquid).

(vi) Method of compliance with the standard (e.g., "monthly leak detection and repair" or "equipped with dual mechanical seals").

- (2) For facilities that comply with the provisions of §264.1033(a)(2), an implementation schedule as specified in §264.1033(a)(2).
- (3) Where an owner or operator chooses to use test data to demonstrate the organic removal efficiency or total organic compound concentration achieved by the control device, a performance test plan as specified in §264.1035(b)(3).
- (4) Documentation of compliance with §264.1060, including the detailed design documentation or performance test results specified in §264.1036(b)(4).
- (c) When each leak is detected as specified in §§264.1052, 264.1053, 264.1057, and 264.1058, the following requirements apply:
- (1) A weatherproof and readily visible identification number, with the equipment identification number, the date evidence of a potential leak was found in accordance with §264.1058(a), and the date the leak was detected, shall be attached to the leaking equipment.
- (2) The identification on equipment, except on a valve, may be removed after it has been repaired.
- (3) The identification on a valve may be removed after it has been monitored for 2 successive months as specified in §264.1057(c) and no leak has been detected during those 2 months.
- (d) When each leak is detected as specified in §§264.1052, 264.1053, 264.1057, and 264.1058, the following information shall be recorded in an inspection log and shall be kept in the facility operating record:
- (1) The instrument and operator identification numbers and the equipment identification number.
- (2) The date evidence of a potential leak was found in accordance with §264.1058(a).
- (3) The date the leak was detected and the dates of each attempt to repair the leak.
- (4) Repair methods applied in each attempt to repair the leak.
- (5) "Above 10,000" if the maximum instrument reading measured by the methods specified in §264.1063(b) after each repair attempt is equal to or greater than 10,000 ppm.
- (6) "Repair delayed," and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.
- (7) Documentation supporting the delay of repair of a valve in compliance with §264.1059(c).
- (8) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a hazardous waste management unit shutdown.
- (9) The expected date of successful repair of the leak if a leak is not repaired within 15 calendar days.
- (10) The date of successful repair of the leak.
- (e) Design documentation and monitoring, operating, and inspection information for each closed-vent system and control device required to comply with the provisions of §264.1060 shall be recorded and kept up-to-date in the facility operating record as specified in §264.1036(c). Design documentation is specified in §264.1035 (c)(1) and (c)(2) and monitoring, operating, and inspection information in §264.1035 (c)(3)-(c)(9).
- (f) For a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system, the Regional Administrator will specify the appropriate record-keeping requirements.
- (g) The following information pertaining to all equipment subject to the requirements in §264.1052 through 264.1060 shall be recorded in a log that is kept in the facility operating record:
- (1) A list of identification numbers for equipment (except welded fittings) subject to the requirements of this subpart.
- (2)(i) A list of identification numbers for equipment that the owner or operator elects to designate for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, under the provisions of §264.1052(e), 264.1053(d), and 264.1057(f).
- (ii) The designation of this equipment as subject to the requirements of §§264.1052(e), 264.1053(d), or 264.1057(f) shall be signed by the owner or operator.
- (3) A list of equipment identification numbers for pressure relief devices required to comply with §264.1064(a).

- (4)(i) The dates of each compliance test required in §§264.1052(e), 264.1053(f), 264.1054, and 264.1057(f).
- (ii) The background level measured during each compliance test.
- (iii) The maximum instrument reading measured at the equipment during each compliance test.
- (5) A list of identification numbers for equipment in vacuum service.
- (h) The following information pertaining to all valves subject to the requirements of §264.1057 (g) and (h) shall be recorded in a log that is kept in the facility operating record:
- (1) A list of identification numbers for valves that are designated as unsafe to monitor, an explanation for each valve stating why the valve is unsafe to monitor, and the plan for monitoring each valve.
- (2) A list of identification numbers for valves that are designated as difficult to monitor, an explanation for each valve stating why the valve is difficult to monitor, and the planned schedule for monitoring each valve.
- (i) The following information shall be recorded in the facility operating record for valves complying with §264.1062:
- (1) A schedule of monitoring.
- (2) The percent of valves found leaking during each monitoring period.
- (j) The following information shall be recorded in a log that is kept in the facility operating record:
- (1) Criteria required in §264.1052(d)(5)(ii) and §264.1053(e)(2) and an explanation of the design criteria.
- (2) Any changes to these criteria and the reasons for the changes.
- (k) The following information shall be recorded in a log that is kept in the facility operating record for use in determining exemptions as provided in the applicability section of this subpart and other specific subparts:
- (1) An analysis determining the design capacity of the hazardous waste management unit.
- (2) A statement listing the hazardous waste influent to and effluent from each hazardous waste management unit subject to the requirements in §264.1052 through 264.1060 and an analysis determining whether these hazardous wastes are heavy liquids.

- (3) An up-to-date analysis and the supporting information and data used to determine whether or not equipment is subject to the requirements in §§264.1052 through 264.1060. The record shall include supporting documentation as required by §264.1063(d)(3) when application of the knowledge of the nature of the hazardous waste stream or the process by which it was produced is used. If the owner or operator takes any action (e.g., changing the process that produced the waste) that could result in an increase in the total organic content of the waste contained in or contacted by equipment determined not to be subject to the requirements in §§264.1052 through 264.1060, then a new determination is required.
- (l) Records of the equipment leak information required by paragraph (d) of this section and the operating information required by paragraph (e) of this section need be kept only 3 years.
- (m) The owner or operator of any facility that is subject to this subpart and to regulations at 40 CFR part 60, subpart VV, or 40 CFR part 61, subpart V, may elect to determine compliance with this subpart by documentation either pursuant to §264.1064 of this subpart, or pursuant to those provisions of 40 CFR part 60 or 61, to the extent that the documentation under the regulation at 40 CFR part 60 or part 61 duplicates the documentation required under this subpart. The documentation under the regulation at 40 CFR part 60 or part 61 shall be kept with or made readily available with the facility operating record.
- §264.1065 Reporting requirements.**
- (a) A semiannual report shall be submitted by owners and operators subject to the requirements of this subpart to the Regional Administrator by dates specified by the Regional Administrator. The report shall include the following information:
- (1) The Environmental Protection Agency identification number, name, and address of the facility.
- (2) For each month during the semiannual reporting period:
- (i) The equipment identification number of each valve for which a leak was not repaired as required in §264.1057(d).

(1) The equipment identification number of each pump for which a leak was not repaired as required in § 264.1062 (c) and (d)(6).

(11) The equipment identification number of each compressor for which a leak was not repaired as required in § 264.1053(g).

(3) Dates of hazardous waste management unit shutdowns that occurred within the semiannual reporting period.

(4) For each month during the semiannual reporting period, dates when the control device installed as required by § 264.1052, 264.1053, 264.1054, or 264.1055 exceeded or operated outside of the design specifications as defined in § 264.1064(e) and as indicated by the control device monitoring required by § 264.1060 and was not corrected within 24 hours, the duration and cause of each exceedance, and any corrective measures taken.

(b) If, during the semiannual reporting period, leaks from valves, pumps, and compressors are repaired as required in § 264.1057 (d), 264.1052 (c) and (d)(6), and 264.1053 (g), respectively, and the control device does not exceed or operate outside of the design specifications as defined in § 264.1064(e) for more than 24 hours, a report to the Regional Administrator is not required.

§ 264.1066—264.1070 [Reserved]

Subpart DD—Containment Buildings

Source: 57 FR 37265, Aug. 18, 1992, unless otherwise noted.

§ 264.1100 Applicability.

The requirements of this subpart apply to owners or operators who store or treat hazardous waste in units designed and operated under § 264.1101 of this subpart. These provisions will become effective on February 18, 1993, although owner or operator may notify the Regional Administrator of his intent to be bound by this subpart at an earlier time. The owner or operator is not subject to the definition of land disposal in RCRA section 3004(k) provided that the unit:

(a) Is a completely enclosed, self-supporting structure that is designed and

constructed of manmade materials of sufficient strength and thickness to support themselves, the waste contents, and any personnel and heavy equipment that operate within the unit, and to prevent failure due to pressure gradients, settlement, compression, or uplift, physical contact with the hazardous wastes to which they are exposed; climatic conditions; and the stresses of daily operation, including the movement of heavy equipment within the unit and contact of such equipment with containment walls;

(b) Has a primary barrier that is designed to be sufficiently durable to withstand the movement of personnel, wastes, and handling equipment within the unit;

(c) If the unit is used to manage liquids, has:

(1) A primary barrier designed and constructed of materials to prevent migration of hazardous constituents into the barrier;

(2) A liquid collection system designed and constructed of materials to minimize the accumulation of liquid on the primary barrier; and

(3) A secondary containment system designed and constructed of materials to prevent migration of hazardous constituents into the barrier, with a leak detection and liquid collection system capable of detecting, collecting, and removing leaks of hazardous constituents at the earliest practicable time, unless the unit has been granted a variance from the secondary containment system requirements under § 264.1101(b)(4);

(d) Has controls sufficient to prevent fugitive dust emissions to meet the no visible emission standard in § 264.1101(q)(1)(iv); and

(e) Is designed and operated to ensure containment and prevent the tracking of materials from the unit by personnel or equipment.

§ 264.1101 Design and operating standards.

(a) All containment buildings must comply with the following design standards:

(1) The containment building must be completely enclosed with a floor, walls, and a roof to prevent exposure to the elements, (e.g., precipitation, wind,

run-on), and to assure containment of managed wastes.

(2) The floor and containment walls of the unit, including the secondary containment system if required under paragraph (b) of this section, must be designed and constructed of materials of sufficient strength and thickness to support themselves, the waste contents, and any personnel and heavy equipment that operate within the unit, and to prevent failure due to pressure gradients, settlement, compression, or uplift, physical contact with the hazardous wastes to which they are exposed; climatic conditions; and the stresses of daily operation, including the movement of heavy equipment within the unit and contact of such equipment with containment walls. The unit must be designed so that it has sufficient structural strength to prevent collapse or other failure. All surfaces to be in contact with hazardous wastes must be chemically compatible with those wastes. EPA will consider standards established by professional organizations generally recognized by the industry such as the American Concrete Institute (ACI) and the American Society of Testing Materials (ASTM) in judging the structural integrity requirements of this paragraph. If appropriate to the nature of the waste management operation to take place in the unit, an exception to the structural strength requirement may be made for light-weight doors and windows that meet these criteria:

(1) They provide an effective barrier against fugitive dust emissions under paragraph (c)(1)(iv); and

(11) The unit is designed and operated in a fashion that assures that wastes will not actually come in contact with these openings.

(3) Incompatible hazardous wastes or treatment reagents must not be placed in the unit or its secondary containment system if they could cause the unit or secondary containment system to leak, corrode, or otherwise fail.

(4) A containment building must have a primary barrier designed to withstand the movement of personnel, waste, and handling equipment in the unit during the operating life of the unit and appropriate for the physical

and chemical characteristics of the waste to be managed.

(b) For a containment building used to manage hazardous wastes containing free liquids or treated with free liquids (the presence of which is determined by the paint filter test, a visual examination, or other appropriate means), the owner or operator must include:

(1) A primary barrier designed and constructed of materials to prevent the migration of hazardous constituents into the barrier (e.g., a geomembrane covered by a concrete wear surface).

(2) A liquid collection and removal system to minimize the accumulation of liquid on the primary barrier of the containment building:

(i) The primary barrier must be sloped to drain liquids to the associated collection system; and

(11) Liquids and waste must be collected and removed to minimize hydraulic head on the containment system at the earliest practicable time.

(3) A secondary containment system including a secondary barrier designed and constructed to prevent migration of hazardous constituents into the barrier, and a leak detection system that is capable of detecting failure of the primary barrier and collecting accumulated hazardous wastes and liquids at the earliest practicable time.

(1) The requirements of the leak detection component of the secondary containment system are satisfied by installation of a system that is, at a minimum:

(A) Constructed with a bottom slope of 1 percent or more; and

(B) Constructed of a granular drainage material with a hydraulic conductivity of 1×10^{-2} cm/sec or more and a thickness of 12 inches (30.5 cm) or more, or constructed of synthetic or geonet drainage materials with a transmissivity of 3×10^{-3} m²/sec or more.

(11) If treatment is to be conducted in the building, an area in which such treatment will be conducted must be designed to prevent the release of liquids, wet materials, or liquid aerosols to other portions of the building.

(111) The secondary containment system must be constructed of materials that are chemically resistant to the waste and liquids managed in the con-

cordance with paragraphs (a) through (d) of this section without first being treated or rendered non-reactive.

(f) Such disposal is in compliance with the requirements of 40 CFR part 268. Persons who incinerate lab packs according to the requirements in 40 CFR 268.42(c)(1) may use fiber drums in place of metal outer containers. Such fiber drums must meet the DOT specifications in 49 CFR 173.12 and be overpacked according to the requirements in paragraph (b) of this section.

[46 FR 56566, Nov. 17, 1981, as amended at 56 FR 27666, June 1, 1990; 57 FR 54461, Nov. 18, 1992]

Subpart O—Incinerators

Source: 46 FR 7680, Jan. 23, 1981, unless otherwise noted.

§ 265.340 Applicability.

(a) The regulations of this subpart apply to owners and operators of hazardous waste incinerators (as defined in § 260.10 of this chapter), except as § 265.1 provides otherwise.

(b) Owners and operators of incinerators burning hazardous waste are exempt from all of the requirements of this subpart, except § 265.351 (Closure), provided that the owner or operator has documented, in writing, that the waste would not reasonably be expected to contain any of the hazardous constituents listed in part 261, appendix VIII, of this chapter, and such documentation is retained at the facility, if the waste to be burned is:

- (1) Listed as a hazardous waste in part 261, subpart D, of this chapter solely because it is ignitable (Hazard Code I), corrosive (Hazard Code C), or both; or
- (2) Listed as a hazardous waste in part 261, subpart D, of this chapter solely because it is reactive (Hazard Code R) for characteristics other than those listed in § 261.23(a) (4) and (5), and will not be burned when other hazardous wastes are present in the combustion zone; or
- (3) A hazardous waste solely because it possesses the characteristic of ignitability, corrosivity, or both, as determined by the tests for characteristics of hazardous wastes under part 261, subpart C, of this chapter; or

(b) Crushed, shredded, or similarly reduced in volume to the maximum practical extent before burial in the landfill.

[50 FR 16048, Apr. 23, 1985]

§ 265.316 Disposal of small containers of hazardous waste in overpacked drums (lab packs).

Small containers of hazardous waste in overpacked drums (lab packs) may be placed in a landfill if the following requirements are met:

(a) Hazardous waste must be packaged in non-leaking inside containers. The inside containers must be of a design and constructed of a material that will not react dangerously with the waste held therein. Inside containers must be tightly and securely sealed. The inside containers must be of the size and type specified in the Department of Transportation (DOT) hazardous materials regulations (49 CFR parts 173, 178 and 179), if those regulations specify a particular inside container for the waste.

(b) The inside containers must be overpacked in an open head DOT-specification metal shipping container (49 CFR parts 178 and 179) of no more than 416-liter (110 gallon) capacity and surrounded by, at a minimum, a sufficient quantity of sorbent material, determined to be nonbiodegradable in accordance with § 265.314(f), to completely absorb all of the liquid contents of the inside containers. The metal outer container must be full after it has been packed with inside containers and sorbent material.

(c) The sorbent material used must not be capable of reacting dangerously with, being decomposed by, or being ignited by the contents of the inside container's in accordance with § 265.17(b).

(d) Incompatible wastes, as defined in § 260.10(a) of this chapter, must not be placed in the same outside container.

(e) Reactive waste, other than cyanide- or sulfide-bearing waste as defined in § 261.23(a)(6) of this chapter, must be treated or rendered non-reactive prior to packaging in accordance with paragraphs (a) through (d) of this section. Cyanide- and sulfide-bearing reactive waste may be packaged in ac-

(4) A hazardous waste solely because it possesses the reactivity characteristics described by § 261.23(a) (1), (2), (3), (6), (7), or (8) of this chapter, and will not be burned when other hazardous wastes are present in the combustion zone.

[47 FR 27533, June 24, 1982 and 50 FR 668, Jan. 4, 1985, as amended at 50 FR 49263, Nov. 29, 1985; 56 FR 7209, Feb. 21, 1991]

§ 265.341 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must sufficiently analyze any waste which he has not previously burned in his incinerator to enable him to establish steady state (normal) operating conditions (including waste and auxiliary fuel feed and air flow) and to determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

- (a) Heating value of the waste;
- (b) Halogen content and sulfur content in the waste; and
- (c) Concentrations in the waste of lead and mercury, unless the owner or operator has written, documented data that show that the element is not present.

[Comment: As required by § 265.73, the owner or operator must place the results from each waste analysis, or the documented information, in the operating record of the facility.]

§ 265.342—265.344 [Reserved]

§ 265.345 General operating requirements.

During start-up and shut-down of an incinerator, the owner or operator must not feed hazardous waste unless the incinerator is at steady state (normal) conditions of operation, including steady state operating temperature and air flow.

§ 265.346 [Reserved]

§ 265.347 Monitoring and inspections.

The owner or operator must conduct, as a minimum, the following monitoring and inspections when incinerating hazardous waste:

- (a) Existing instruments which relate to combustion and emission control must be monitored at least every 15 minutes. Appropriate corrections to

maintain steady state combustion conditions must be made immediately either automatically or by the operator. Instruments which relate to combustion and emission control would normally include those measuring waste feed, auxiliary fuel feed, air flow, incinerator temperature, scrubber flow, scrubber pH, and relevant level controls.

(b) The complete incinerator and associated equipment (pumps, valves, conveyors, pipes, etc.) must be inspected at least daily for leaks, spills, and fugitive emissions, and all emergency shutdown controls and system alarms must be checked to assure proper operation.

[46 FR 7678, Jan. 23, 1981, as amended at 47 FR 27533, June 24, 1982]

§ 265.348—265.350 [Reserved]

§ 265.351 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 incinerator.

[Comment: At closure, as throughout the operating period, unless the owner or operator can demonstrate, in accordance with § 261.3(d) of this chapter, that the residue removed from his incinerator is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of parts 262 through 268 of this chapter.]

§ 265.352 Interim status incinerators burning particular hazardous wastes.

(a) Owners or operators of incinerators subject to this subpart may burn EPA Hazardous Wastes FO20, FO21, FO22, FO23, FO26, or FO27 if they receive a certification from the Assistant Administrator for Solid Waste and Emergency Response that they can meet the performance standards of subpart O of part 264 when they burn these wastes.

(b) The following standards and procedures will be used in determining whether to certify an incinerator:

- (1) The owner or operator will submit an application to the Assistant Admin-

istrator for Solid Waste and Emergency Response containing applicable information in §§ 270.19 and 270.62 demonstrating that the incinerator can meet the performance standards in subpart O of part 264 when they burn these wastes.

(2) The Assistant Administrator for Solid Waste and Emergency Response will issue a tentative decision as to whether the incinerator can meet the performance standards in subpart O of part 264. Notification of this tentative decision will be provided by newspaper advertisement and radio broadcast in the jurisdiction where the incinerator is located. The Assistant Administrator for Solid Waste and Emergency Response will accept comment on the tentative decision for 60 days. The Assistant Administrator for Solid Waste and Emergency Response also may hold a public hearing upon request or at his discretion.

(3) After the close of the public comment period, the Assistant Administrator for Solid Waste and Emergency Response will issue a decision whether or not to certify the incinerator.

[50 FR 2005, Jan. 14, 1985]

§ 265.363—265.369 [Reserved]

Subpart P—Thermal Treatment

§ 265.370 Other thermal treatment.

The regulations in this subpart apply to owners or operators of facilities that thermally treat hazardous waste in devices other than enclosed devices using controlled flame combustion, except as § 265.1 provides otherwise. Thermal treatment in enclosed devices using controlled flame combustion is subject to the requirements of subpart O if the unit is an incinerator, and subpart H of part 265, if the unit is a boiler or an industrial furnace as defined in § 260.10.

[50 FR 686 Jan. 4, 1985, as amended at 58 FR 32692, July 17, 1993]

§ 265.371—265.373 [Reserved]

§ 265.373 General operating requirements.

Before adding hazardous waste, the owner or operator must bring his thermal treatment process to steady state (normal) conditions of operation—in-

cluding steady state operating temperature—using auxiliary fuel or other means, unless the process is a non-continuous (batch) thermal treatment process which requires a complete thermal cycle to treat a discrete quantity of hazardous waste.

§ 265.374 [Reserved]

§ 265.375 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must sufficiently analyze any waste which he has not previously treated in his thermal process to enable him to establish steady state (normal) or other appropriate (for a non-continuous process) operating conditions (including waste and auxiliary fuel feed) and to determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

- (a) Heating value of the waste;
- (b) Halogen content and sulfur content in the waste; and
- (c) Concentrations in the waste of lead and mercury, unless the owner or operator has written, documented data that show that the element is not present.

[Comment: As required by § 265.73, the owner or operator must place the results from each waste analysis, or the documented information, in the operating record of the facility.]

§ 265.376 [Reserved]

§ 265.377 Monitoring and inspections.

(a) The owner or operator must conduct, as a minimum, the following monitoring and inspections when thermally treating hazardous waste:

- (1) Existing instruments which relate to temperature and emission control (if an emission control device is present) must be monitored at least every 15 minutes. Appropriate corrections to maintain steady state or other appropriate thermal treatment conditions must be made immediately either automatically or by the operator. Instruments which relate to temperature and emission control would normally include those measuring waste feed, auxiliary fuel feed, treatment process temperature, and relevant process flow and level controls.

(2) The stack plume (emissions), where present, must be observed visually at least hourly for normal appearance (color and opacity). The operator must immediately make any indicated operating corrections necessary to return any visible emissions to their normal appearance.

(3) The complete thermal treatment process and associated equipment (pumps, valves, conveyors, pipes, etc.) must be inspected at least daily for leaks, spills, and fugitive emissions, and all emergency shutdown controls and system alarms must be checked to assure proper operation.

§ 265.378—265.380 [Reserved]

§ 265.381 Closure.

At closure, the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash) from the thermal treatment process or equipment.

[Comment: At closure, as throughout the operating period, unless the owner or operator can demonstrate, in accordance with § 261.3 (c) or (d) of this chapter, that any solid waste removed from his thermal treatment process or equipment is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of parts 262, 263, and 265 of this chapter.]

§ 265.382 Open burning; waste explosives.

Open burning of hazardous waste is prohibited except for the open burning and detonation of waste explosives. Waste explosives include waste which has the potential to detonate and bulk military propellants which cannot safely be disposed of through other modes of treatment. Detonation is an explosion in which chemical transformation passes through the material faster than the speed of sound (0.33 kilometers/second at sea level). Owners or operators choosing to open burn or detonate waste explosives must do so in accordance with the following table and in a manner that does not threaten human health or the environment.

Pounds of waste explosives or propellants	Minimum distance from open burning or detonation to the property of others
0 to 100	204 meters (670 feet).
101 to 1,000	300 meters (1,250 feet).
1,001 to 10,000	530 meters (1,730 feet).
10,001 to 30,000	630 meters (2,260 feet).

§ 265.383 Interim status thermal treatment devices burning particular hazardous waste.

(a) Owners or operators of thermal treatment devices subject to this subpart may burn EPA Hazardous Wastes FO20, FO21, FO22, FO23, FO26, or FO27 if they receive a certification from the Assistant Administrator for Solid Waste and Emergency Response that they can meet the performance standards of subpart O of part 264 when they burn these wastes.

(b) The following standards and procedures will be used in determining whether to certify a thermal treatment unit:

- (1) The owner or operator will submit an application to the Assistant Administrator for Solid Waste and Emergency Response containing the applicable information in §§ 270.19 and 270.62 demonstrating that the thermal treatment unit can meet the performance standard in subpart O of part 264 when they burn these wastes.

(2) The Assistant Administrator for Solid Waste and Emergency Response will issue a tentative decision as to whether the thermal treatment unit can meet the performance standards in subpart O of part 264. Notification of this tentative decision will be provided by newspaper advertisement and radio broadcast in the jurisdiction where the thermal treatment device is located. The Assistant Administrator for Solid Waste and Emergency Response will accept comment on the tentative decision for 60 days. The Assistant Administrator for Solid Waste and Emergency Response also may hold a public hearing upon request or at his discretion.

(3) After the close of the public comment period, the Assistant Administrator for Solid Waste and Emergency Response will issue a decision whether or not to certify the thermal treatment unit.

[50 FR 2005, Jan. 14, 1985]

Subparts X—Z (Reserved)

Subpart AA—Air Emission Standards for Process Vents

Source: 55 FR 25597, June 21, 1990, unless otherwise noted.

§ 265.1030 Applicability.

(a) The regulations in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous wastes (except as provided in § 265.11).

(b) Except for §§ 265.1034(d) and (e), this subpart applies to process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10 ppmw, if these operations are conducted in:

- (1) Units that are subject to the permitting requirements of part 270, or
- (2) Hazardous waste recycling units that are located on hazardous waste management facilities otherwise subject to the permitting requirements of part 270.

(NOTE: The requirements of § 265.1032 through 265.1036 apply to process vents on hazardous waste recycling units previously exempt under paragraph 261.6(c)(1). Other exemptions under §§ 261.4, 262.34, and 265.1(c) are not affected by these requirements.)

[55 FR 25597, June 21, 1990, as amended at 56 FR 19290, Apr. 26, 1991]

§ 265.1031 Definitions.

As used in this subpart, all terms shall have the meaning given them in § 264.1031, the Act, and parts 260-266.

§ 265.1032 Standards: Process vents.

(a) The owner or operator of a facility with process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction or air or steam stripping operations managing hazardous wastes with organic concentrations at least 10 ppmw shall either:

- (1) Reduce total organic emissions from all affected process vents at the facility below 1.4 kg/h (3 lb/h) and 2.8 Mg/yr (3.1 tons/yr), or

(2) Reduce, by use of a control device, total organic emissions from all affected process vents at the facility by 95 weight percent.

(b) If the owner or operator installs a closed-vent system and control device to comply with the provisions of paragraph (a) of this section, the closed-vent system and control device must meet the requirements of § 265.1033.

(c) Determinations of vent emissions and emission reductions or total organic compound concentrations achieved by add-on control devices may be based on engineering calculations or performance tests. If performance tests are used to determine vent emissions, emission reductions, or total organic compound concentrations achieved by add-on control devices, the performance tests must conform with the requirements of § 265.1034(c).

(d) When an owner or operator and the Regional Administrator do not agree on determinations of vent emissions and/or emission reductions or total organic compound concentrations achieved by add-on control devices based on engineering calculations, the test methods in § 265.1034(c) shall be used to resolve the disagreement.

§ 265.1033 Standards: Closed-vent systems and control devices.

(a)(1) Owners or operators of closed-vent systems and control devices used to comply with provisions of this part shall comply with the provisions of this section.

(2) The owner or operator of an existing facility who cannot install a closed-vent system and control device to comply with the provisions of this subpart on the effective date that the facility becomes subject to the provisions of this subpart must prepare an implementation schedule that includes dates by which the closed-vent system and control device will be installed and in operation. The controls must be installed as soon as possible, but the implementation schedule may allow up to 18 months after the effective date that the facility becomes subject to this subpart for installation and startup.

All units that begin operation after December 21, 1990 must comply with the rules immediately (i.e., must have control devices installed and operating on

startup of the affected unit); the 2-year implementation schedule does not apply to these units.

(b) A control device involving vapor recovery (e.g., a condenser or adsorber) shall be designed and operated to recover the organic vapors vented to it with an efficiency of 95 weight percent or greater unless the total organic emission limits of § 265.1032(a)(1) for all affected process vents can be attained at an efficiency less than 95 weight percent.

(c) An enclosed combustion device (e.g., a vapor incinerator, boiler, or process heater) shall be designed and operated to reduce the organic emissions vented to it by 95 weight percent or greater; to achieve a total organic compound concentration of 20 ppmv, expressed as the sum of the actual compounds, not carbon equivalents, on a dry basis corrected to 3 percent oxygen; or to provide a minimum residence time of 0.50 seconds at a minimum temperature of 760 °C. If a boiler or process heater is used as the control device, then the vent stream shall be introduced into the flame combustion zone of the boiler or process heater.

(d)(1) A flare shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (e)(1) of this section, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

(2) A flare shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f)(2)(iii) of this section.

(3) A flare shall be used only if the net heating value of the gas being combusted is 11.2 MJ/secm (300 Btu/secf) or greater, if the flare is steam-assisted or air-assisted; or if the net heating value of the gas being combusted is 7.46 MJ/secm (200 Btu/secf) or greater if the flare is nonassisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (e)(2) of this section.

(4)(i) A steam-assisted or nonassisted flare shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (e)(3) of this section, of less than 18.3 m/s (60 ft/s), except as provided in

paragraphs (d)(4) (ii) and (iii) of this section.

(ii) A steam-assisted or nonassisted flare designed for and operated with an exit velocity, as determined by the methods specified in paragraph (e)(3) of this section, equal to or greater than 18.3 m/s (60 ft/s) but less than 122 m/s (400 ft/s) is allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/secm (1,000 Btu/secf).

(iii) A steam-assisted or nonassisted flare designed for and operated with an exit velocity, as determined by the methods specified in paragraph (e)(3) of this section, less than the velocity, V_{max} , as determined by the method specified in paragraph (e)(4) of this section, and less than 122 m/s (400 ft/s) is allowed.

(5) An air-assisted flare shall be designed and operated with an exit velocity less than the velocity, V_{max} , as determined by the method specified in paragraph (e)(6) of this section.

(6) A flare used to comply with this section shall be steam-assisted, air-assisted, or nonassisted.

(e)(1) Reference Method 22 in 40 CFR part 60 shall be used to determine the compliance of a flare with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.

(2) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_f = K \left[\sum_{i=1}^n C_i H_i \right]$$

where:

H_f = Net heating value of the sample, MJ/secm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to 1 mol is 20 °C;

K = Constant, 1.74×10^{-7} (1/ppm) (g mol/secm) (MJ/kcal) where standard temperature for (g mol/secm) is 20 °C;

C_p = Concentration of sample component 1 in ppm on a wet basis, as measured for organics by Reference Method 18 in 40 CFR part 60 and measured for hydrogen and carbon monoxide by ASTM D 1945-82 (incorporated by reference as specified in § 260.11); and

H_f = Net heat of combustion of sample component 1, kcal/g mol at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D 2382-83 (incorporated by reference as specified in § 260.11) if published values are not available or cannot be calculated.

(3) The actual exit velocity of a flare shall be determined by dividing the volumetric flow rate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D in 40 CFR part 60 as appropriate, by the unobstructed (free) cross-sectional area of the flare tip.

(4) The maximum allowed velocity in m/s, V_{max} , for a flare complying with paragraph (d)(4)(iii) of this section shall be determined by the following equation:

$$\text{Log}_{10}(V_{max}) = (H_f + 23.8)/31.7$$

where:

H_f = The net heating value as determined in paragraph (e)(2) of this section.

28.8 = Constant,

31.7 = Constant.

(5) The maximum allowed velocity in m/s, V_{max} , for an air-assisted flare shall be determined by the following equation:

$$V_{max} = 8.706 + 0.7084 (H_f)$$

where:

8.706 = Constant.

0.7084 = Constant.

H_f = The net heating value as determined in paragraph (e)(2) of this section.

(f) The owner or operator shall monitor and inspect each control device required to comply with this section to ensure proper operation and maintenance of the control device by implementing the following requirements:

(1) Install, calibrate, maintain, and operate according to the manufacturer's specifications a flow indicator that provides a record of vent stream flow from each affected process vent to the control device at least once every hour. The flow indicator sensor shall be installed in the vent stream at the nearest feasible point to the control device

inlet, but before being combined with other vent streams.

(2) Install, calibrate, maintain, and operate according to the manufacturer's specifications a device to continuously monitor control device operation as specified below:

(i) For a thermal vapor incinerator, a temperature monitoring device equipped with a continuous recorder. The device shall have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. The temperature sensor shall be installed at a location in the combustion chamber downstream of the combustion zone.

(ii) For a catalytic vapor incinerator, a temperature monitoring device equipped with a continuous recorder. The device shall be capable of monitoring temperature at two locations and have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. One temperature sensor shall be installed in the vent stream at the nearest feasible point to the catalyst bed inlet and a second temperature sensor shall be installed in the vent stream at the nearest feasible point to the catalyst bed outlet.

(iii) For a flare, a heat sensing monitoring device equipped with a continuous recorder that indicates the continuous ignition of the pilot flame.

(iv) For a boiler or process heater having a design heat input capacity less than 44 MW, a temperature monitoring device equipped with a continuous recorder. The device shall have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. The temperature sensor shall be installed at a location in the furnace downstream of the combustion zone.

(v) For a boiler or process heater having a design heat input capacity greater than or equal to 44 MW, a monitoring device equipped with a continuous recorder to measure a parameter(s) that indicates good combustion operating practices are being used.

(vi) For a condenser, either:

(A) A monitoring device equipped with a continuous recorder to measure the concentration level of the organic

compounds in the exhaust vent stream from the condenser; or

(B) A temperature monitoring device equipped with a continuous recorder. The device shall be capable of monitoring temperature at two locations and have an accuracy of ± 1 percent of the temperature being monitored in °C or ± 0.5 °C, whichever is greater. One temperature sensor shall be installed at a location in the exhaust vent stream from the condenser, and a second temperature sensor shall be installed at a location in the coolant fluid exiting the condenser.

(vii) For a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly in the control device, either:

(A) A monitoring device equipped with a continuous recorder to measure the concentration level of the organic compounds in the exhaust vent stream from the carbon bed, or

(B) A monitoring device equipped with a continuous recorder to measure a parameter that indicates the carbon bed is regenerated on a regular, predetermined time cycle.

(3) Inspect the readings from each monitoring device required by paragraphs (f) (1) and (2) of this section at least once each operating day to check control device operation and, if necessary, immediately implement the corrective measures necessary to ensure the control device operates in compliance with the requirements of this section.

(g) An owner or operator using a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly onsite in the control device, shall replace the existing carbon in the control device with fresh carbon at a regular, predetermined time interval that is no longer than the carbon service life established as a requirement of § 265.1035(b)(4)(iii)(F).

(h) An owner or operator using a carbon adsorption system such as a carbon canister that does not regenerate the carbon bed directly onsite in the control device shall replace the existing carbon in the control device with fresh carbon on a regular basis by using one of the following procedures:

(1) Monitor the concentration level of the organic compounds in the exhaust vent stream from the carbon adsorption system on a regular schedule and replace the existing carbon with fresh carbon immediately when carbon breakthrough is indicated. The monitoring frequency shall be daily or at an interval no greater than 20 percent of the time required to consume the total carbon working capacity established as a requirement of § 265.1035(b)(4)(iii)(G), whichever is longer.

(2) Replace the existing carbon with fresh carbon at a regular, predetermined time interval that is less than the design carbon replacement interval established as a requirement of § 265.1035(b)(4)(iii)(G).

(i) An owner or operator of an affected facility seeking to comply with the provisions of this part by using a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system is required to develop documentation including sufficient information to describe the control device operation and identify the process parameter or parameters that indicate proper operation and maintenance of the control device.

(3)(i) Closed-vent systems shall be designed for and operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background and by visual inspections, as determined by the methods specified as § 265.1034(b).

(2) Closed-vent systems shall be monitored to determine compliance with this section during the initial leak detection monitoring which shall be conducted by the date that the facility becomes subject to the provisions of this section, annually, and at other times as requested by the Regional Administrator.

(3) Detectable emissions, as indicated by an instrument reading greater than 500 ppm and visual inspections, shall be controlled as soon as practicable, but not later than 15 calendar days after the emission is detected.

(4) A first attempt at repair shall be made no later than 5 calendar days after the emission is detected.

(k) Closed-vent systems and control devices used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

\$265.1034 Test methods and procedures.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the test methods and procedures requirements provided in this section.

(b) When a closed-vent system is tested for compliance with no detectable emissions, as required in §265.1033(i), the test shall comply with the following requirements:

(1) Monitoring shall comply with Reference Method 21 in 40 CFR part 60.

(2) The detection instrument shall meet the performance criteria of Reference Method 21.

(3) The instrument shall be calibrated before use on each day of its use by the procedures specified in Reference Method 21.

(4) Calibration gases shall be:

(i) Zero air (less than 10 ppm of hydrocarbon in air).

(ii) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.

(5) The background level shall be determined as set forth in Reference Method 21.

(6) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(7) The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 ppm for determining compliance.

(c) Performance tests to determine compliance with §265.1032(a) and with the total organic compound concentration limit of §265.1033(c) shall comply with the following:

(1) Performance tests to determine total organic compound concentrations and mass flow rates entering and exiting control devices shall be conducted and data reduced in accordance with the following reference methods and calculation procedures:

(i) Method 2 in 40 CFR part 60 for velocity and volumetric flow rate.

(ii) Method 18 in 40 CFR part 60 for organic content.

(iii) Each performance test shall consist of three separate runs; each run conducted for at least 1 hour under the conditions that exist when the hazardous waste management unit is operating at the highest load or capacity level reasonably expected to occur. For the purpose of determining total organic compound concentrations and mass flow rates, the average of results of all runs shall apply. The average shall be computed on a time-weighted basis.

(iv) Total organic mass flow rates shall be determined by the following equation:

$$E_A = Q_A \left[\sum_{i=1}^n C_i \text{ MW}_i \right] [0.0416] [10^{-6}]$$

where:

E_A = Total organic mass flow rate, kg/h;

Q_A = Volumetric flow rate of gases entering or exiting control device, as determined by Method 2, dscm/h;

n = Number of organic compounds in the vent gas;

C_i = Organic concentration in ppm, dry basis, of compound i in the vent gas, as determined by Method 18;

MW_i = Molecular weight of organic compound i in the vent gas, kg/kg-mol;

0.0416 = Conversion factor for molar volume, kg-mol/m³ (@ 293 K and 760 mm Hg);

10^{-6} = Conversion from ppm, ppm⁻¹.

(v) The annual total organic emission rate shall be determined by the following equation:

$E_A = (E_A) (H)$

where:

E_A = Total organic mass emission rate, kg/y;

E_A = Total organic mass flow rate for the process vent, kg/h;

H = Total annual hours of operations for the affected unit, h.

(vi) Total organic emissions from all affected process vents at the facility shall be determined by summing the hourly total organic mass emission rates (E_A), as determined in paragraph (c)(1)(iv) of this section) and by summing the annual total organic mass emission rates (E_A), as determined in

paragraph (c)(1)(v) of this section) for all affected process vents at the facility.

(2) The owner or operator shall record such process information as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test.

(3) The owner or operator of an affected facility shall provide, or cause to be provided, performance testing facilities as follows:

(i) Sampling ports adequate for the test methods specified in paragraph (c)(1) of this section.

(ii) Safe sampling platform(s).

(iii) Safe access to sampling platform(s).

(iv) Utilities for sampling and testing equipment.

(4) For the purpose of making compliance determinations, the time-weighted average of the results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances beyond the owner or operator's control, compliance may, upon the Regional Administrator's approval, be determined using the average of the results of the two other runs.

(d) To show that a process vent associated with a hazardous waste distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operation is not subject to the requirements of this subpart, the owner or operator must make an initial determination that the time-weighted, annual average total organic concentration of the waste managed by the waste management unit is less than 10 ppmw using one of the following two methods:

(1) Direct measurement of the organic concentration of the waste using the following procedures:

(i) The owner or operator must take a minimum of four grab samples of waste for each waste stream managed in the affected unit under process con-

ditions expected to cause the maximum waste organic concentration.

(ii) For waste generated onsite, the grab samples must be collected at a point before the waste is exposed to the atmosphere such as in an enclosed pipe or other closed system that is used to transfer the waste after generation to the first affected distillation fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operation. For waste generated offsite, the grab samples must be collected at the inlet to the first waste management unit that receives the waste provided the waste has been transferred to the facility in a closed system such as a tank truck and the waste is not diluted or mixed with other waste.

(iii) Each sample shall be analyzed and the total organic concentration of the sample shall be computed using Method 9060 or 8240 of SW-846 (incorporated by reference under §260.11).

(iv) The arithmetic mean of the results of the analyses of the four samples shall apply for each waste stream managed in the unit in determining the time-weighted, annual average total organic concentration of the waste. The time-weighted average is to be calculated using the annual quantity of each waste stream processed and the mean organic concentration of each waste stream managed in the unit.

(2) Using knowledge of the waste to determine that its total organic concentration is less than 10 ppmw. Documentation of the waste determination is required. Examples of documentation that shall be used to support a determination under this provision include production process information documenting that no organic compounds are used, information that the waste is generated by a process that is identical to a process at the same or another facility that has previously been demonstrated by direct measurement to generate a waste stream having a total organic content less than 10 ppmw, or prior specification analysis results on the same waste stream where it can also be documented that no process changes have occurred since that analysis that could affect the total organic concentration.

(e) The determination that distillation fractionation, thin-film evapo-

ration, solvent extraction, or air or steam stripping operations manage hazardous wastes with time-weighted annual average total organic concentrations less than 10 ppmw shall be made as follows:

(1) By the effective date that the facility becomes subject to the provisions of this subpart or by the date when the waste is first managed in a waste management unit, whichever is later; and

(2) For continuously generated waste, annually; or

(3) Whenever there is a change in the waste being managed or a change in the process that generates or treats the waste.

(f) When an owner or operator and the Regional Administrator do not agree on whether a distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operation manages a hazardous waste with organic concentrations of at least 10 ppmw based on knowledge of the waste, the procedures in Method 8240 can be used to resolve the dispute.

[55 FR 25507, June 21, 1990, as amended at 56 FR 19230, Apr. 26, 1991]

§ 265.1035 Recordkeeping requirements.

(a)(1) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section.

(2) An owner or operator of more than one hazardous waste management unit subject to the provisions of this subpart may comply with the recordkeeping requirements for these hazardous waste management units in one recordkeeping system if the system identifies each record by each hazardous waste management unit.

(b) Owners and operators must record the following information in the facility operating record:

(1) For facilities that comply with the provisions of § 265.1033(a)(2), an implementation schedule that includes dates by which the closed-vent system and control device will be installed and in operation. The schedule must also include a rationale of why the installation cannot be completed at an earlier date. The implementation schedule

must be in the facility operating record by the effective date that the facility becomes subject to the provisions of this subpart.

(2) Up-to-date documentation of compliance with the process vent standards in § 265.1032, including:

(i) Information and data identifying all affected process vents, annual throughput and operating hours of each affected unit, estimated emission rates for each affected vent and for the overall facility (i.e., the total emissions for all affected vents at the facility), and the approximate location within the facility of each affected unit (e.g., identify the hazardous waste management units on a facility plot plan); and

(ii) Information and data supporting determinations of vent emissions and emission reductions achieved by add-on control devices based on engineering calculations or source tests. For the purpose of determining compliance, determinations of vent emissions and emission reductions must be made using operating parameter values (e.g., temperatures, flow rates or vent stream organic compounds and concentrations) that represent the conditions that result in maximum organic emissions, such as when the waste management unit is operating at the highest load or capacity level reasonably expected to occur. If the owner or operator takes any action (e.g., managing a waste of different composition or increasing operating hours of affected waste management units) that would result in an increase in total organic emissions from affected process vents at the facility, then a new determination is required.

(3) Where an owner or operator chooses to use test data to determine the organic removal efficiency or total organic compound concentration achieved by the control device, a performance test plan. The test plan must include:

(i) A description of how it is determined that the planned test is going to be conducted when the hazardous waste management unit is operating at the highest load or capacity level reasonably expected to occur. This shall include the estimated or design flow rate and organic content of each vent stream and define the acceptable oper-

Environmental Protection Agency

ating ranges of key process and control device parameters during the test program.

(ii) A detailed engineering description of the closed-vent system and control device including:

(A) Manufacturer's name and model number of control device.

(B) Type of control device.

(C) Dimensions of the control device.

(D) Capacity.

(E) Construction materials.

(iii) A detailed description of sampling and monitoring procedures, including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis.

(4) Documentation of compliance with § 265.1033 shall include the following information:

(i) A list of all information references and sources used in preparing the documentation.

(ii) Records, including the dates, of each compliance test required by § 265.1033(j).

(iii) If engineering calculations are used, a design analysis, specifications, drawings, schematics, and piping and instrumentation diagrams based on the appropriate sections of "APTI Course 416: Control of Gaseous Emissions" (Incorporated by reference as specified in § 260.11) or other engineering texts acceptable to the Regional Administrator that present basic control device design information. Documentation provided by the control device manufacturer or vendor that describes the control device design in accordance with paragraphs (b)(4)(iii)(A) through (b)(4)(iii)(G) of this section may be used to comply with this requirement. The design analysis shall address the vent stream characteristics and control device operation parameters as specified below.

(A) For a thermal vapor incinerator, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperature in the combustion zone and the combustion zone residence time.

(B) For a catalytic vapor incinerator, the design analysis shall consider the

vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperatures across the catalyst bed inlet and outlet.

(C) For a boiler or process heater, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average flame zone temperatures, combustion zone residence time, and description of method and location where the vent stream is introduced into the combustion zone.

(D) For a flare, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also consider the requirements specified in § 265.1033(d).

(E) For a condenser, the design analysis shall consider the vent stream composition, constituent concentrations, flow rate, relative humidity, and temperature. The design analysis shall also establish the design outlet organic compound concentration level, design average temperature of the condenser exhaust vent stream, and design average temperatures of the coolant fluid at the condenser inlet and outlet.

(F) For a carbon adsorption system such as a fixed-bed adsorber that regenerates the carbon bed directly onsite in the control device, the design analysis shall consider the vent stream composition, constituent concentrations, flow rate, relative humidity, and temperature. The design analysis shall also establish the design exhaust vent stream organic compound concentration level, number and capacity of carbon beds, type and working capacity of activated carbon used for carbon beds, design total steam flow over the period of each complete carbon bed regeneration cycle, duration of the carbon bed steaming and cooling/drying cycles, design carbon bed temperature after regeneration, design carbon bed regeneration time, and design service life of carbon.

(G) For a carbon adsorption system such as a carbon canister that does not regenerate the carbon bed directly onsite in the control device, the design analysis shall consider the vent stream

composition, constituent concentrations, flow rate, relative humidity, and temperature. The design analysis shall also establish the design outlet organic concentration level, capacity of carbon bed, type and working capacity of activated carbon used for carbon bed, and design carbon replacement interval based on the total carbon working capacity of the control device and source operating schedule.

(iv) A statement signed and dated by the owner or operator certifying that the operating parameters used in the design analysis reasonably represent the conditions that exist when the hazardous waste management unit is or would be operating at the highest load or capacity level reasonably expected to occur.

(v) A statement signed and dated by the owner or operator certifying that the control device is designed to operate at an efficiency of 95 percent or greater unless the total organic concentration limit of § 265.1032(a) is achieved at an efficiency less than 95 weight percent or the total organic emission limits of § 265.1032(a) for affected process vents at the facility can be attained by a control device involving vapor recovery at an efficiency less than 95 weight percent. A statement provided by the control device manufacturer or vendor certifying that the control equipment meets the design specifications may be used to comply with this requirement.

(vi) If performance tests are used to demonstrate compliance, all test results.

(c) Design documentation and monitoring, operating, and inspection information for each closed-vent system and control device required to comply with the provisions of this part shall be recorded and kept up-to-date in the facility operating record. The information shall include:

(1) Description and date of each modification that is made to the closed-vent system or control device design.

(2) Identification of operating parameter, description of monitoring device, and diagram of monitoring sensor location or locations used to comply with § 265.1033(f)(1) and (f)(2).

(3) Monitoring, operating and inspection information required by paragraphs (f) through (j) of § 265.1033.

(4) Date, time, and duration of each period that occurs while the control device is operating when any monitored parameter exceeds the value established in the control device design analysis as specified below:

(i) For a thermal vapor incinerator designed to operate with a minimum residence time of 0.50 seconds at a minimum temperature of 760 °C, period when the combustion temperature is below 760 °C.

(ii) For a thermal vapor incinerator designed to operate with an organic emission reduction efficiency of 95 percent or greater, period when the combustion zone temperature is more than 28 °C below the design average combustion zone temperature established as a requirement of paragraph (b)(4)(iii)(A) of this section.

(iii) For a catalytic vapor incinerator, period when:

(A) Temperature of the vent stream at the catalyst bed inlet is more than 28 °C below the average temperature of the inlet vent stream established as a requirement of paragraph (b)(4)(iii)(B) of this section; or

(B) Temperature difference across the catalyst bed is less than 80 percent of the design average temperature difference established as a requirement of paragraph (b)(4)(iii)(B) of this section.

(iv) For a boiler or process heater, period when:

(A) Flame zone temperature is more than 28 °C below the design average flame zone temperature established as a requirement of paragraph (b)(4)(iii)(C) of this section; or

(B) Position changes where the vent stream is introduced to the combustion zone from the location established as a requirement of paragraph (b)(4)(iii)(C) of this section.

(v) For a flare, period when the pilot flame is not ignited.

(vi) For a condenser that complies with § 265.1033(f)(2)(vi)(A), period when the organic compound concentration level or readings of organic compounds in the exhaust vent stream from the condenser are more than 20 percent greater than the design outlet organic compound concentration level established as a requirement of paragraph (b)(4)(iii)(A) of this section.

lished as a requirement of paragraph (b)(4)(iii)(E) of this section.

(vi) For a condenser that complies with § 265.1033(f)(2)(vi)(B), period when:

(A) Temperature of the exhaust vent stream from the condenser is more than 6 °C above the design average exhaust vent stream temperature established as a requirement of paragraph (b)(4)(iii)(E) of this section; or

(B) Temperature of the coolant fluid exiting the condenser is more than 6 °C above the design average coolant fluid temperature at the condenser outlet established as a requirement of paragraph (b)(4)(iii)(E) of this section.

(vii) For a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly onsite in the control device and complies with § 265.1033(f)(2)(vii)(A), period when the organic compound concentration level or readings of organic compounds in the exhaust vent stream from the carbon bed are more than 20 percent greater than the design exhaust vent stream organic compound concentration level established as a requirement of paragraph (b)(4)(iii)(F) of this section.

(ix) For a carbon adsorption system such as a fixed-bed carbon adsorber that regenerates the carbon bed directly onsite in the control device and complies with § 265.1033(f)(2)(vii)(B), period when the vent stream continues to flow through the control device beyond the predetermined carbon bed regeneration time established as a requirement of paragraph (b)(4)(iii)(F) of this section.

(b) Explanation for each period recorded under paragraph (c)(4) of this section of the cause for control device operating parameter exceeding the design value and the measures implemented to correct the control device operation.

(6) For carbon adsorption systems operated subject to requirements specified in § 265.1033(g) or § 265.1033(h)(2), date when existing carbon in the control device is replaced with fresh carbon.

(7) For carbon adsorption systems operated subject to requirements specified in § 265.1033(h)(1), a log that records:

(i) Date and time when control device is monitored for carbon breakthrough and the monitoring device reading.

(ii) Date when existing carbon in the control device is replaced with fresh carbon.

(8) Date of each control device start-up and shutdown.

(d) Records of the monitoring, operating, and inspection information required by paragraphs (c)(3) through (c)(8) of this section need be kept only 3 years.

(e) For a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system, monitoring and inspection information indicating proper operation and maintenance of the control device must be recorded in the facility operating record.

(f) Up-to-date information and data used to determine whether or not a process vent is subject to the requirements in § 265.1032 including supporting documentation as required by § 265.1034(d)(2) when application of the knowledge of the nature of the hazardous waste stream or the process by which it was produced is used, shall be recorded in a log that is kept in the facility operating record.

§ 265.1036—265.1049 [Reserved]

§ 265.1036—265.1049 [Reserved]

Subpart BB—Air Emission Standards for Equipment Leaks

Source: 55 FR 25512, June 21, 1990, unless otherwise noted.

§ 265.1050 Applicability.

(a) The regulations in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous wastes (except as provided in § 265.1).

(b) Except as provided in § 265.1054(f), this subpart applies to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight that are managed in:

(1) Units that are subject to the permitting requirements of part 270, or

(2) Hazardous waste recycling units that are located on hazardous waste management facilities otherwise subject to the permitting requirements of part 270.

(c) Each piece of equipment to which this subpart applies shall be marked in such a manner that it can be distinguished readily from other pieces of equipment.

(d) Equipment that is in vacuum service is excluded from the requirements of §265.1052 to §265.1060 if it is identified as required in §265.1064(g)(6).

(NOTE: The requirements of §§265.1052 through 265.1064 apply to equipment associated with hazardous waste recycling units previously exempt under paragraph 261.6(c)(1). Other exemptions under §§261.4, 262.34, and 265.1(c) are not affected by these requirements.)

§265.1051 Definitions.

As used in this subpart, all terms shall have the meaning given them in §264.1031, the Act, and parts 260-266.

§265.1052 Standards: Pumps in light liquid service.

(a)(1) Each pump in light liquid service shall be monitored monthly to detect leaks by the methods specified in §265.1063(b), except as provided in paragraphs (d), (e), and (f) of this section.

(2) Each pump in light liquid service shall be checked by visual inspection each calendar week for indications of liquids dripping from the pump seal.

(b)(1) If an instrument reading of 10,555 ppm or greater is measured, a leak is detected.

(2) If there are indications of liquids dripping from the pump seal, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in §265.1059.

(2) A first attempt at repair (e.g., tightening the packing gland) shall be made no later than 5 calendar days after each leak is detected.

(d) Each pump equipped with a dual mechanical seal system that includes a barrier fluid system is exempt from the requirements of paragraph (a), provided the following requirements are met:

(1) Each dual mechanical seal system must be:

(i) Operated with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure, or

(ii) Equipped with a barrier fluid degassing reservoir that is connected by a closed-vent system to a control device that complies with the requirements of §265.1060, or

(iii) Equipped with a system that purges the barrier fluid into a hazardous waste stream with no detectable emissions to the atmosphere.

(2) The barrier fluid system must not be a hazardous waste with organic concentrations 10 percent or greater by weight.

(3) Each barrier fluid system must be equipped with a sensor that will detect failure of the seal system, the barrier fluid system or both.

(4) Each pump must be checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seals.

(6)(i) Each sensor as described in paragraph (d)(3) of this section must be checked daily or be equipped with an audible alarm that must be checked monthly to ensure that it is functioning properly.

(ii) The owner or operator must determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(6)(i) If there are indications of liquids dripping from the pump seal or the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined in paragraph (d)(5)(ii) of this section, a leak is detected.

(ii) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in §265.1059.

(iii) A first attempt at repair (e.g., relapping the seal) shall be made no later than 5 calendar days after each leak is detected.

(e) Any pump that is designated, as described in §265.1064(g)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraphs (a), (c),

Environmental Protection Agency

and (d) of this section if the pump meets the following requirements:

(1) Must have no externally actuated shaft penetrating the pump housing.

(2) Must operate with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background as measured by the methods specified in §265.1063(c).

(3) Must be tested for compliance with paragraph (e)(2) of this section initially upon designation, annually, and at other times as requested by the Regional Administrator.

(f) If any pump is equipped with a closed-vent system capable of capturing and transporting any leakage from the seal or seals to a control device that complies with the requirements of §265.1060, it is exempt from the requirements of paragraphs (a) through (e) of this section.

(55 FR 26512, June 21, 1990, as amended at 56 FR 19230, Apr. 26, 1991)

§265.1053 Standards: Compressors.

(a) Each compressor shall be equipped with a seal system that includes a barrier fluid system and that prevents leakage of total organic emissions to the atmosphere, except as provided in paragraphs (h) and (i) of this section.

(b) Each compressor seal system as required in paragraph (a) of this section shall be:

(1) Operated with the barrier fluid at a pressure that is at all times greater than the compressor stuffing box pressure, or

(2) Equipped with a barrier fluid system that is connected by a closed-vent system to a control device that complies with the requirements of §265.1060, or

(3) Equipped with a system that purges the barrier fluid into a hazardous waste stream with no detectable emissions to atmosphere.

(c) The barrier fluid must not be a hazardous waste with organic concentrations 10 percent or greater by weight.

(d) Each barrier fluid system as described in paragraphs (a) through (c) of this section shall be equipped with a sensor that will detect failure of the seal system, barrier fluid system, or both.

(e)(1) Each sensor as required in paragraph (d) of this section shall be checked daily or shall be equipped with an audible alarm that must be checked monthly to ensure that it is functioning properly unless the compressor is located within the boundary of an unattended plant site, in which case the sensor must be checked daily.

(2) The owner or operator shall determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system or both.

(f) If the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined under paragraph (e)(2) of this section, a leak is detected.

(g)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in §265.1059.

(2) A first attempt at repair (e.g., tightening the packing gland) shall be made no later than 5 calendar days after each leak is detected.

(h) A compressor is exempt from the requirements of paragraphs (a) and (b) of this section if it is equipped with a closed-vent system capable of capturing and transporting any leakage from the seal to a control device that complies with the requirements of §265.1060, except as provided in paragraph (i) of this section.

(i) Any compressor that is designated, as described in §265.1064(g)(2), for no detectable emission as indicated by an instrument reading of less than 500 ppm above background is exempt from the requirements of paragraphs (a) through (h) of this section if the compressor:

(1) Is determined to be operating with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in §265.1063(c).

(2) Is tested for compliance with paragraph (i)(1) of this section initially upon designation, annually, and at other times as requested by the Regional Administrator.

§ 265.1054 Standards: Pressure relief devices in gas/vapor service.

(a) Except during pressure releases, each pressure relief device in gas/vapor service shall be operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in § 265.1063(c).

(b)(1) After each pressure release, the pressure relief device shall be returned to a condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as soon as practicable, but no later than 5 calendar days after each pressure release, except as provided in § 265.1059.

(2) No later than 5 calendar days after the pressure release, the pressure relief device shall be monitored to confirm the condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in § 265.1063(c).

(c) Any pressure relief device that is equipped with a closed-vent system capable of capturing and transporting leakage from the pressure relief device to a control device as described in § 265.1060 is exempt from the requirements of paragraphs (a) and (b) of this section.

§ 265.1055 Standards: Sampling connecting systems.

(a) Each sampling connection system shall be equipped with a closed-purge system or closed-vent system.

(b) Each closed-purge system or closed-vent system as required in paragraph (a) shall:

(1) Return the purged hazardous waste stream directly to the hazardous waste management process line with no detectable emissions to atmosphere, or

(2) Collect and recycle the purged hazardous waste stream with no detectable emissions to atmosphere, or

(3) Be designed and operated to capture and transport all the purged hazardous waste stream to a control device that complies with the requirements of § 265.1060.

(c) *In situ* sampling systems are exempt from the requirements of paragraphs (a) and (b) of this section.

§ 265.1056 Standards: Open-ended valves or lines.

(a)(1) Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or a second valve.

(2) The cap, blind flange, plug, or second valve shall seal the open end at all times except during operations requiring hazardous waste stream flow through the open-ended valve or line.

(b) Each open-ended valve or line equipped with a second valve shall be operated in a manner such that the valve on the hazardous waste stream end is closed before the second valve is closed.

(c) When a double block and bleed system is being used, the bleed valve or line may remain open during operations that require venting the line between the block valves but shall comply with paragraph (a) of this section at all other times.

§ 265.1057 Standards: Valves in gas/vapor service or in light liquid service.

(a) Each valve in gas/vapor or light liquid service shall be monitored monthly to detect leaks by the methods specified in § 265.1063(b) and shall comply with paragraphs (b) through (e) of this section, except as provided in paragraphs (f), (g), and (h) of this section' and §§ 265.1061 and 265.1062.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) Any valve for which a leak is not detected for two successive months may be monitored the first month of every succeeding quarter, beginning with the next quarter, until a leak is detected.

(2) If a leak is detected, the valve shall be monitored monthly until a leak is not detected for 2 successive months.

(d)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after the leak is detected, except as provided in § 265.1059.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) First attempts at repair include, but are not limited to, the following best practices where practicable:

- (1) Tightening of bonnet bolts.
- (2) Replacement of bonnet bolts.
- (3) Tightening of packing gland nuts.
- (4) Injection of lubricant into lubricated packing.

(f) Any valve that is designated, as described in § 265.1064(g)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraph (a) of this section if the valve:

(1) Has no external actuating mechanism in contact with the hazardous waste stream.

(2) Is operated with emissions less than 500 ppm above background as determined by the method specified in § 265.1063(c).

(3) Is tested for compliance with paragraph (f)(2) of this section initially upon designation, annually, and at other times as requested by the Regional Administrator.

(g) Any valve that is designated, as described in § 265.1064(h)(1), as an un-safe-to-monitor valve is exempt from the requirements of paragraph (a) of this section if:

(1) The owner or operator of the valve determines that the valve is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with paragraph (a) of this section.

(2) The owner or operator of the valve adheres to a written plan that requires monitoring of the valve as frequently as practicable during safe-to-monitor times.

(h) Any valve that is designated, as described in § 265.1064(h)(2), as a difficult-to-monitor valve is exempt from the requirements of paragraph (a) of this section if:

(1) The owner or operator of the valve determines that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.

(2) The hazardous waste management unit within which the valve is located was in operation before June 21, 1990.

(3) The owner or operator of the valve follows a written plan that requires monitoring of the valve at least once per calendar year.

§ 265.1058 Standards: Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors.

(a) Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors shall be monitored within 5 days by the method specified in § 265.1063(b) if evidence of a potential leak is found by visual, audible, olfactory, or any other detection method.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 265.1059.

(2) The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) First attempts at repair include, but are not limited to, the best practices described under § 265.1057(e).

§ 265.1059 Standards: Delay of repair.

(a) Delay of repair of equipment for which leaks have been detected will be allowed if the repair is technically infeasible without a hazardous waste management unit shutdown. In such a case, repair of this equipment shall occur before the end of the next hazardous waste management unit shutdown.

(b) Delay of repair of equipment for which leaks have been detected will be allowed for equipment that is isolated from the hazardous waste management unit and that does not continue to contain or contact hazardous waste with organic concentrations at least 10 percent by weight.

(c) Delay of repair for valves will be allowed if:

(1) The owner or operator determines that emissions of purged material resulting from immediate repair are greater than the emissions likely to result from delay of repair.

(2) When repair procedures are effected, the purged material is collected and destroyed or recovered in a control device complying with § 265.1060.

(d) Delay of repair for pumps will be allowed if:

- (1) Repair requires the use of a dual mechanical seal system that includes a barrier fluid system.
- (2) Repair is completed as soon as practicable, but not later than 6 months after the leak was detected.
- (e) Delay of repair beyond a hazardous waste management unit shutdown will be allowed for a valve if valve assembly replacement is necessary during the hazardous waste management unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the next hazardous waste management unit shutdown will not be allowed unless the next hazardous waste management unit shutdown occurs sooner than 6 months after the first hazardous waste management unit shutdown.

§ 265.1060 Standards; Closed-vent systems and control devices.

Owners or operators of closed-vent systems and control devices shall comply with the provisions of § 265.1033.

§ 265.1061 Alternative standards for valves in gas/vapor service or in light liquid service; percentage of valves allowed to leak.

(a) An owner or operator subject to the requirements of § 265.1057 may elect to have all valves within a hazardous waste management unit comply with an alternative standard which allows no greater than 2 percent of the valves to leak.

(b) The following requirements shall be met if an owner or operator decides to comply with the alternative standard of allowing 2 percent of valves to leak:

- (1) An owner or operator must notify the Regional Administrator that the owner or operator has elected to comply with the requirements of this section.
- (2) A performance test as specified in paragraph (c) of this section shall be conducted initially upon designation, annually, and at other times requested by the Regional Administrator.

(3) If a valve leak is detected, it shall be repaired in accordance with § 265.1057 (d) and (e).

(c) Performance tests shall be conducted in the following manner:

- (1) All valves subject to the requirements in § 265.1057 within the hazardous waste management unit shall be monitored within 1 week by the methods specified in § 265.1063(b).
- (2) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.
- (3) The leak percentage shall be determined by dividing the number of valves subject to the requirements in § 265.1057 for which leaks are detected by the total number of valves subject to the requirements in § 265.1057 within the hazardous waste management unit.
- (d) If an owner or operator decides no longer to comply with this section, the owner or operator must notify the Regional Administrator in writing that the work practice standard described in § 265.1067 (a) through (e) will be followed.

§ 265.1062 Alternative standards for valves in gas/vapor service or in light liquid service; skip period leak detection and repair.

(a)(1) An owner or operator subject to the requirements of § 265.1057 may elect for all valves within a hazardous waste management unit to comply with one of the alternative work practices specified in paragraphs (b) (2) and (3) of this section.

(2) An owner or operator must notify the Regional Administrator before implementing one of the alternative work practices.

(b)(1) An owner or operator shall comply with the requirements for valves, as described in § 265.1057, except as described in paragraphs (b)(2) and (b)(3) of this section.

(2) After two consecutive quarterly leak detection periods with the percentage of valves leaking equal to or less than 2 percent, an owner or operator may begin to skip one of the quarterly leak detection periods for the valves subject to the requirements in § 265.1057.

(3) After five consecutive quarterly leak detection periods with the percentage of valves leaking equal to or

less than 2 percent, an owner or operator may begin to skip three of the quarterly leak detection periods for the valves subject to the requirements in § 265.1057.

(4) If the percentage of valves leaking is greater than 2 percent, the owner or operators shall monitor monthly in compliance with the requirements in § 265.1057, but may again elect to use this section after meeting the requirements of § 265.1057(c)(1).

§ 265.1063 Test methods and procedures.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the test methods and procedures requirements provided in this section.

(b) Leak detection monitoring, as required in §§ 265.1052 through 265.1062, shall comply with the following requirements:

- (1) Monitoring shall comply with Reference Method 21 in 40 CFR part 60.
- (2) The detection instrument shall meet the performance criteria of Reference Method 21.
- (3) The instrument shall be calibrated before use on each day of its use by the procedures specified in Reference Method 21.
- (4) Calibration gases shall be:
 - (i) Zero air (less than 10 ppm of hydrocarbon in air).
 - (ii) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.
- (5) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.
- (c) When equipment is tested for compliance with no detectable emissions, as required in § 266.1052(e), 265.1053(1), 265.1054, and 265.1057(f), the test shall comply with the following requirements:
 - (1) The requirements of paragraphs (b) (1) through (4) of this section shall apply.
 - (2) The background level shall be determined, as set forth in Reference Method 21.
 - (3) The instrument probe shall be traversed around all potential leak inter-

faces as close to the interface as possible as described in Reference Method 21.

(4) The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 ppm for determining compliance.

(d) In accordance with the waste analysis plan required by § 265.13(b), an owner or operator of a facility must determine, for each piece of equipment, whether the equipment contains or contacts a hazardous waste with organic concentration that equals or exceeds 10 percent by weight using the following:

- (1) Methods described in ASTM Methods D 2267-88, E 169-87, E 168-88, E 290-85, (incorporated by reference under § 260.11);
- (2) Method 9060 or 8240 of SW-846 (incorporated by reference under § 260.11); or
- (3) Application of the knowledge of the nature of the hazardous waste stream or the process by which it was produced. Documentation of a waste determination by knowledge is required. Examples of documentation that shall be used to support a determination under this provision include production process information documenting that no organic compounds are used, information that the waste is generated by a process that is identical to a process at the same or another facility that has previously been demonstrated by direct measurement to have a total organic content less than 10 percent, or prior specification analysis results on the same waste stream where it can also be documented that no process changes have occurred since that analysis that could affect the waste total organic concentration.

(e) If an owner or operator determines that a piece of equipment contains or contacts a hazardous waste with organic concentrations at least 10 percent by weight, the determination can be revised only after following the procedures in paragraph (d)(1) or (d)(2) of this section.

(f) When an owner or operator and the Regional Administrator do not agree on whether a piece of equipment contains or contacts a hazardous waste with organic concentrations at least 10

percent by weight, the procedures in paragraph (d)(1) or (d)(2) of this section can be used to resolve the dispute.

(g) Samples used in determining the percent organic content shall be representative of the highest total organic content hazardous waste that is expected to be contained in or contact the equipment.

(h) To determine if pumps or valves are in light liquid service, the vapor pressures of constituents may be obtained from standard reference texts or may be determined by ASTM D-2879 86 (incorporated by reference under § 260.11).

(i) Performance tests to determine if a control device achieves 95 weight percent organic emission reduction shall comply with the procedures of § 265.1034 (c)(1) through (c)(4).

§ 265.1064 Recordkeeping requirements.

(a)(1) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section.

(2) An owner or operator of more than one hazardous waste management unit subject to the provisions of this subpart may comply with the recordkeeping requirements for these hazardous waste management units in one recordkeeping system if the system identifies each record by each hazardous waste management unit.

(b) Owners and operators must record the following information in the facility operating record:

(1) For each piece of equipment to which subpart BB of part 265 applies:

(i) Equipment identification number and hazardous waste management unit identification.

(ii) Approximate locations within the facility (e.g., identify the hazardous waste management unit on a facility plot plan).

(iii) Type of equipment (e.g., a pump or pipeline valve).

(iv) Percent-by-weight total organics in the hazardous waste stream at the equipment.

(v) Hazardous waste state at the equipment (e.g., gas/vapor or liquid).

(vi) Method of compliance with the standard (e.g., "monthly leak detection

and repair" or "equipped with dual mechanical seals").

(2) For facilities that comply with the provisions of § 265.1033(a)(2), an implementation schedule as specified in § 265.1033(a)(2).

(3) Where an owner or operator chooses to use test data to demonstrate the organic removal efficiency or total organic compound concentration achieved by the control device, a performance test plan as specified in § 265.1035(b)(3).

(4) Documentation of compliance with § 265.1060, including the detailed design documentation or performance test results specified in § 265.1035(b)(4).

(c) When each leak is detected as specified in §§ 265.1052, 265.1053, 265.1057, and 265.1058, the following requirements apply:

(1) A weatherproof and readily visible identification, marked with the equipment identification number, the date evidence of a potential leak was found in accordance with § 265.1058(a), and the date the leak was detected, shall be attached to the leaking equipment.

(2) The identification on equipment, except on a valve, may be removed after it has been repaired.

(3) The identification on a valve may be removed after it has been monitored for 2 successive months as specified in § 265.1057(c) and no leak has been detected during those 2 months.

(d) When each leak is detected as specified in §§ 265.1052, 265.1053, 265.1057, and 265.1058, the following information shall be recorded in an inspection log and shall be kept in the facility operating record:

(1) The instrument and operator identification numbers and the equipment identification number.

(2) The date evidence of a potential leak was found in accordance with § 265.1058(a).

(3) The date the leak was detected and the dates of each attempt to repair the leak.

(4) Repair methods applied in each attempt to repair the leak.

(5) "Above 10,000" if the maximum instrument reading measured by the methods specified in § 265.1063(b) after each repair attempt is equal to or greater than 10,000 ppm.

(6) "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.

(7) Documentation supporting the delay of repair of a valve in compliance with § 265.1059(c).

(8) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a hazardous waste management unit shutdown.

(9) The expected date of successful repair of the leak if a leak is not repaired within 15 calendar days.

(10) The date of successful repair of the leak.

(e) Design documentation and monitoring, operating, and inspection information for each closed-vent system and control device required to comply with the provisions of § 265.1060 shall be recorded and kept up-to-date in the facility operating record as specified in § 265.1035(c). Design documentation is specified in § 265.1035 (c)(1) and (c)(2) and monitoring, operating, and inspection information in § 265.1035 (c)(3)-(c)(8).

(f) For a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system, monitoring and inspection information indicating proper operation and maintenance of the control device must be recorded in the facility operating record.

(g) The following information pertaining to all equipment subject to the requirements in § 265.1052 through 265.1060 shall be recorded in a log that is kept in the facility operating record:

(1) A list of identification numbers for equipment (except welded fittings) subject to the requirements of this subpart.

(2)(i) A list of identification numbers for equipment that the owner or operator elects to designate for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, under the provisions of §§ 265.1052(e), 265.1053(1), and 265.1057(f).

(ii) The designation of this equipment as subject to the requirements of §§ 265.1052(e), 265.1053(1), or 265.1057(f)

shall be signed by the owner or operator.

(3) A list of equipment identification numbers for pressure relief devices required to comply with § 265.1054(a).

(4)(i) The dates of each compliance test required in §§ 265.1052(e), 265.1053(1), 265.1054, and 265.1057(f).

(ii) The background level measured during each compliance test.

(iii) The maximum instrument reading measured at the equipment during each compliance test.

(5) A list of identification numbers for equipment in vacuum service.

(h) The following information pertaining to all valves subject to the requirements of § 265.1057 (g) and (h) shall be recorded in a log that is kept in the facility operating record:

(1) A list of identification numbers for valves that are designated as unsafe to monitor, an explanation for each valve stating why the valve is unsafe to monitor, and the plan for monitoring each valve.

(2) A list of identification numbers for valves that are designated as difficult to monitor, an explanation for each valve stating why the valve is difficult to monitor, and the planned schedule for monitoring each valve.

(i) The following information shall be recorded in the facility operating record for valves complying with § 265.1052:

(1) A schedule of monitoring.

(2) The percent of valves found leaking during each monitoring period.

(j) The following information shall be recorded in a log that is kept in the facility operating record:

(1) Criteria required in § 265.1052 (d)(5)(ii) and 265.1053(e)(2) and an explanation of the criteria.

(2) Any changes to these criteria and the reasons for the changes.

(k) The following information shall be recorded in a log that is kept in the facility operating record for use in determining exemptions as provided in the applicability section of this subpart and other specific subparts:

(1) An analysis determining the design capacity of the hazardous waste management unit.

(2) A statement listing the hazardous waste influent to and effluent from each hazardous waste management

unit subject to the requirements in §§ 265.1052 through 265.1060 and an analysis determining whether these hazardous wastes are heavy liquids.

(3) An up-to-date analysis and the supporting information and data used to determine whether or not equipment is subject to the requirements in §§ 265.1052 through 265.1060. The record shall include supporting documentation as required by § 265.1063(d)(3) when application of the knowledge of the nature of the hazardous waste stream or the process by which it was produced is used. If the owner or operator takes any action (e.g., changing the process that produced the waste) that could result in an increase in the total organic content of the waste contained in or contacted by equipment determined not to be subject to the requirements in §§ 265.1052 through 265.1060, then a new determination is required.

(1) Records of the equipment leak information required by paragraph (d) of this section and the operating information required by paragraph (e) of this section need be kept only 3 years.

(m) The owner or operator of any facility that is subject to this subpart and to regulations at 40 CFR part 60, subpart VV, or 40 CFR part 61, subpart V, may elect to determine compliance with this subpart by documentation elsewhere pursuant to § 265.1064 of this subpart, or pursuant to those provisions of 40 CFR part 60 or 61, to the extent that the documentation under the regulation at 40 CFR part 60 or part 61 duplicates the documentation required under this subpart. The documentation under the regulation at 40 CFR part 60 or part 61 shall be kept with or made readily available with the facility operating record.

[55 FR 25512, June 21, 1990, as amended at 56 FR 19290, Apr. 26, 1991]

§§ 265.1065–265.1079 [Reserved]

Subpart CC—(Reserved)

Subpart DD—Confined Buildings

SOURCE: 57 FR 37268, Aug. 18, 1992, unless otherwise noted.

§ 265.1100 Applicability.

The requirements of this subpart apply to owners or operators who store or treat hazardous waste in units designed and operated under § 265.101 of this subpart. These provisions will become effective on February 18, 1993, although the owner or operator may notify the Regional Administrator of his intent to be bound by this subpart at an earlier time. The owner or operator is not subject to the definition of land disposal in RCRA section 3004(k) provided that the unit:

(a) Is a completely enclosed, self-supporting structure that is designed and constructed of manmade materials of sufficient strength and thickness to support themselves, the waste contents, and any personnel and heavy equipment that operate within the units, and to prevent failure due to pressure gradients, settlement, compression, or uplift, physical contact with the hazardous wastes to which they are exposed; climatic conditions; and the stresses of daily operation, including the movement of heavy equipment within the unit and contact of such equipment with containment walls;

(b) Has a primary barrier that is designed to be sufficiently durable to withstand the movement of personnel and handling equipment within the unit;

(c) If the unit is used to manage liquids, has:

(1) A primary barrier designed and constructed of materials to prevent migration of hazardous constituents into the barrier;

(2) A liquid collection system designed and constructed of materials to minimize the accumulation of liquid on the primary barrier; and

(3) A secondary containment system designed and constructed of materials to prevent migration of hazardous constituents into the barrier, with a leak detection and liquid collection system capable of detecting, collecting, and removing leaks of hazardous constituents at the earliest possible time, unless the unit has been granted a variance from the secondary containment system requirements under § 265.1101(b)(4);

(d) Has controls as needed to permit fugitive dust emissions; and

(e) Is designed and operated to ensure containment and prevent the tracking of materials from the unit by personnel or equipment.

§ 265.1101 Design and operating standards.

(a) All containment buildings must comply with the following design standards:

(1) The containment building must be completely enclosed with a floor, walls, and a roof to prevent exposure to the elements, (e.g., precipitation, wind, run-on), and to assure containment of managed wastes.

(2) The floor and containment walls of the unit, including the secondary containment system if required under paragraph (b) of this section, must be designed and constructed of materials of sufficient strength and thickness to support themselves, the waste contents, and any personnel and heavy equipment that operate within the unit, and to prevent failure due to pressure gradients, settlement, compression, or uplift, physical contact with the hazardous wastes to which they are exposed; climatic conditions; and the stresses of daily operation, including the movement of heavy equipment within the unit and contact of such equipment with containment walls. The unit must be designed so that it has sufficient structural strength to prevent collapse or other failure. All surfaces to be in contact with hazardous wastes must be chemically compatible with those wastes. EPA will consider standards established by professional organizations generally recognized by the industry such as the American Concrete Institute (ACI) and the American Society of Testing Materials (ASTM) in judging the structural integrity requirements of this paragraph. If appropriate to the nature of the waste management operation to take place in the unit, an exception to the structural strength requirement may be made for light-weight doors and windows that meet those criteria:

(i) They provide an effective barrier against fugitive dust emissions under paragraph (c)(1)(iv); and

(ii) The unit is designed and operated in a fashion that assures that wastes

will not actually come in contact with these openings.

(3) Incompatible hazardous wastes or treatment reagents must not be placed in the unit or its secondary containment system if they could cause the unit or secondary containment system to leak, corrode, or otherwise fail.

(4) A containment building must have a primary barrier designed to withstand the movement of personnel, waste, and handling equipment in the unit during the operating life of the unit and appropriate for the physical and chemical characteristics of the waste to be managed.

(b) For a containment building used to manage hazardous wastes containing free liquids or treated with free liquids (the presence of which is determined by the paint filter test, a visual examination, or other appropriate means), the owner or operator must include:

(1) A primary barrier designed and constructed of materials to prevent the migration of hazardous constituents into the barrier (e.g. a geomembrane covered by a concrete wear surface).

(2) A liquid collection and removal system to prevent the accumulation of liquid on the primary barrier of the containment building;

(i) The primary barrier must be sloped to drain liquids to the associated collection system; and

(ii) Liquids and waste must be collected and removed to minimize hydraulic head on the containment system at the earliest practicable time that protects human health and the environment.

(3) A secondary containment system including a secondary barrier designed and constructed to prevent migration of hazardous constituents into the barrier, and a leak detection system that is capable of detecting failure of the primary barrier and collecting accumulated hazardous wastes and liquids at the earliest practicable time.

(i) The requirements of the leak detection component of the secondary containment system are satisfied by installation of a system that is, at a minimum:

(A) Constructed with a bottom slope of 1 percent or more; and

AUTHORITY: 42 U.S.C. 6905, 6912(a), 6924, and 6934.

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.

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

\$266.21 Standards applicable to generators and transporters of materials used in a manner that constitute 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 storage 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 264 and 265 and parts 270 and 124 of this chapter and the notification requirement under section 3010 of RCRA. (Those 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 23760, July 15, 1985]

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, palladium, iridium, 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;

(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.

Subpart G—Spent Lead-Acid Batteries Being Reclaimed

\$266.80 Applicability and requirements.

(a) The regulations of this subpart apply to persons who reclaim spent lead-acid batteries that are recyclable materials ("spent batteries"). Persons who generate, transport, or collect spent batteries, or who store spent batteries but do not reclaim them 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 batteries before reclaiming them are subject to the following requirements:

- (1) Notification requirements under section 3010 of RCRA;

(2) All applicable provisions in subparts A, B (but not §264.13 (waste analysis)), C, D, E (but not §264.71 or §264.72 (dealing with the use of the manifest and manifest discrepancies)), and F through L of part 264 of this chapter;

(3) All applicable provisions in subparts A, B (but not §265.13 (waste analysis)), C, D, E (but not §265.71 and 265.72 (dealing with use of the manifest and manifest discrepancies)), and F through L of part 265 of this chapter;

(4) All applicable provisions in parts 270 and 124 of this chapter.

[50 FR 666, Jan. 4, 1985, as amended at 50 FR 33543, Aug. 20, 1985]

Subpart H—Hazardous Waste Burned in Boilers and Industrial Furnaces

SOURCE: 58 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) (v-viii) of this chapter, and hazardous wastes that are subject to the special requirements for conditionally exempt small quantity generators under § 261.5 of this chapter; 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 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 dusts 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 recovery furnace, or a metal recovery furnace that burns baghouse dusts used to capture metallic dusts emitted by steel manufacturing, must provide a one-

Environmental Protection Agency

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.

(i) The hazardous wastes listed in appendices XI and XII, part 266, and baghouse dusts 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 XI must contain recoverable levels of lead, a waste listed in appendix XII must contain recoverable levels of nickel or chromium, and baghouse dusts 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;

(ii) 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)(i) of this section and records to document compliance with paragraph (c)(3) of this section shall be kept for at least three years.

(iii) The Director may decide on a case-by-case basis that the toxic organic constituents in a material listed in appendix XI or XII 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, palladium, iridium, 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:

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

(1) 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 32888, 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. 26, 1992; 57 FR 41612, Sept. 10, 1992]

§ 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 facilities 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 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(g) 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 (c) 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 (c) 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 \$ 270.68 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 chlorides/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 \$ 266.106:

(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;

(i) 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 omission 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.

(ii) 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 chlorine and chlorine feed rate screening limits of §266.107(b)(1), the permit will specify the following operating requirements:

(A) Feed rate of total chlorine 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 chlorine and chlorine for the hazardous waste, other fuels, and industrial furnace feedstocks;

(ii) For conformance with the Tier II HCl and Cl₂ emission rate screening limits under §266.107(b)(2) and the Tier III HCl and Cl₂ controls under §266.107(c), the permit will specify the following operating requirements:

(A) Maximum emission rate for HCl and for Cl₂ 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 Cl₂ 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.* (i) 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.

(i) *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:

(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.

(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/Cl₂, 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, or 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, valves, 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 re-

Environmental Protection Agency

strict 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 32088, 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.

(ii) 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 §265.105(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)(6) 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

(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 Cl₂ 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 Cl₂:

- (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 Cl₂ of total chlorine 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 (c) and 266.107 (b)(1) or (e), the feed rate (lb/hr) of total chlorine 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 Cl₂ (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 Cl₂, and the following information to support such determinations:

(A) The estimated air pollution control system (APCS) removal efficiency for particulate matter, HCl, Cl₂, 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, Cl₂, 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(i);
 - (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 meteorological 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 Tier III emissions rate controls for metals or HCl and Cl₂, 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 chlorine 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 (e)(6)(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 §266.106.

(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 "Al-

ternative Methodology for Implementing Metals Controls" in appendix IX of this part.

(b) *Measurement of feed rates and production rate—(1) 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)(6) (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) Data 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 Cl₂;

(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 Agency 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 or 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 xii) 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).

(i) *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 or 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:

(i) 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)(9)(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 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, 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 ratio;

(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 precollector 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 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)).

(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 160 °C, an explanation of why a heated system is not used (see paragraph (c)(6) 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.

(ii) 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(o).

(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)(i)(A) or (B) of this section, however, need not reach steady state conditions with respect to the flow of materials 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/Cl₂, 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:

(1) 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)(ii) 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.

(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, Cl₂, 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 Cl₂ 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 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

(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 direc-

tion 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. However, owners and operators of facilities electing to comply with the alternative hydrocarbon provision of §266.104(f) and requesting a time extension under §266.103(c)(7)(ii)(B) may establish the baseline HC level and comply with the interim HC limit established by the time extension using a conditioned gas monitoring system if the Director determines that the owner or operator has demonstrated that they have made a good faith effort to operate a heated monitoring system but found it to be impracticable.

(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 (i) 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:

(i) 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 ap-

plication 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/Cl₂.

(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).

(B) *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 (i) 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 (i) 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 (xii) 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, or 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 application of compliance.

cable 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 §§ 266.111-266.115 of this chapter.

[58 FR 7238, Feb. 21, 1993; 58 FR 32689, July 17, 1993, as amended at 58 FR 42512, 42514, Aug. 27, 1993; 57 FR 38564, Aug. 25, 1992; 57 FR 45000, Sept. 30, 1992]

§ 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) 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 (DRE) of 99.999% 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-

graph (a)(2) of this section) in its permit for each waste feed. DRE is determined for each POHC from the following equation:

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

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.

p-dioxins and dibenzofurans. DRE is determined for each FOHC 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.

(6) *Low risk waste.* Owners and operators of boilers or industrial furnaces that burn hazardous waste in compliance with the requirements of § 266.108(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 incinerated 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 dibenzop-dioxins and dibenzofurans do not result in an increased lifetime cancer risk to the hypothetical maximum ex-

posed 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 23, "Determination of Polychlorinated Dibenzop-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) from Stationary Sources", in appendix IX of this part;

(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 Dibenzop-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)" (1996) 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) *Alternative HC limit for furnaces with organic matter in raw material.* For industrial furnaces that cannot meet the 20 ppmv HC limit because of organic matter in normal raw material, the Director may establish an alter-

native HC limit on a case-by-case basis (under a part B permit proceeding) at a level that ensures that flue gas HC (and CO) concentrations when burning hazardous waste are not greater than when not burning hazardous waste (the baseline HC level) provided that the owner or operator complies with the following requirements. However, cement kilns equipped with a by-pass duct meeting the requirements of paragraph (g) of this section, are not eligible for an alternative HC limit.

(1) When the baseline HC (and CO) level is determined, the owner or operator must demonstrate that the facility is designed and operated to minimize hydrocarbon emissions from fuels and raw materials and that the facility is producing normal products under normal operating conditions feeding normal feedstocks and fuels. The baseline HC level is defined as the average over all valid test runs of the highest hourly rolling average HC value for each run when the facility does not burn hazardous waste, adjusted as appropriate to consider the variability of hydrocarbon levels under good combustion operating conditions. The baseline CO level is determined based on the test runs used to establish the baseline HC level and is defined as the average over all test runs of the highest hourly rolling average CO value for each run. More than one baseline level must be determined if the facility operates under different modes that may generate significantly lower HC (and CO) levels;

(2) The owner or operator must develop an approach to monitor over time changes in the operation of the facility that could reduce the baseline HC level;

(3) The owner or operator must conduct emissions testing during the trial burn to:

(i) Determine the baseline HC (and CO) level;

(ii) Demonstrate that, when hazardous waste is burned, HC (and CO) levels do not exceed the baseline level; and

(iii) Identify the types and concentrations of organic compounds listed in appendix VIII, part 261 of this chapter, that are emitted and conduct dispersion modeling to predict the maximum annual average ground level concentra-

tion of each organic compound. On-site ground level concentrations must be considered for this evaluation if a person resides on site.

(A) Sampling and analysis of organic emissions shall be conducted using procedures prescribed by the Director.

(B) Dispersion modelling shall be conducted according to procedures provided by paragraph (e)(2) of this section; and

(iv) Demonstrate that maximum annual average ground level concentrations of the organic compounds identified in paragraph (f)(3)(iii) of this section do 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 compounds of the ratios of the actual ground level concentration to the level established in appendix V cannot exceed 1.0. To estimate the health risk from chlorinated dibenzo-p-dioxins and dibenzofuran congeners, use the procedures prescribed by paragraph (e)(3) of this section to estimate the 2,3,7,8-TCDD toxicity equivalence of the congeners.

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

(4) All hydrocarbon levels specified under this paragraph are to be monitored and reported as specified in paragraphs (c)(1) and (c)(2) of this section.

(g) *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.

(h) *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.

(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 these 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 726, Feb. 21, 1991; 56 FR 32639, July 17, 1991, as amended at 57 FR 38565, Aug. 25, 1992; 58 FR 3333, July 20, 1993]

§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 these 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)(1)(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)(1)(B);

(B) An averaging period of 2 to 24 hours as defined in §266.102(e)(6)(1)(i) 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)(1)(i) 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:

$$TESH=Ha+Ht-Tr$$

where:

Ha=Actual physical stack height

Ht=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 61.100(11).

(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.

(6) *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:

$K=HV^T$

Where:

K =a parameter accounting for relative influence of stack height and plume rise;
 H =physical stack height (meters);
 V =stack gas flow rate (m³/second); and
 T =exhaust temperature (°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

40 CFR Ch. I (7-1-94 Edition)

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:

$$\frac{n}{\sum_{i=1}^n} \frac{AER_{0i}}{ERSL_{0i}} \leq 1.0$$

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 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)(i) of this section.

Environmental Protection Agency

tion. The feed rate of metals in each feedstream must be monitored to ensure that the feed rate limits for on-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.

(6) *Multiple stacks.* (i) 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 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 determined by the following equation:

$$\frac{n}{\sum_{i=1}^n} \frac{\text{Predicted Ambient Concentration}_i}{\text{Risk-Specific Dose}_{0i}} \leq 1.0$$

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).

onstrated 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 10⁵ 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:

(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)(i) 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.

(c) *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 dis-

person 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 (C)(2)(i)(A) of this section such that the sum for all carcinogenic metals of the ratios of the selected emission limit to the emission rate does not exceed 1.0.

(g) *Emission testing.*—(1) *General.* Emission testing for metals shall be conducted using the Multiple Metals Train as described in appendix IX of this part.

(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 appendix IX of this part.

(h) *Dispersion Modeling.* Dispersion modeling required under this section shall be conducted according to methods recommended in appendix W of part 61 of this chapter ("Guideline on Air Quality Models (Revised)" (1996) 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 on-site.

(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 "In-voation" justifying modification or revocation and re-issuance of a permit under § 270.41 of this chapter.

[38 FR 7206, Feb. 21, 1991; 56 FR 32683, July 17, 1991; 57 FR 38565, Aug. 25, 1992; 58 FR 38893, July 30, 1993]

§ 266.107 Standards to control hydrogen chloride (HCl) and chlorine gas (Cl₂) emissions.

(a) *General.* The owner or operator must comply with the hydrogen chloride (HCl) and chlorine (Cl₂) 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 Cl₂ 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 Cl₂ 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 Cl₂ emissions under a RCRA operating permit or interim status control 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 Cl₂ 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 Cl₂, 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 Cl₂ (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 Cl₂ emissions under a RCRA operating permit or interim status control 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 Cl₂.

(d) *Averaging periods.* The HCl and Cl₂ 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 appendix IX of this part.

(g) *Dispersion modeling.* Dispersion modeling shall be conducted according to the provisions of § 266.105(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; 67 FR 38566, Aug. 25, 1992]

§ 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 (gal./hour/month)	Terrain-adjusted effective stack height of device (meters)	Allowable hazardous waste burning rate (gal./hour/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	480
12.0 to 13.9	58	65.0 to 69.9	610
14.0 to 15.9	76	70.0 to 74.9	690
16.0 to 17.9	94	75.0 to 79.9	780
18.0 to 19.9	112	80.0 to 84.9	850
20.0 to 21.9	130	85.0 to 89.9	900
22.0 to 23.9	148	90.0 to 94.9	1,100
24.0 to 25.9	166	95.0 to 99.9	1,200
26.0 to 27.9	184	100.0 to 104.9	1,300
28.0 to 29.9	202	105.0 to 109.9	1,500
30.0 to 34.9	220	110.0 to 114.9	1,700
35.0 to 39.9	238	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:

$$\frac{\text{Actual Quantity Burned}_{q_1}}{\Sigma} \leq 1.0$$

$$\frac{\text{Actual Quantity Burned}_{q_2}}{\text{Allowable Quantity Burned}_{q_2}}$$

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; 67 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, 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 constituent 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 constituent fed to the device is omitted.

(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 particulate 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 dem-

onstrate 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 §268.104(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 §268.104(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 §§268.102 or 268.103 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 "bank 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 (f) 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 compactibility 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/appli 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 668, Jan. 4, 1985, as amended at 56 FR 42516, 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 F039 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 F039 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 36566, Aug. 25, 1992; 58 FR 53602, Nov. 9, 1993]

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

TERRAIN					
[Values for urban areas]					
Thallium (g/hr)	Silver (g/hr)	Mercury (g/hr)	Lead (g/hr)	Barium (g/hr)	Antimony (g/hr)
6.0E+01	6.0E+01	6.0E+01	1.2E+01	1.0E+01	6.0E+01
6.8E+01	6.8E+01	6.8E+01	2.3E+01	1.3E+01	6.8E+01
7.6E+01	7.6E+01	7.6E+01	2.5E+01	1.4E+01	7.6E+01
8.6E+01	8.6E+01	8.6E+01	3.0E+01	1.7E+01	8.6E+01
9.6E+01	9.6E+01	9.6E+01	3.0E+01	1.8E+01	9.6E+01
1.1E+02	1.1E+02	1.1E+02	3.4E+01	2.1E+01	1.1E+02
1.3E+02	1.3E+02	1.3E+02	3.6E+01	2.1E+01	1.3E+02
1.4E+02	1.4E+02	1.4E+02	4.0E+01	2.4E+01	1.4E+02
1.5E+02	1.5E+02	1.5E+02	4.0E+01	2.4E+01	1.5E+02
1.6E+02	1.6E+02	1.6E+02	4.3E+01	2.7E+01	1.6E+02
1.8E+02	1.8E+02	1.8E+02	4.6E+01	2.7E+01	1.8E+02
2.0E+02	2.0E+02	2.0E+02	5.4E+01	3.0E+01	2.0E+02
2.2E+02	2.2E+02	2.2E+02	5.4E+01	3.0E+01	2.2E+02
2.3E+02	2.3E+02	2.3E+02	6.0E+01	3.3E+01	2.3E+02
2.4E+02	2.4E+02	2.4E+02	6.0E+01	3.3E+01	2.4E+02
2.5E+02	2.5E+02	2.5E+02	7.5E+01	3.6E+01	2.5E+02
2.6E+02	2.6E+02	2.6E+02	7.5E+01	3.6E+01	2.6E+02
2.7E+02	2.7E+02	2.7E+02	8.0E+01	3.9E+01	2.7E+02
2.8E+02	2.8E+02	2.8E+02	8.0E+01	3.9E+01	2.8E+02
2.9E+02	2.9E+02	2.9E+02	9.0E+01	4.0E+01	2.9E+02
3.0E+02	3.0E+02	3.0E+02	9.0E+01	4.0E+01	3.0E+02
3.1E+02	3.1E+02	3.1E+02	1.1E+02	4.3E+01	3.1E+02
3.2E+02	3.2E+02	3.2E+02	1.1E+02	4.3E+01	3.2E+02
3.3E+02	3.3E+02	3.3E+02	1.2E+02	4.6E+01	3.3E+02
3.4E+02	3.4E+02	3.4E+02	1.2E+02	4.6E+01	3.4E+02
3.5E+02	3.5E+02	3.5E+02	1.3E+02	4.9E+01	3.5E+02
3.6E+02	3.6E+02	3.6E+02	1.3E+02	4.9E+01	3.6E+02
3.7E+02	3.7E+02	3.7E+02	1.4E+02	5.1E+01	3.7E+02
3.8E+02	3.8E+02	3.8E+02	1.4E+02	5.1E+01	3.8E+02
3.9E+02	3.9E+02	3.9E+02	1.5E+02	5.4E+01	3.9E+02
4.0E+02	4.0E+02	4.0E+02	1.5E+02	5.4E+01	4.0E+02
4.1E+02	4.1E+02	4.1E+02	1.6E+02	5.7E+01	4.1E+02
4.2E+02	4.2E+02	4.2E+02	1.6E+02	5.7E+01	4.2E+02
4.3E+02	4.3E+02	4.3E+02	1.7E+02	6.0E+01	4.3E+02
4.4E+02	4.4E+02	4.4E+02	1.7E+02	6.0E+01	4.4E+02
4.5E+02	4.5E+02	4.5E+02	1.8E+02	6.3E+01	4.5E+02
4.6E+02	4.6E+02	4.6E+02	1.8E+02	6.3E+01	4.6E+02
4.7E+02	4.7E+02	4.7E+02	1.9E+02	6.6E+01	4.7E+02
4.8E+02	4.8E+02	4.8E+02	1.9E+02	6.6E+01	4.8E+02
4.9E+02	4.9E+02	4.9E+02	2.0E+02	6.9E+01	4.9E+02
5.0E+02	5.0E+02	5.0E+02	2.0E+02	6.9E+01	5.0E+02
5.1E+02	5.1E+02	5.1E+02	2.1E+02	7.2E+01	5.1E+02
5.2E+02	5.2E+02	5.2E+02	2.1E+02	7.2E+01	5.2E+02
5.3E+02	5.3E+02	5.3E+02	2.2E+02	7.5E+01	5.3E+02
5.4E+02	5.4E+02	5.4E+02	2.2E+02	7.5E+01	5.4E+02
5.5E+02	5.5E+02	5.5E+02	2.3E+02	7.8E+01	5.5E+02
5.6E+02	5.6E+02	5.6E+02	2.3E+02	7.8E+01	5.6E+02
5.7E+02	5.7E+02	5.7E+02	2.4E+02	8.1E+01	5.7E+02
5.8E+02	5.8E+02	5.8E+02	2.4E+02	8.1E+01	5.8E+02
5.9E+02	5.9E+02	5.9E+02	2.5E+02	8.4E+01	5.9E+02
6.0E+02	6.0E+02	6.0E+02	2.5E+02	8.4E+01	6.0E+02
6.1E+02	6.1E+02	6.1E+02	2.6E+02	8.7E+01	6.1E+02
6.2E+02	6.2E+02	6.2E+02	2.6E+02	8.7E+01	6.2E+02
6.3E+02	6.3E+02	6.3E+02	2.7E+02	9.0E+01	6.3E+02
6.4E+02	6.4E+02	6.4E+02	2.7E+02	9.0E+01	6.4E+02
6.5E+02	6.5E+02	6.5E+02	2.8E+02	9.3E+01	6.5E+02
6.6E+02	6.6E+02	6.6E+02	2.8E+02	9.3E+01	6.6E+02
6.7E+02	6.7E+02	6.7E+02	2.9E+02	9.6E+01	6.7E+02
6.8E+02	6.8E+02	6.8E+02	2.9E+02	9.6E+01	6.8E+02
6.9E+02	6.9E+02	6.9E+02	3.0E+02	9.9E+01	6.9E+02
7.0E+02	7.0E+02	7.0E+02	3.0E+02	9.9E+01	7.0E+02
7.1E+02	7.1E+02	7.1E+02	3.1E+02	1.0E+02	7.1E+02
7.2E+02	7.2E+02	7.2E+02	3.1E+02	1.0E+02	7.2E+02
7.3E+02	7.3E+02	7.3E+02	3.2E+02	1.1E+02	7.3E+02
7.4E+02	7.4E+02	7.4E+02	3.2E+02	1.1E+02	7.4E+02
7.5E+02	7.5E+02	7.5E+02	3.3E+02	1.2E+02	7.5E+02
7.6E+02	7.6E+02	7.6E+02	3.3E+02	1.2E+02	7.6E+02
7.7E+02	7.7E+02	7.7E+02	3.4E+02	1.3E+02	7.7E+02
7.8E+02	7.8E+02	7.8E+02	3.4E+02	1.3E+02	7.8E+02
7.9E+02	7.9E+02	7.9E+02	3.5E+02	1.4E+02	7.9E+02
8.0E+02	8.0E+02	8.0E+02	3.5E+02	1.4E+02	8.0E+02
8.1E+02	8.1E+02	8.1E+02	3.6E+02	1.5E+02	8.1E+02
8.2E+02	8.2E+02	8.2E+02	3.6E+02	1.5E+02	8.2E+02
8.3E+02	8.3E+02	8.3E+02	3.7E+02	1.6E+02	8.3E+02
8.4E+02	8.4E+02	8.4E+02	3.7E+02	1.6E+02	8.4E+02
8.5E+02	8.5E+02	8.5E+02	3.8E+02	1.7E+02	8.5E+02
8.6E+02	8.6E+02	8.6E+02	3.8E+02	1.7E+02	8.6E+02
8.7E+02	8.7E+02	8.7E+02	3.9E+02	1.8E+02	8.7E+02
8.8E+02	8.8E+02	8.8E+02	3.9E+02	1.8E+02	8.8E+02
8.9E+02	8.9E+02	8.9E+02	4.0E+02	1.9E+02	8.9E+02
9.0E+02	9.0E+02	9.0E+02	4.0E+02	1.9E+02	9.0E+02
9.1E+02	9.1E+02	9.1E+02	4.1E+02	2.0E+02	9.1E+02
9.2E+02	9.2E+02	9.2E+02	4.1E+02	2.0E+02	9.2E+02
9.3E+02	9.3E+02	9.3E+02	4.2E+02	2.1E+02	9.3E+02
9.4E+02	9.4E+02	9.4E+02	4.2E+02	2.1E+02	9.4E+02
9.5E+02	9.5E+02	9.5E+02	4.3E+02	2.2E+02	9.5E+02
9.6E+02	9.6E+02	9.6E+02	4.3E+02	2.2E+02	9.6E+02
9.7E+02	9.7E+02	9.7E+02	4.4E+02	2.3E+02	9.7E+02
9.8E+02	9.8E+02	9.8E+02	4.4E+02	2.3E+02	9.8E+02
9.9E+02	9.9E+02	9.9E+02	4.5E+02	2.4E+02	9.9E+02
1.0E+03	1.0E+03	1.0E+03	4.5E+02	2.4E+02	1.0E+03
1.1E+03	1.1E+03	1.1E+03	4.6E+02	2.5E+02	1.1E+03
1.2E+03	1.2E+03	1.2E+03	4.7E+02	2.6E+02	1.2E+03
1.3E+03	1.3E+03	1.3E+03	4.7E+02	2.6E+02	1.3E+03
1.4E+03	1.4E+03	1.4E+03	4.8E+02	2.7E+02	1.4E+03
1.5E+03	1.5E+03	1.5E+03	4.8E+02	2.7E+02	1.5E+03
1.6E+03	1.6E+03	1.6E+03	4.9E+02	2.8E+02	1.6E+03
1.7E+03	1.7E+03	1.7E+03	4.9E+02	2.8E+02	1.7E+03
1.8E+03	1.8E+03	1.8E+03	5.0E+02	2.9E+02	1.8E+03
1.9E+03	1.9E+03	1.9E+03	5.0E+02	2.9E+02	1.9E+03
2.0E+03	2.0E+03	2.0E+03	5.1E+02	3.0E+02	2.0E+03
2.1E+03	2.1E+03	2.1E+03	5.1E+02	3.0E+02	2.1E+03
2.2E+03	2.2E+03	2.2E+03	5.2E+02	3.1E+02	2.2E+03
2.3E+03	2.3E+03	2.3E+03	5.2E+02	3.1E+02	2.3E+03
2.4E+03	2.4E+03	2.4E+03	5.3E+02	3.2E+02	2.4E+03
2.5E+03	2.5E+03	2.5E+03	5.3E+02	3.2E+02	2.5E+03
2.6E+03	2.6E+03	2.6E+03	5.4E+02	3.3E+02	2.6E+03
2.7E+03	2.7E+03	2.7E+03	5.4E+02	3.3E+02	2.7E+03
2.8E+03	2.8E+03	2.8E+03	5.5E+02	3.4E+02	2.8E+03
2.9E+03	2.9E+03	2.9E+03	5.5E+02	3.4E+02	2.9E+03
3.0E+03	3.0E+03	3.0E+03	5.6E+02	3.5E+02	3.0E+03
3.1E+03	3.1E+03	3.1E+03	5.6E+02	3.5E+02	3.1E+03
3.2E+03	3.2E+03	3.2E+03	5.7E+02	3.6E+02	3.2E+03
3.3E+03	3.3E+03	3.3E+03	5.7E+02	3.6E+02	3.3E+03
3.4E+03	3.4E+03	3.4E+03	5.8E+02	3.7E+02	3.4E+03
3.5E+03	3.5E+03	3.5E+03	5.8E+02	3.7E+02	3.5E+03
3.6E+03	3.6E+03	3.6E+03	5.9E+02	3.8E+02	3.6E+03
3.7E+03	3.7E+03	3.7E+03	5.9E+02	3.8E+02	3.7E+03
3.8E+03	3.8E+03	3.8E+03	6.0E+02	3.9E+02	3.8E+03
3.9E+03	3.9E+03	3.9E+03	6.0E+02	3.9E+02	3.9E+03
4.0E+03	4.0E+03	4.0E+03	6.1E+02	4.0E+02	4.0E+03
4.1E+03	4.1E+03	4.1E+03	6.1E+02	4.0E+02	4.1E+03
4.2E+03	4.2E+03	4.2E+03	6.2E+02	4.1E+02	4.2E+03
4.3E+03	4.3E+03	4.3E+03	6.2E+02	4.1E+02	4.3E+03
4.4E+03	4.4E+03	4.4E+03	6.3E+02	4.2E+02	4.4E+03
4.5E+03	4.5E+03	4.5E+03	6.3E+02	4.2E+02	4.5E+03
4.6E+03	4.6E+03	4.6E+03	6.4E+02	4.3E+02	4.6E+03
4.7E+03	4.7E+03	4.7E+03	6.4E+02	4.3E+02	4.7E+03
4.8E+03	4.8E+03	4.8E+03	6.5E+02	4.4E+02	4.8E+03
4.9E+03	4.9E+03	4.9E+03	6.5E+02	4.4E+02	4.9E+03
5.0E+03	5.0E+03	5.0E+03	6.6E+02	4.5E+02	5.0E+03
5.1E+03	5.1E+03	5.1E+03	6.6E+02	4.5E+02	5.1E+03
5.2E+03	5.2E+03	5.2E+03	6.7E+02	4.6E+02	5.2E+03
5.3E+03	5.3E+03	5.3E+03	6.7E+02	4.6E+02	5.3E+03
5.4E+03	5.4E+03	5.4E+03	6.8E+02	4.7E+02	5.4E+03
5.5E+03	5.5E+03	5.5E+03	6.8E+02	4.7E+02	5.5E+03
5.6E+03	5.6E+03	5.6E+03	6.9E+02	4.8E+02	5.6E+03
5.7E+03	5.7E+03	5.7E+03	6.9E+02	4.8E+02	5.7E+03
5.8E+03	5.8E+03	5.8E+03	7.0E+02	4.9E+02	5.8E+03
5.9E+03	5.9E+03	5.9E+03	7.0E+02	4.9E+02	5.9E+03
6.0E+03	6.0E+03	6.0E+03	7.1E+02	5.0E+02	6.0E+03
6.1E+03	6.1E+03	6.1E+03	7.1E+02	5.0E+02	6.1E+03
6.2E+03	6.2E+03	6.2E+03	7.2E+02	5.1E+02	6.2E+03
6.3E+03	6.3E+03	6.3E+03	7.2E+02	5.1E+02	6.3E+03
6.4E+03	6.4E+03	6.4E+03	7.3E+02	5.2E+02	6.4E+03
6.5E+03	6.5E+03	6.5E+03	7.3E+02	5.2E+02	6.5E+03
6.6E+03	6.6E+03	6.6E+03	7.4E+02	5.3E+02	6.6E+03
6.7E+03	6.7E+03	6.7E+03	7.4E+02	5.3E+02	6.7E+03
6.8E+03	6.8E+03	6.8E+03	7.5E+02	5.4E+02	6.8E+03
6.9E+03	6.9E+03	6.9E+03	7.5E+02	5.4E+02	6.9E+03
7.0E+03	7.0E+03	7.0E+03	7.6E+02	5.5E+02	7.0E+03
7.1E+03	7.1E+03	7.1E+03	7.6E+02	5.5E+02	7.1E+03
7.2E+03	7.2E+03	7.2E+03	7.7E+02	5.6E+02	7.2E+03
7.3E+03	7.3E+03	7.3E+03	7.7E+02	5.6E+02	7.3E+03
7.4E+03	7.4E+03	7.4E+03	7.8E+02	5.7E+02	7.4E+03
7.5E+03	7.5E+03	7.5E+03	7.8E+02	5.7E+02	7.5E+03
7.6E+03	7.6E+03	7.6E+03	7.9E+02	5.8E+02	7.6E+03
7.7E+03	7.7E+03	7.7E+03	7.9E+02	5.8E+02	7.7E+03
7.8E+03	7.8E+03	7.8E+03	8.0E+02	5.9E+02	7.8E+03
7.9E+03	7.9E+03	7.9E+03	8.0E+02	5.9E+02	7.9E+03
8.0E+03	8.0E+03	8.0E+03	8.1E+02	6.0E+02	8.0E+03
8.1E+03	8.1E+03	8.1E+03	8.1E+02		

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

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	3.8E+01	6.0E+03	1.1E+01	3.6E+01	3.6E+02	3.6E+01
6	4.0E+01	6.0E+03	1.2E+01	4.0E+01	4.0E+02	4.0E+01
8	4.5E+01	6.5E+03	1.3E+01	4.5E+01	4.5E+02	4.5E+01
10	4.8E+01	7.0E+03	1.4E+01	4.8E+01	4.8E+02	4.8E+01
12	5.0E+01	7.5E+03	1.5E+01	5.0E+01	5.0E+02	5.0E+01
14	5.2E+01	7.8E+03	1.6E+01	5.2E+01	5.2E+02	5.2E+01
16	5.4E+01	8.0E+03	1.7E+01	5.4E+01	5.4E+02	5.4E+01
18	5.6E+01	8.2E+03	1.8E+01	5.6E+01	5.6E+02	5.6E+01
20	5.8E+01	8.4E+03	1.9E+01	5.8E+01	5.8E+02	5.8E+01
22	6.0E+01	8.6E+03	2.0E+01	6.0E+01	6.0E+02	6.0E+01
24	6.2E+01	8.8E+03	2.1E+01	6.2E+01	6.2E+02	6.2E+01
26	6.4E+01	9.0E+03	2.2E+01	6.4E+01	6.4E+02	6.4E+01
28	6.6E+01	9.2E+03	2.3E+01	6.6E+01	6.6E+02	6.6E+01
30	6.8E+01	9.4E+03	2.4E+01	6.8E+01	6.8E+02	6.8E+01
35	7.2E+01	9.8E+03	2.6E+01	7.2E+01	7.2E+02	7.2E+01
40	7.6E+01	1.0E+04	2.8E+01	7.6E+01	7.6E+02	7.6E+01
45	8.0E+01	1.1E+04	3.0E+01	8.0E+01	8.0E+02	8.0E+01
50	8.4E+01	1.2E+04	3.2E+01	8.4E+01	8.4E+02	8.4E+01
55	8.8E+01	1.3E+04	3.4E+01	8.8E+01	8.8E+02	8.8E+01
60	9.2E+01	1.4E+04	3.6E+01	9.2E+01	9.2E+02	9.2E+01
65	9.6E+01	1.5E+04	3.8E+01	9.6E+01	9.6E+02	9.6E+01
70	1.0E+02	1.6E+04	4.0E+01	1.0E+02	1.0E+03	1.0E+02
75	1.1E+02	1.7E+04	4.2E+01	1.1E+02	1.1E+03	1.1E+02
80	1.2E+02	1.8E+04	4.4E+01	1.2E+02	1.2E+03	1.2E+02
85	1.3E+02	1.9E+04	4.6E+01	1.3E+02	1.3E+03	1.3E+02
90	1.4E+02	2.0E+04	4.8E+01	1.4E+02	1.4E+03	1.4E+02
95	1.5E+02	2.1E+04	5.0E+01	1.5E+02	1.5E+03	1.5E+02
100	1.6E+02	2.2E+04	5.2E+01	1.6E+02	1.6E+03	1.6E+02
105	1.7E+02	2.3E+04	5.4E+01	1.7E+02	1.7E+03	1.7E+02
110	1.8E+02	2.4E+04	5.6E+01	1.8E+02	1.8E+03	1.8E+02
115	1.9E+02	2.5E+04	5.8E+01	1.9E+02	1.9E+03	1.9E+02
120	2.0E+02	2.6E+04	6.0E+01	2.0E+02	2.0E+03	2.0E+02

[Values for rural areas]

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

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	8.2E+00	3.0E+01	3.0E+02	3.0E+01
10	4.2E+01	7.5E+03	1.3E+01	4.2E+01	4.2E+02	4.2E+01

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

12	6.4E+01	8.0E+03	1.7E+01	6.4E+01	6.4E+02	6.4E+01
14	6.8E+01	8.4E+03	2.0E+01	6.8E+01	6.8E+02	6.8E+01
16	7.2E+01	8.8E+03	2.4E+01	7.2E+01	7.2E+02	7.2E+01
18	7.6E+01	9.2E+03	2.8E+01	7.6E+01	7.6E+02	7.6E+01
20	8.0E+01	9.6E+03	3.2E+01	8.0E+01	8.0E+02	8.0E+01
22	8.4E+01	1.0E+04	3.6E+01	8.4E+01	8.4E+02	8.4E+01
24	8.8E+01	1.1E+04	4.0E+01	8.8E+01	8.8E+02	8.8E+01
26	9.2E+01	1.2E+04	4.4E+01	9.2E+01	9.2E+02	9.2E+01
28	9.6E+01	1.3E+04	4.8E+01	9.6E+01	9.6E+02	9.6E+01
30	1.0E+02	1.4E+04	5.2E+01	1.0E+02	1.0E+03	1.0E+02
35	1.1E+02	1.5E+04	5.8E+01	1.1E+02	1.1E+03	1.1E+02
40	1.2E+02	1.6E+04	6.4E+01	1.2E+02	1.2E+03	1.2E+02
45	1.3E+02	1.7E+04	7.0E+01	1.3E+02	1.3E+03	1.3E+02
50	1.4E+02	1.8E+04	7.6E+01	1.4E+02	1.4E+03	1.4E+02
55	1.5E+02	1.9E+04	8.2E+01	1.5E+02	1.5E+03	1.5E+02
60	1.6E+02	2.0E+04	8.8E+01	1.6E+02	1.6E+03	1.6E+02
65	1.7E+02	2.1E+04	9.4E+01	1.7E+02	1.7E+03	1.7E+02
70	1.8E+02	2.2E+04	1.0E+02	1.8E+02	1.8E+03	1.8E+02
75	1.9E+02	2.3E+04	1.1E+02	1.9E+02	1.9E+03	1.9E+02
80	2.0E+02	2.4E+04	1.2E+02	2.0E+02	2.0E+03	2.0E+02
85	2.1E+02	2.5E+04	1.3E+02	2.1E+02	2.1E+03	2.1E+02
90	2.2E+02	2.6E+04	1.4E+02	2.2E+02	2.2E+03	2.2E+02
95	2.3E+02	2.7E+04	1.5E+02	2.3E+02	2.3E+03	2.3E+02
100	2.4E+02	2.8E+04	1.6E+02	2.4E+02	2.4E+03	2.4E+02
105	2.5E+02	2.9E+04	1.7E+02	2.5E+02	2.5E+03	2.5E+02
110	2.6E+02	3.0E+04	1.8E+02	2.6E+02	2.6E+03	2.6E+02
115	2.7E+02	3.1E+04	1.9E+02	2.7E+02	2.7E+03	2.7E+02
120	2.8E+02	3.2E+04	2.0E+02	2.8E+02	2.8E+03	2.8E+02

4	4.6E+01	1.1E+00	1.7E+01	8.2E+01	5.8E+01	8.6E+02	1.2E+00	9.8E+01	6.2E+00
6	5.4E+01	1.3E+00	1.9E+01	8.4E+01	6.0E+01	8.8E+02	1.3E+00	1.0E+01	6.8E+00
8	6.0E+01	1.4E+00	2.2E+01	8.6E+01	6.2E+01	9.2E+02	1.4E+00	1.1E+01	7.2E+00
10	6.8E+01	1.5E+00	2.4E+01	8.8E+01	6.4E+01	9.6E+02	1.5E+00	1.2E+01	7.6E+00
12	7.6E+01	1.6E+00	2.7E+01	9.0E+01	6.6E+01	1.0E+03	1.6E+00	1.3E+01	8.0E+00
14	8.6E+01	1.7E+00	3.1E+01	9.2E+01	6.8E+01	1.1E+03	1.7E+00	1.4E+01	8.4E+00
16	9.6E+01	2.0E+00	3.5E+01	9.4E+01	7.0E+01	1.2E+03	2.0E+00	1.5E+01	8.8E+00
18	1.1E+02	2.6E+00	4.0E+01	9.6E+01	7.2E+01	1.3E+03	2.6E+00	1.6E+01	9.2E+00
20	1.2E+02	3.0E+00	4.4E+01	9.8E+01	7.4E+01	1.4E+03	3.0E+00	1.7E+01	9.6E+00
22	1.4E+02	3.4E+00	4.8E+01	1.0E+02	7.6E+01	1.5E+03	3.4E+00	1.8E+01	1.0E+01
24	1.6E+02	3.8E+00	5.2E+01	1.0E+02	7.8E+01	1.6E+03	3.8E+00	1.9E+01	1.1E+01
26	1.8E+02	4.2E+00	5.6E+01	1.0E+02	8.0E+01	1.7E+03	4.2E+00	2.0E+01	1.2E+01
28	2.0E+02	4.6E+00	6.0E+01	1.0E+02	8.2E+01	1.8E+03	4.6E+00	2.1E+01	1.3E+01
30	2.2E+02	5.0E+00	6.4E+01	1.0E+02	8.4E+01	1.9E+03	5.0E+00	2.2E+01	1.4E+01
32	2.4E+02	5.4E+00	6.8E+01	1.0E+02	8.6E+01	2.0E+03	5.4E+00	2.3E+01	1.5E+01
34	2.6E+02	5.8E+00	7.2E+01	1.0E+02	8.8E+01	2.1E+03	5.8E+00	2.4E+01	1.6E+01
36	2.8E+02	6.2E+00	7.6E+01	1.0E+02	9.0E+01	2.2E+03	6.2E+00	2.5E+01	1.7E+01
38	3.0E+02	6.6E+00	8.0E+01	1.0E+02	9.2E+01	2.3E+03	6.6E+00	2.6E+01	1.8E+01
40	3.2E+02	7.0E+00	8.4E+01	1.0E+02	9.4E+01	2.4E+03	7.0E+00	2.7E+01	1.9E+01
42	3.4E+02	7.4E+00	8.8E+01	1.0E+02	9.6E+01	2.5E+03	7.4E+00	2.8E+01	2.0E+01
44	3.6E+02	7.8E+00	9.2E+01	1.0E+02	9.8E+01	2.6E+03	7.8E+00	2.9E+01	2.1E+01
46	3.8E+02	8.2E+00	9.6E+01	1.0E+02	1.0E+02	2.7E+03	8.2E+00	3.0E+01	2.2E+01
48	4.0E+02	8.6E+00	1.0E+02	1.0E+02	1.0E+02	2.8E+03	8.6E+00	3.1E+01	2.3E+01
50	4.2E+02	9.0E+00	1.0E+02	1.0E+02	1.0E+02	2.9E+03	9.0E+00	3.2E+01	2.4E+01
52	4.4E+02	9.4E+00	1.0E+02	1.0E+02	1.0E+02	3.0E+03	9.4E+00	3.3E+01	2.5E+01
54	4.6E+02	9.8E+00	1.0E+02	1.0E+02	1.0E+02	3.1E+03	9.8E+00	3.4E+01	2.6E+01
56	4.8E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.2E+03	1.0E+01	3.5E+01	2.7E+01
58	5.0E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.3E+03	1.0E+01	3.6E+01	2.8E+01
60	5.2E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.4E+03	1.0E+01	3.7E+01	2.9E+01
62	5.4E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.5E+03	1.0E+01	3.8E+01	3.0E+01
64	5.6E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.6E+03	1.0E+01	3.9E+01	3.1E+01
66	5.8E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.7E+03	1.0E+01	4.0E+01	3.2E+01
68	6.0E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.8E+03	1.0E+01	4.1E+01	3.3E+01
70	6.2E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	3.9E+03	1.0E+01	4.2E+01	3.4E+01
72	6.4E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.0E+03	1.0E+01	4.3E+01	3.5E+01
74	6.6E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.1E+03	1.0E+01	4.4E+01	3.6E+01
76	6.8E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.2E+03	1.0E+01	4.5E+01	3.7E+01
78	7.0E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.3E+03	1.0E+01	4.6E+01	3.8E+01
80	7.2E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.4E+03	1.0E+01	4.7E+01	3.9E+01
82	7.4E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.5E+03	1.0E+01	4.8E+01	4.0E+01
84	7.6E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.6E+03	1.0E+01	4.9E+01	4.1E+01
86	7.8E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.7E+03	1.0E+01	5.0E+01	4.2E+01
88	8.0E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.8E+03	1.0E+01	5.1E+01	4.3E+01
90	8.2E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	4.9E+03	1.0E+01	5.2E+01	4.4E+01
92	8.4E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.0E+03	1.0E+01	5.3E+01	4.5E+01
94	8.6E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.1E+03	1.0E+01	5.4E+01	4.6E+01
96	8.8E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.2E+03	1.0E+01	5.5E+01	4.7E+01
98	9.0E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.3E+03	1.0E+01	5.6E+01	4.8E+01
100	9.2E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.4E+03	1.0E+01	5.7E+01	4.9E+01
102	9.4E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.5E+03	1.0E+01	5.8E+01	5.0E+01
104	9.6E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.6E+03	1.0E+01	5.9E+01	5.1E+01
106	9.8E+02	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.7E+03	1.0E+01	6.0E+01	5.2E+01
108	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.8E+03	1.0E+01	6.1E+01	5.3E+01
110	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	5.9E+03	1.0E+01	6.2E+01	5.4E+01
112	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.0E+03	1.0E+01	6.3E+01	5.5E+01
114	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.1E+03	1.0E+01	6.4E+01	5.6E+01
116	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.2E+03	1.0E+01	6.5E+01	5.7E+01
118	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.3E+03	1.0E+01	6.6E+01	5.8E+01
120	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.4E+03	1.0E+01	6.7E+01	5.9E+01
122	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.5E+03	1.0E+01	6.8E+01	6.0E+01
124	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.6E+03	1.0E+01	6.9E+01	6.1E+01
126	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.7E+03	1.0E+01	7.0E+01	6.2E+01
128	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.8E+03	1.0E+01	7.1E+01	6.3E+01
130	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	6.9E+03	1.0E+01	7.2E+01	6.4E+01
132	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.0E+03	1.0E+01	7.3E+01	6.5E+01
134	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.1E+03	1.0E+01	7.4E+01	6.6E+01
136	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.2E+03	1.0E+01	7.5E+01	6.7E+01
138	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.3E+03	1.0E+01	7.6E+01	6.8E+01
140	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.4E+03	1.0E+01	7.7E+01	6.9E+01
142	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.5E+03	1.0E+01	7.8E+01	7.0E+01
144	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.6E+03	1.0E+01	7.9E+01	7.1E+01
146	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.7E+03	1.0E+01	8.0E+01	7.2E+01
148	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.8E+03	1.0E+01	8.1E+01	7.3E+01
150	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	7.9E+03	1.0E+01	8.2E+01	7.4E+01
152	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.0E+03	1.0E+01	8.3E+01	7.5E+01
154	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.1E+03	1.0E+01	8.4E+01	7.6E+01
156	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.2E+03	1.0E+01	8.5E+01	7.7E+01
158	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.3E+03	1.0E+01	8.6E+01	7.8E+01
160	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.4E+03	1.0E+01	8.7E+01	7.9E+01
162	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.5E+03	1.0E+01	8.8E+01	8.0E+01
164	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.6E+03	1.0E+01	8.9E+01	8.1E+01
166	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.7E+03	1.0E+01	9.0E+01	8.2E+01
168	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.8E+03	1.0E+01	9.1E+01	8.3E+01
170	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	8.9E+03	1.0E+01	9.2E+01	8.4E+01
172	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.0E+03	1.0E+01	9.3E+01	8.5E+01
174	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+01	9.4E+01	8.6E+01
176	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.2E+03	1.0E+01	9.5E+01	8.7E+01
178	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.3E+03	1.0E+01	9.6E+01	8.8E+01
180	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.4E+03	1.0E+01	9.7E+01	8.9E+01
182	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.5E+03	1.0E+01	9.8E+01	9.0E+01
184	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.6E+03	1.0E+01	9.9E+01	9.1E+01
186	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.7E+03	1.0E+01	1.0E+02	9.2E+01
188	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.8E+03	1.0E+01	1.0E+02	9.3E+01
190	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	9.9E+03	1.0E+01	1.0E+02	9.4E+01
192	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	1.0E+04	1.0E+01	1.0E+02	9.5E+01
194	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	1.0E+04	1.0E+01	1.0E+02	9.6E+01
196	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	1.0E+04	1.0E+01	1.0E+02	9.7E+01
198	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	1.0E+04	1.0E+01	1.0E+02	9.8E+01
200	1.0E+03	1.0E+01	1.0E+02	1.0E+02	1.0E+02	1.0E+04	1.0E+01	1.0E+02	9.9E+01

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

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)	Barium (g/hr)	Terrain adjusted eff. stack Ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)	Barium (g/hr)
35	3.0E+00	6.5E+00	1.0E+00	5.4E+00	5.4E+00	35	3.0E+00	6.5E+00	1.0E+00	5.4E+00	5.4E+00
40	3.6E+00	7.8E+00	1.1E+00	6.6E+00	6.6E+00	40	3.6E+00	7.8E+00	1.1E+00	6.6E+00	6.6E+00
45	4.5E+00	9.8E+00	1.3E+00	8.2E+00	8.2E+00	45	4.5E+00	9.8E+00	1.3E+00	8.2E+00	8.2E+00
50	5.5E+00	1.1E+01	1.5E+00	1.0E+01	1.0E+01	50	5.5E+00	1.1E+01	1.5E+00	1.0E+01	1.0E+01
55	6.0E+00	1.2E+01	1.6E+00	1.1E+01	1.1E+01	55	6.0E+00	1.2E+01	1.6E+00	1.1E+01	1.1E+01
60	7.0E+00	1.4E+01	1.8E+00	1.3E+01	1.3E+01	60	7.0E+00	1.4E+01	1.8E+00	1.3E+01	1.3E+01
65	8.0E+00	1.6E+01	2.0E+00	1.5E+01	1.5E+01	65	8.0E+00	1.6E+01	2.0E+00	1.5E+01	1.5E+01
70	9.0E+00	1.8E+01	2.2E+00	1.7E+01	1.7E+01	70	9.0E+00	1.8E+01	2.2E+00	1.7E+01	1.7E+01
75	1.0E+01	2.0E+01	2.4E+00	1.9E+01	1.9E+01	75	1.0E+01	2.0E+01	2.4E+00	1.9E+01	1.9E+01
80	1.1E+01	2.2E+01	2.6E+00	2.1E+01	2.1E+01	80	1.1E+01	2.2E+01	2.6E+00	2.1E+01	2.1E+01
85	1.2E+01	2.4E+01	2.8E+00	2.3E+01	2.3E+01	85	1.2E+01	2.4E+01	2.8E+00	2.3E+01	2.3E+01
90	1.3E+01	2.6E+01	3.0E+00	2.5E+01	2.5E+01	90	1.3E+01	2.6E+01	3.0E+00	2.5E+01	2.5E+01
95	1.4E+01	2.8E+01	3.2E+00	2.7E+01	2.7E+01	95	1.4E+01	2.8E+01	3.2E+00	2.7E+01	2.7E+01
100	1.5E+01	3.0E+01	3.4E+00	2.9E+01	2.9E+01	100	1.5E+01	3.0E+01	3.4E+00	2.9E+01	2.9E+01
105	1.6E+01	3.2E+01	3.6E+00	3.1E+01	3.1E+01	105	1.6E+01	3.2E+01	3.6E+00	3.1E+01	3.1E+01
110	1.7E+01	3.4E+01	3.8E+00	3.3E+01	3.3E+01	110	1.7E+01	3.4E+01	3.8E+00	3.3E+01	3.3E+01
115	1.8E+01	3.6E+01	4.0E+00	3.5E+01	3.5E+01	115	1.8E+01	3.6E+01	4.0E+00	3.5E+01	3.5E+01
120	1.9E+01	3.8E+01	4.2E+00	3.7E+01	3.7E+01	120	1.9E+01	3.8E+01	4.2E+00	3.7E+01	3.7E+01

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						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)	Barium (g/hr)	Terrain adjusted eff. stack Ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)	Barium (g/hr)
4	1.1E-01	2.6E-01	2.6E-01	2.6E-01	2.6E-01	4	1.1E-01	2.6E-01	2.6E-01	2.6E-01	2.6E-01
5	1.6E-01	3.9E-01	3.9E-01	3.9E-01	3.9E-01	5	1.6E-01	3.9E-01	3.9E-01	3.9E-01	3.9E-01
6	2.4E-01	5.8E-01	5.8E-01	5.8E-01	5.8E-01	6	2.4E-01	5.8E-01	5.8E-01	5.8E-01	5.8E-01
10	3.9E-01	9.2E-01	9.2E-01	9.2E-01	9.2E-01	10	3.9E-01	9.2E-01	9.2E-01	9.2E-01	9.2E-01
12	4.8E-01	1.1E+00	1.1E+00	1.1E+00	1.1E+00	12	4.8E-01	1.1E+00	1.1E+00	1.1E+00	1.1E+00
14	5.0E-01	1.0E+00	1.0E+00	1.0E+00	1.0E+00	14	5.0E-01	1.0E+00	1.0E+00	1.0E+00	1.0E+00
16	6.0E-01	1.4E+00	1.4E+00	1.4E+00	1.4E+00	16	6.0E-01	1.4E+00	1.4E+00	1.4E+00	1.4E+00
18	6.8E-01	1.6E+00	1.6E+00	1.6E+00	1.6E+00	18	6.8E-01	1.6E+00	1.6E+00	1.6E+00	1.6E+00
20	7.6E-01	1.8E+00	1.8E+00	1.8E+00	1.8E+00	20	7.6E-01	1.8E+00	1.8E+00	1.8E+00	1.8E+00
22	8.2E-01	1.9E+00	1.9E+00	1.9E+00	1.9E+00	22	8.2E-01	1.9E+00	1.9E+00	1.9E+00	1.9E+00
24	9.0E-01	2.1E+00	2.1E+00	2.1E+00	2.1E+00	24	9.0E-01	2.1E+00	2.1E+00	2.1E+00	2.1E+00
26	1.0E+00	2.4E+00	2.4E+00	2.4E+00	2.4E+00	26	1.0E+00	2.4E+00	2.4E+00	2.4E+00	2.4E+00
28	1.1E+00	2.7E+00	2.7E+00	2.7E+00	2.7E+00	28	1.1E+00	2.7E+00	2.7E+00	2.7E+00	2.7E+00
30	1.1E+00	2.7E+00	2.7E+00	2.7E+00	2.7E+00	30	1.1E+00	2.7E+00	2.7E+00	2.7E+00	2.7E+00
35	1.2E+00	3.0E+00	3.0E+00	3.0E+00	3.0E+00	35	1.2E+00	3.0E+00	3.0E+00	3.0E+00	3.0E+00
40	1.3E+00	3.2E+00	3.2E+00	3.2E+00	3.2E+00	40	1.3E+00	3.2E+00	3.2E+00	3.2E+00	3.2E+00
45	1.4E+00	3.4E+00	3.4E+00	3.4E+00	3.4E+00	45	1.4E+00	3.4E+00	3.4E+00	3.4E+00	3.4E+00
50	1.5E+00	3.6E+00	3.6E+00	3.6E+00	3.6E+00	50	1.5E+00	3.6E+00	3.6E+00	3.6E+00	3.6E+00
55	1.6E+00	3.8E+00	3.8E+00	3.8E+00	3.8E+00	55	1.6E+00	3.8E+00	3.8E+00	3.8E+00	3.8E+00
60	1.7E+00	4.0E+00	4.0E+00	4.0E+00	4.0E+00	60	1.7E+00	4.0E+00	4.0E+00	4.0E+00	4.0E+00
65	1.8E+00	4.2E+00	4.2E+00	4.2E+00	4.2E+00	65	1.8E+00	4.2E+00	4.2E+00	4.2E+00	4.2E+00
70	1.9E+00	4.4E+00	4.4E+00	4.4E+00	4.4E+00	70	1.9E+00	4.4E+00	4.4E+00	4.4E+00	4.4E+00
75	2.0E+00	4.6E+00	4.6E+00	4.6E+00	4.6E+00	75	2.0E+00	4.6E+00	4.6E+00	4.6E+00	4.6E+00
80	2.1E+00	4.8E+00	4.8E+00	4.8E+00	4.8E+00	80	2.1E+00	4.8E+00	4.8E+00	4.8E+00	4.8E+00
85	2.2E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	85	2.2E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00
90	2.3E+00	5.2E+00	5.2E+00	5.2E+00	5.2E+00	90	2.3E+00	5.2E+00	5.2E+00	5.2E+00	5.2E+00
95	2.4E+00	5.4E+00	5.4E+00	5.4E+00	5.4E+00	95	2.4E+00	5.4E+00	5.4E+00	5.4E+00	5.4E+00
100	2.5E+00	5.6E+00	5.6E+00	5.6E+00	5.6E+00	100	2.5E+00	5.6E+00	5.6E+00	5.6E+00	5.6E+00
105	2.6E+00	5.8E+00	5.8E+00	5.8E+00	5.8E+00	105	2.6E+00	5.8E+00	5.8E+00	5.8E+00	5.8E+00
110	2.7E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	110	2.7E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00
115	2.8E+00	6.2E+00	6.2E+00	6.2E+00	6.2E+00	115	2.8E+00	6.2E+00	6.2E+00	6.2E+00	6.2E+00
120	2.9E+00	6.4E+00	6.4E+00	6.4E+00	6.4E+00	120	2.9E+00	6.4E+00	6.4E+00	6.4E+00	6.4E+00

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

66	3.5E+00	4.3E+00	6.4E+00	1.0E+01	6.4E+00
60	4.3E+00	5.4E+00	1.0E+01	1.3E+01	6.4E+00
55	5.4E+00	6.0E+00	1.3E+01	1.9E+01	1.5E+00
70	6.0E+00	6.8E+00	1.4E+01	2.2E+00	1.5E+00
75	6.8E+00	7.6E+00	1.6E+01	2.4E+00	1.5E+00
80	7.6E+00	8.2E+00	1.8E+01	2.7E+00	1.5E+00
85	8.2E+00	9.4E+00	2.0E+01	3.0E+00	1.5E+00
90	9.4E+00	1.0E+01	2.2E+01	3.4E+00	1.5E+00
95	1.0E+01	1.0E+01	2.5E+01	4.0E+00	1.5E+00
100	1.2E+01	1.2E+01	2.8E+01	4.3E+00	1.5E+00
105	1.3E+01	1.3E+01	3.2E+01	4.3E+00	1.5E+00
110	1.5E+01	1.5E+01	3.5E+01	4.3E+00	1.5E+00
115	1.7E+01	1.7E+01	4.0E+01	4.3E+00	1.5E+00
120	1.9E+01	1.9E+01	4.4E+01	4.3E+00	1.5E+00

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)	
	Urban (g/hr)	Urban (g/hr)	Rural (g/hr)	
4	8.2E+01	4.2E+01	4.2E+01	1.9E+01
6	9.1E+01	4.8E+01	4.8E+01	2.8E+01
8	1.0E+02	5.3E+01	5.3E+01	4.1E+01
10	1.2E+02	6.2E+01	6.2E+01	5.8E+01
12	1.3E+02	7.7E+01	7.7E+01	7.2E+01
14	1.6E+02	9.1E+01	9.1E+01	9.1E+01
16	1.7E+02	1.2E+02	1.2E+02	1.1E+02
18	1.9E+02	1.4E+02	1.4E+02	1.2E+02
20	2.1E+02	1.8E+02	1.8E+02	1.3E+02
22	2.4E+02	2.3E+02	2.3E+02	1.4E+02
24	2.7E+02	2.9E+02	2.9E+02	1.6E+02
26	3.1E+02	3.7E+02	3.7E+02	1.7E+02
28	3.5E+02	4.7E+02	4.7E+02	1.9E+02
30	3.9E+02	5.8E+02	5.8E+02	2.1E+02
35	5.3E+02	9.8E+02	9.8E+02	2.6E+02
40	6.2E+02	1.4E+03	1.4E+03	3.3E+02
45	8.2E+02	2.0E+03	2.0E+03	4.0E+02
50	1.1E+03	2.8E+03	2.8E+03	4.8E+02
55	1.3E+03	3.5E+03	3.5E+03	6.2E+02
60	1.6E+03	4.8E+03	4.8E+03	7.7E+02
65	2.0E+03	6.2E+03	6.2E+03	9.1E+02
70	2.3E+03	7.2E+03	7.2E+03	1.1E+03
75	2.6E+03	8.9E+03	8.9E+03	1.2E+03
80	2.8E+03	1.0E+04	1.0E+04	1.3E+03
85	3.3E+03	1.2E+04	1.2E+04	1.4E+03
90	3.7E+03	1.4E+04	1.4E+04	1.6E+03
95	4.2E+03	1.7E+04	1.7E+04	1.8E+03
100	4.8E+03	2.1E+04	2.1E+04	2.0E+03
105	5.3E+03	2.4E+04	2.4E+04	2.3E+03
110	6.2E+03	2.8E+04	2.8E+04	2.5E+03
115	7.2E+03	3.6E+04	3.6E+04	2.8E+03
120	8.2E+03	4.1E+04	4.1E+04	3.2E+03

[56 FR 52890, 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
	Urban (g/hr)		Rural (g/hr)	
	Urban (g/hr)	Urban (g/hr)	Rural (g/hr)	
4	8.2E+01	4.2E+01	4.2E+01	1.9E+01
6	9.1E+01	4.8E+01	4.8E+01	2.8E+01
8	1.0E+02	5.3E+01	5.3E+01	4.1E+01
10	1.2E+02	6.2E+01	6.2E+01	5.8E+01
12	1.3E+02	7.7E+01	7.7E+01	7.2E+01
14	1.6E+02	9.1E+01	9.1E+01	9.1E+01
16	1.7E+02	1.2E+02	1.2E+02	1.1E+02
18	1.9E+02	1.4E+02	1.4E+02	1.2E+02
20	2.1E+02	1.8E+02	1.8E+02	1.3E+02
22	2.4E+02	2.3E+02	2.3E+02	1.4E+02
24	2.7E+02	2.9E+02	2.9E+02	1.6E+02
26	3.1E+02	3.7E+02	3.7E+02	1.7E+02
28	3.5E+02	4.7E+02	4.7E+02	1.9E+02
30	3.9E+02	5.8E+02	5.8E+02	2.1E+02
35	5.3E+02	9.8E+02	9.8E+02	2.6E+02
40	6.2E+02	1.4E+03	1.4E+03	3.3E+02
45	8.2E+02	2.0E+03	2.0E+03	4.0E+02
50	1.1E+03	2.8E+03	2.8E+03	4.8E+02
55	1.3E+03	3.5E+03	3.5E+03	6.2E+02
60	1.6E+03	4.8E+03	4.8E+03	7.7E+02
65	2.0E+03	6.2E+03	6.2E+03	9.1E+02
70	2.3E+03	7.2E+03	7.2E+03	1.1E+03
75	2.6E+03	8.9E+03	8.9E+03	1.2E+03
80	2.8E+03	1.0E+04	1.0E+04	1.3E+03
85	3.3E+03	1.2E+04	1.2E+04	1.4E+03
90	3.7E+03	1.4E+04	1.4E+04	1.6E+03
95	4.2E+03	1.7E+04	1.7E+04	1.8E+03
100	4.8E+03	2.1E+04	2.1E+04	2.0E+03
105	5.3E+03	2.4E+04	2.4E+04	2.3E+03
110	6.2E+03	2.8E+04	2.8E+04	2.5E+03
115	7.2E+03	3.6E+04	3.6E+04	2.8E+03
120	8.2E+03	4.1E+04	4.1E+04	3.2E+03

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			
	Cl ₁ (g/hr)	HCl (g/hr)	Cl ₂ (g/hr)	HCl (g/hr)		
70	2.3E+03	3.0E+04	7.2E+03	1.3E+05	1.1E+03	1.8E+04
75	2.5E+03	4.5E+04	8.0E+03	1.5E+05	1.2E+03	2.0E+04
80	2.8E+03	6.0E+04	1.0E+04	1.8E+05	1.3E+03	2.3E+04
85	3.3E+03	8.0E+04	1.2E+04	2.2E+05	1.4E+03	2.6E+04
90	3.7E+03	1.0E+05	1.4E+04	2.5E+05	1.6E+03	2.9E+04
95	4.2E+03	1.2E+05	1.7E+04	3.0E+05	1.8E+03	3.2E+04
100	4.8E+03	1.4E+05	2.1E+04	3.8E+05	2.0E+03	3.5E+04
105	5.3E+03	1.7E+05	2.4E+04	4.3E+05	2.3E+03	3.9E+04
110	6.2E+03	2.1E+05	2.8E+04	5.1E+05	2.5E+03	4.3E+04
115	7.2E+03	2.4E+05	3.5E+04	6.1E+05	2.8E+03	5.0E+04
120	8.2E+03	2.8E+05	4.1E+04	7.2E+05	3.2E+03	5.6E+04

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

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

Constituent	CAS No.	RAC ($\mu\text{g}/\text{m}^3$)
Wulfin	81-81-2	0.3
Xylenes	1330-20-7	80
Zinc Cyanide	557-21-1	50
Zinc Phosphide	1314-94-7	0.3

*The RAC for other appendix VIII part 261 constituents not listed herein or in appendix V of this part is 0.1 $\mu\text{g}/\text{m}^3$.APPENDIX V TO PART 266—RISK SPECIFIC DOSES (10⁻³)

Constituent	CAS No.	Unit risk (m^3/ug)	RaD ($\mu\text{g}/\text{m}^3$)
Acrylonitrile	79-06-1	1.3E-03	7.7E-02
Acrylonitrile	107-13-1	0.8E-03	1.6E-01
Adin	309-00-2	4.9E-03	2.0E-03
Aniline	62-63-3	7.4E-06	1.4E-02
Arsenic	7440-38-2	4.3E-03	2.3E-02
Benz(a)anthracene	56-05-3	8.9E-04	1.1E-02
Benzene	71-43-2	8.3E-06	1.2E-02
Benzidine	92-87-5	6.7E-02	1.5E-04
Benzofuran	50-32-8	3.3E-03	3.0E-03
Benzylamine	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	109-09-0	2.8E-04	3.6E-02
Cadmium	7440-43-9	1.8E-03	5.6E-03
Carbon Tetrachloride	56-23-6	1.5E-06	6.7E-01
Chloroacetic acid	77-47-9	3.7E-04	2.7E-02
Chloroform	67-68-3	2.3E-05	4.3E-01
Chloromethane	74-87-3	3.6E-06	2.8E-02
Chromium VI	7440-47-3	1.2E-02	8.3E-04
DDT	50-29-3	9.7E-03	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-Dibromomethane	106-93-4	2.2E-04	4.6E-02
1,1-Dichloroethane	75-34-3	2.6E-06	3.8E-01
1,2-Dichloroethane	107-06-2	2.6E-05	3.8E-01
1,1-Dichloroethylene	75-35-4	5.0E-03	2.0E-01
1,3-Dichloropropane	542-75-8	3.6E-01	2.9E-06
Dieldrin	60-57-1	4.6E-03	2.2E-03
Dimethylhydrazine	59-53-1	1.4E-01	7.1E-06
2,4-Dinitrofluorene	62-75-9	1.4E-02	7.1E-04
1,2-Diphenylhydrazine	121-14-2	8.8E-05	1.1E-01
1,4-Dioxane	122-66-7	2.2E-04	4.5E-02
Epichlorohydrin	123-91-1	1.4E-03	7.1E-04
Ethylbenzene	100-99-8	1.2E-06	8.3E-02
Ethylene Dichloride	106-93-4	1.0E-04	1.0E-01
Formaldehyde	50-00-0	1.3E-05	7.7E-01
Heptachlor Epoxide	76-44-9	1.3E-03	7.7E-03
Hexachlorobenzene	1024-57-3	2.6E-03	3.8E-03
Hexachlorocyclopentadiene	118-74-1	4.9E-04	2.0E-02
Alpha-hexachloro-cyclohexane	87-68-3	2.0E-05	6.0E-01
Beta-hexachloro-cyclohexane	319-84-6	1.6E-03	5.6E-03
Gamma-hexachloro-cyclohexane	319-85-7	5.3E-04	1.9E-02
Hexachlorocyclohexene, Technical	58-69-9	3.6E-04	2.6E-02
Hexachlorocyclopentadiene p-dioxin (1,2 Mixture)		5.1E-04	2.0E-02
Hexachloroethane		1.3E-01	7.7E-06
Hydrazine	67-72-1	4.0E-06	2.5E-02
Hydrazine Sulfate	302-01-2	2.9E-03	3.4E-03
3-Methylcholanthrene	302-01-2	2.9E-03	3.4E-03
Methyl Hydrazine	68-49-5	2.7E-03	3.7E-03
Methylene Chloride	60-34-4	3.1E-04	3.2E-02
4,4'-Methylene-bis-2-chloroaniline	75-09-2	4.1E-06	2.4E-02
Nickel	101-14-4	4.7E-05	2.1E-01
Nickel Heptahydrate	7440-02-0	2.4E-04	4.2E-02
Nickel Sulfide	7440-02-0	2.4E-04	4.2E-02
2-Nitropropane	12035-72-2	4.0E-04	2.7E-02

Environmental Protection Agency

APPENDIX V TO PART 266—RISK SPECIFIC DOSES (10⁻³)—Continued

Constituent	CAS No.	Unit risk (m^3/ug)	RaD ($\mu\text{g}/\text{m}^3$)
N-Nitro-n-butylamine	924-16-3	1.6E-03	6.3E-03
N-Nitro-n-methylurea	684-03-6	8.6E-02	1.2E-04
N-Nitrosodimethylamine	55-18-6	4.3E-02	2.3E-04
N-Nitrosopropylamine	930-55-2	6.1E-04	1.6E-02
Perchloronitrobenzene	82-68-8	7.3E-05	1.4E-01
PCBs	1330-30-3	1.2E-03	8.3E-03
Propanol	23850-58-6	4.6E-06	2.2E-02
Resorcinol	50-55-6	3.0E-03	3.3E-03
2,3,7,8-Tetrachloro-dibenzo-p-dioxin	1746-01-8	4.5E-01	2.2E-07
1,1,2,2-Tetrachloroethane	79-34-6	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	78-00-6	1.6E-05	6.3E-01
Trichloroethylene	78-01-6	1.3E-06	7.7E-02
2,4,6-Trichlorophenol	88-06-2	6.7E-06	1.8E-02
Toluene	9001-35-2	3.2E-04	3.1E-02
Vinyl Chloride	75-01-4	7.1E-06	1.4E-02

[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 (m ³ /s)	Exhaust Temperature (K°)											
	<325	325-349	350-399	400-449	450-499	500-599	600-699	700-799	800-899	900-999	1000-1499	>1499
<0.5	0	0	0	0	0	0	0	0	0	0	0	0
0.5-0.9	0	0	0	0	0	0	0	0	0	1	1	1
1.0-1.9	0	0	0	0	0	1	1	2	3	3	3	4
2.0-2.9	0	0	0	1	3	4	4	6	6	7	8	9
3.0-3.9	0	0	1	2	5	6	7	9	10	11	12	13
4.0-4.9	1	2	3	5	6	8	10	12	13	14	15	17
5.0-5.9	2	3	5	8	10	12	14	16	17	19	21	24
6.0-7.4	3	6	8	12	15	17	20	22	23	24	25	26
7.5-9.9	4	7	10	16	19	21	23	24	25	26	27	28
10.0-12.4	4	8	12	18	22	23	25	26	27	28	29	31
12.5-14.9	5	10	13	20	23	24	26	27	28	29	31	32
15.0-19.9	6	10	17	23	25	27	29	30	31	32	34	34
20.0-24.9	7	12	20	25	27	29	31	32	33	35	36	38
25.0-29.9	8	14	22	28	29	31	33	35	36	37	39	39
30.0-34.9	9	16	23	28	30	32	35	36	37	39	41	41
35.0-39.9	9	18	25	30	32	34	36	38	39	41	42	42
40.0-49.9	10	17	24	29	32	34	36	38	39	41	42	44
50.0-59.9	12	21	28	31	34	36	39	41	42	44	46	46
60.0-69.9	14	22	27	33	36	39	42	43	45	47	49	49
70.0-79.9	16	23	29	35	38	41	44	46	48	49	51	51
80.0-89.9	17	25	30	36	38	41	44	46	48	49	51	54
90.0-99.9	19	26	31	38	40	42	44	46	50	51	53	56
100.0-119.9	21	28	32	39	42	44	48	50	52	53	55	58
120.0-139.9	22	28	33	39	43	46	49	52	55	56	59	61
140.0-159.9	23	30	35	42	46	49	52	55	58	59	62	65
160.0-179.9	23	30	36	44	48	51	55	58	60	62	65	67
180.0-199.9	25	31	38	46	50	54	58	60	62	65	67	70
200.0-249.9	26	32	40	48	52	56	60	63	65	67	69	73
>249.9	28	33	41	49	54	58	62	65	67	69	73	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	1x E+00
Arsenic	7440-38-2	5x E+00
Barium	7440-39-3	1x E+02
Beryllium	7440-41-7	7x E-03
Cadmium	7440-43-9	1x E-01
Chromium	7440-47-3	5x E+00
Lead	7439-92-1	5x E+00
Mercury	7439-97-8	2x E-01
Nickel	7440-02-0	7x E+01
Selenium	7782-49-2	1x E+00
Silver	7440-22-4	5x E+00
Thallium	7440-28-0	7x E+00

NONMETALS—RESIDUE CONCENTRATION LIMITS

Constituent	CAS No.	Concentration limits for residue (mg/kg)
Acetonitrile	75-05-8	2x E-01
Acetophenone	98-96-2	4x E+00
Acrolein	107-02-6	5x E-01
Amylamine	107-10-1	2x E-04
Acrylonitrile	107-13-1	7x E-04
Adrin	309-00-2	2x E-05
Allyl alcohol	107-18-8	2x E-01
Aluminum phosphate	20859-73-8	1x E-02
Aniline	62-53-3	6x E-02
Barium cyanide	542-82-1	1x E+00
Benzaldehyde	98-95-2	1x E-04
Benzene	71-43-2	5x E-03
Benzidine	92-87-5	1x E-06
Bis(2-chloroethyl) ether	111-44-4	3x E-04
Bis(2-ethylhexyl) phthalate	542-89-1	2x E-06
Bromobenzene	117-81-7	3x E+01
Bromobenzene	75-25-2	7x E-01
Calcium cyanide	582-01-8	1x E-06
Carbon disulfide	75-15-0	4x E+00
Carbon tetrachloride	55-23-5	5x E-03
Chlordane	57-74-9	3x E-04
Chlorobenzene	108-90-7	1x E+00
Chlorobenzene	67-68-3	6x E-02
Copper cyanide	514-72-3	2x E-01
Cresols (Cresylic acid)	1318-77-3	2x E+00
Cyanogen	480-19-5	1x E+00
DDT	50-29-3	1x E-03
Dibenz(a,h)anthracene	53-70-3	7x E-04
1,2-Dichloro-3-chloropropane	96-12-8	2x E-05
p-Dichlorobenzene	95-69-2	7x E+00
Dichlorodibromomethane	75-71-8	5x E+00
1,1-Dichloroethylene	75-35-4	5x E-03
2,4-Dichlorophenol	120-83-2	1x E-01
1,3-Dichloropropane	542-75-6	1x E-03
Dieldrin	60-57-1	2x E-05
Diethyl phthalate	84-66-2	3x E+01
Diethylstilbestrol	58-53-1	7x E-07
Dimethoate	60-51-6	3x E-02
2,4-Dinitrochlorobenzene	121-14-2	5x E-04
2,4-Dinitrophenol	122-34-4	9x E-01
1,2-Dinitroethylenediamine	122-68-7	5x E-04
Endosulfan	115-29-7	2x E-03
Endrin	72-20-8	2x E-04
Epichlorohydrin	100-89-8	4x E-02
Ethylene dibromide	106-83-4	4x E-07
Ethylene oxide	75-21-8	3x E-04

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

40 CFR Ch. I (7-1-94 Edition)

NONMETALS—RESIDUE CONCENTRATION LIMITS—Continued

Constituent	CAS No.	Concentration limits for residue (mg/kg)
Fluoride	7782-41-4	4x E+00
Formic acid	64-18-6	7x E+01
Heptachlor epoxide	78-44-8	6x E-05
Heptachlor epoxide	1024-67-3	4x E-05
Heptachlor epoxide	118-74-1	2x E-04
Heptachlor epoxide	87-83-3	6x E-03
Heptachlor epoxide	77-47-4	2x E-01
Heptachlor epoxide	19408-74-3	6x E-08
Hydrazine	67-72-1	3x E-02
Hydrogen sulfide	302-01-1	1x E-04
Hydrogen sulfide	74-90-8	7x E-05
Isobutyl alcohol	78-83-1	1x E+01
Methanol	10702-77-5	1x E+00
Methoxychlor	72-43-5	1x E-01
3-Methylcholanthrene	68-48-5	4x E-06
4,4'-Methylenebis(2-chlorophenyl)	101-14-4	2x E-03
Methylene chloride	75-09-2	5x E-02
Methyl ethyl ketone (MEK)	78-03-3	2x E+00
Methyl hydrazine	60-34-4	3x E-04
Methyl parathion	298-00-0	2x E-02
Naphthalene	91-20-3	1x E+01
Nickel cyanide	557-19-7	7x E-01
Nitric oxide	10102-43-9	4x E+00
Nitrobenzene	98-95-3	2x E-05
N-Nitrosodimethylamine	924-18-3	6x E-02
N-Nitrosodimethylamine	55-18-5	1x E-06
N-Nitrosodimethylamine	684-93-5	1x E-07
N-Nitrosodimethylamine	930-55-2	2x E-04
Penicillamine	608-93-5	3x E-02
Penicillamine	122-68-8	1x E-01
Penicillamine	87-86-5	1x E+00
Phenol	108-95-2	1x E+00
Phenylmercury acetate	52-38-4	3x E-03
Phosphine	7803-61-2	1x E-02
Polychlorinated biphenyls, N.O.S.	1336-36-3	5x E-06
Potassium cyanide	151-50-8	2x E+00
Potassium silver cyanide	506-81-6	7x E+00
Prontanilide	23850-58-5	3x E+00
Pyridine	110-86-1	4x E-02
Reserpine	50-65-6	3x E-05
Selenic acid	630-10-4	2x E-01
Silver cyanide	508-64-9	4x E+00
Sodium cyanide	143-33-9	1x E+00
Styrene	57-24-9	1x E-02
1,2,4,5-Tetrachlorobenzene	95-94-3	1x E-02
1,1,2,2-Tetrachloroethane	79-34-5	2x E-03
Tetrachloroethylene	127-18-4	7x E-01
2,3,4,6-Tetrachlorophenol	58-60-2	1x E-02
Terbutyl lead	78-00-2	4x E-06
Thiourea	62-58-6	2x E-04
Toluene	108-98-3	1x E+01
Toluene	8001-35-2	6x E-03
1,1,2-Trichloroethane	79-00-6	6x E-03
Trichloroethylene	79-01-6	6x E-03
Trichloromethylmethane	75-49-4	1x E+01
2,4,5-Trichlorophenol	95-95-4	4x E+00
2,4,6-Trichlorophenol	88-06-2	4x E+00
Vanadium pentoxide	1314-62-1	7x E-01
Vinyl chloride	75-01-4	2x E-03

Environmental Protection Agency

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 §266.43 of this chapter for F039 nonwastewaters. See §266.112(b)(2)(1).

[56 FR 7234, Feb. 21, 1991; 56 FR 32691, July 17, 1991, as amended at 56 FR 69603, Nov. 9, 1991]

APPENDIX VIII TO PART 266—POTENTIAL RISKS 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
Chlorobenzene	Diethyl phthalate
Methylene chloride	Bis(2-ethylhexyl)phthalate
Trichloroethylene	2,4-Dimethylphenol
Tetrachloroethylene	o-Dichlorobenzene
1,1,1-Trichloroethane	p-Dichlorobenzene
Chlorobenzene	Heptachlorobenzene
1,1,1,2-Tetrachloroethane	2,4,6-Trichlorophenol
Bromochloromethane	Fluoranthene
Bromodichloromethane	o-Nitrophenol
Bromobenzene	1,2,4-Trichlorobenzene
Methylene bromide	o-Chlorophenol
Methyl ethyl ketone	Penicillamine
	Pyrene
	Dimethyl phthalate
	Monochlorobenzene
	2,6-Toluene dicarbonylate

[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

1.0 Introduction	10.1
2.0 Performance Specifications for Continuous Emission Monitoring Systems	10.2
2.1 Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste	10.3
2.2 Performance Specifications for Continuous Emission Monitoring of Hydrocarbons for Incinerators, Boilers, and Industrial Furnaces	10.4
3.0 Sampling and Analytical Methods	10.5
3.1 Methodology for the Determination of Metals Emissions in Exhaust Gases from	10.6

Hazardous Waste Incineration and Similar Combustion Processes	10.7
3.2 Determination of Hexavalent Chromium Emissions from Stationary Sources (Method Cr-6)	10.8
3.3 Measurement of HCl and Cl ₂	10.9
3.3.1 Isokinetic HCl/Cl ₂ Emission Sampling Train (Method 0050)	10.10
3.3.2 Midjet Impinger HCl/Cl ₂ Emission Sampling Train (Method 0051)	10.11
3.3.3 Protocol for Analysis of Samples from HCl/Cl ₂ Emission Sampling Train (Method 0057)	10.12
3.4 Determination of Polychlorinated Dibenzop-dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) from Stationary Sources (Method 23)	10.13
3.5 Sampling for Aldehyde and Ketone Emissions from Stationary Sources (Method 0011)	10.14
3.6 Analysis for Aldehydes and Ketones by High Performance Liquid Chromatography (HPLC) (Method 001A)	10.15
4.0 Procedure for Estimating Toxicity Equipment or Chlorinated Dibenzop-dioxin and Dibenzofuran Congeners	10.16
5.0 Hazardous Waste Combustion Air Quality Screening Procedure	10.17
6.0 Simplified Land Use Classification Procedure for Compliance With Tier I and Tier II Limits	10.18
7.0 Statistical Methodology for Bevil Reel Determinations	10.19
8.0 Procedures for Determining Default Values for Air Pollution Control System Removal Efficiencies	10.20
8.1 APCS RE Default Values for Metals	10.21
8.2 APCS RE Default Values for HCl and Cl ₂	10.22
8.3 APCS RE Default Values for Ash	10.23
8.4 References	10.24
9.0 Procedures for Determining Default Values for Partitioning of Metals, Ash, and Total Chloride/Chlorine	10.25
9.1 Partitioning Default Value for Metals	10.26
9.2 Special Procedures for Chlorine, HCl, and Cl ₂	10.27
9.3 Special Procedures for Ash	10.28
9.4 Use of Engineering Judgement to Estimate Partitioning and APCS RE Values	10.29
9.5 Restrictions on Use of Test Data	10.30
10.0 Alternative Methodology for Implementing Metals Controls	10.31
10.1 Applicability	10.32
10.2 Introduction	10.33
10.3 Basis	10.34
10.4 Overview	10.35
10.5 Implementation Procedures	10.36
10.6 Precompliance Procedures	10.37
Appendix A—Statistics	10.38

SECTION 1.0 INTRODUCTION

This document presents required methods for demonstrating compliance with 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 Dibenzodioxins and Dibenzofurans, and Aldehydes and Ketones.
3. Procedures for Estimating the Toxicity Equivalency of Chlorinated Dibenzop-dioxin and Dibenzofuran Congeners.
4. Hazardous Waste Combustion Air Quality Screening Procedures (HWAQASP).
5. Simplified Land Use Classification Procedure for Compliance with 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 61.

SECTION 2.0 PERFORMANCE SPECIFICATIONS FOR CONTINUOUS EMISSION MONITORING SYSTEMS

2.1 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 (O₂) 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 RA 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 O₂). 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 centroidal 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 sampling

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 0.6 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 O₂ 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 O₂ 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 measurement

ments, displace the line up to 30 cm (or 5 percent of the equivalent diameter of the cross section, whichever is less) from the central 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 CEMS. 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 260, subpart H.

TABLE 2.1-1—Performance Specifications of CO and O₂ Monitors

Parameter	CO monitors		O ₂ monitors
	Low range	High range	
Calibration drift 24 hours	<6 ppm ¹	<40 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)

¹For Tier II, CO and CE are <5% and <5% of twice the permit limit, respectively.

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

³The greater of 10% of PTM or 10 ppm.

TABLE 2.1-2—CEMS Span Values for CO and O₂ Monitors

	CO monitors		O ₂ monitors (percent)
	Low range (ppm)	High range (ppm)	
The 1 rolling average formal.	200	3,000	25
The 11 rolling average formal.	2 x 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 O₂ 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 O₂ analyzer (for Tier I).

2.1.4.2.2 The high-level concentration for the CO or O₂ 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 12.5-25.5 percent O₂ for the O₂ 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 O₂ for the O₂ analyzer.

2.1.4.4 Response Time. The response time for the CO or O₂ 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 O₂ 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 O₂ monitor calibration response must not drift or deviate from the reference value by more than 0.5 percent O₂ at both zero and high levels.

2.1.4.6 Relative Accuracy. The result of the RA test of the CO CEMS (which incorporates the O₂ 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 O₂ 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 O₂ 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 16 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 Rerest. 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 O₂ shall be conducted simultaneously so that the results can be calculated for CO corrected to 7 percent O₂. 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 O₂) 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		O ₂ percent
	Low range ¹	CO, ppm High range	
1	0-40	0-600	0-2
2	60-80	900-1200	8-10
3	140-160	2100-2400	14-16

¹For Tier II, the CE specifications for the low-range CO GEMS 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: $\pm 5\%$ of span each day for seven days.

Figure 2.1-1 Calibration Drift Determination

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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 re-

sults for a single-range CO CEMS) according to Equation 5 (section 2.1.7.6). 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 O₂ 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 =			%	%	%

2.1-2 Calibration Error Determination

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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 O₂ 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 SO₂, NO, and CO, 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 O₂ 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 (d). Calculate d of the difference of a data set using Equation 1.

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i \quad (\text{Eq. 1})$$

where:
n=Number of data points.

Σ d_i=Algebraic sum of the individual difference 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.

$$S_d = \sqrt{\frac{\sum_{i=1}^n d_i^2 - \frac{(\sum_{i=1}^n d_i)^2}{n}}{n-1}} \quad (\text{Eq. 2})$$

2.1.7.3 Confidence Coefficient (CC). Calculate the 2.5 percent error CC (one-tailed) using Equation 3.

$$CC = t_{0.975} \frac{S_d}{\bar{d}} \quad (\text{Eq. 3})$$

where:
t_{0.975}=t-value (see Table 2.1-4).

TABLE 2.1-4—t-Values

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

*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.

$$RA = \frac{|\bar{d}| + |CC|}{PTM} \times 100 \quad (\text{Eq. 4})$$

where:
|d|=Absolute value of the mean of the differences (Equation 1).
|CC|=Absolute value of the confidence coefficient (Equation 3).
PTM=Average reference value.
2.1.7.5 Calibration Error. Calculate CE using Equation 5.

$$CE = \left| \frac{\bar{d}}{FS} \right| \times 100 \quad (\text{Eq. 5})$$

where:
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, calibrated 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 specification test.

tions. 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. Janke, 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 SO₂, NO_x, CO, O₂, and TGS," U.S. Environmental Protection Agency OAQPS, ES&D, Research Triangle Park, North Carolina 27711, EPA-450/3-82-026, October 1982.
3. "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume 1. Principles," U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, EPA-600/3-76-006, December 1984.
4. Michle, 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-600/3-76-006, 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 (CEMS) 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 re-

corder 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 centroidal 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 Location. 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 60 and 90 ppm (60 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 6 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 analysis, 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: $\pm 3\%$ 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.

$$CE = \left| \frac{\bar{d}}{FS} \right| \times 100 \quad (\text{Eq. 1})$$

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 CE, 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-4602-78-041, June 1978.
2. Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Sources 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, Research Triangle Park, North Carolina, 27711, EPA-4602-78-041, June 1978.

Environmental Protection Agency

elements require greater analytical sensitivity than can be obtained by ICAP. Additionally, if desired, the tester may use AAS for analyses of all metals if the resulting in-stack method detection limits meet the goal of the testing program. For convenience, aliquots of each digested sample Fraction 1A plus Fraction 2A can be combined proportionally with respect to the original Fraction 1 (normally diluted to 300 ml following digestion and prior to analysis) section 3.1.5.3; and concentrated Fraction 2A (normally diluted to 150 ml following digestion and prior to analysis) section 3.1.5.3.4.2 for a single analytical determination. The efficiency of the analytical procedure is quantified by the analysis of spiked quality control samples containing each of the target metals and/or other quality assurance measures, as necessary, including actual sample matrix effects checks.

3.1.2 Range, Sensitivity, Precision, and Interferences

3.1.2.1 Range. For the analyses described in this methodology and for similar analyses, the ICAP response is linear over several orders of magnitude. Samples containing metal concentrations in the nanograms per milliliter (ng/ml) to micrograms per milliliter (µg/ml) range in the analytical finish solution can be analyzed using this technique. Samples containing greater than approximately 50 µg/ml of chromium, lead, or arsenic should be diluted to that level or lower for final analysis. Samples containing greater than approximately 20 µg/ml of cadmium should be diluted to that level before analysis.

3.1.2.2 Analytical Sensitivity. ICAP analytical detection limits for the sample solutions (based on SW-846, method 630) are approximately as follows: Sb (32 ng/ml), As (63 ng/ml), Ba (2 ng/ml), Be (0.3 ng/ml), Cd (4 ng/ml), Cr (7 ng/ml), Cu (6 ng/ml), Pb (42 ng/ml), Mn (2 ng/ml), Ni (15 ng/ml), P (76 ng/ml), Se (76 ng/ml), Ag (7 ng/ml), Ti (40 ng/ml), and Zn (2 ng/ml). The actual method detection limits are sample dependent and may vary as the sample matrix may affect the limits. The analytical detection limits for analysis by direct aspiration AAS (based on SW-846, Method 7000 series) are approximately as follows: Sb (200 ng/ml), As (2 ng/ml), Ba (100 ng/ml), Be (5 ng/ml), Cd (5 ng/ml), Cr (50 ng/ml), Cu (20 ng/ml), Pb (100 ng/ml), Mn (10 ng/ml), Ni (40 ng/ml), Se (2 ng/ml), Ag (10 ng/ml), Ti (100 ng/ml), and Zn (5 ng/ml). The detection limit for mercury by CVAAS is approximately 0.2 ng/ml. The use of GFAAS can give added sensitivity compared to the use of direct aspiration AAS for the following metals: Sb (3 ng/ml), As (1 ng/ml), Be (0.2 ng/ml), Cd (0.1 ng/ml), Cr (1 ng/ml), Pb (1 ng/ml), Se (2 ng/ml), and Ti (1 ng/ml).

40 CFR Ch. I (7-1-94 Edition)

tection Agency, OAQPS, Research Triangle Park, North Carolina, 27711, EMB Report No. 76-GAS-6, August 1975.

SECTION 3.0 SAMPLING AND ANALYTICAL METHODS

3.1 Methodology for the Determination of Metals Emissions in Exhaust Gases from Hazardous Waste Incineration and Similar Combustion Processes

3.1.1 Applicability and Principle

3.1.1.1 Applicability. This method is being developed for the determination of total chromium (Cr), cadmium (Cd), arsenic (As), nickel (Ni), manganese (Mn), beryllium (Be), copper (Cu), zinc (Zn), lead (Pb), selenium (Se), phosphorus (P), thallium (Tl), silver (Ag), antimony (Sb), barium (Ba), and mercury (Hg) stack emissions from hazardous waste incinerators and similar combustion processes. This method may also be used for the determination of particulate emissions following the procedures and precautions described. Modifications to the sample recovery and analysis procedures described in this protocol for the purpose of determining particulate emissions may potentially impact the front-half mercury determination. Mercury emissions should be determined using EPA method 101A given in 40 CFR part 61.

3.1.1.2 Principle. The stack sample is withdrawn isokinetically from the source, with particulate emissions collected in the probe and on a heated filter and gaseous emissions collected in a series of chilled impingers containing an aqueous solution of dilute nitric acid combined with dilute hydrogen peroxide in each of two impingers, and acid potassium permanganate solution in each of two impingers. Sampling train components are recovered and digested in separate front- and back-half fractions. Materials collected in the sampling train are digested with acid solutions to dissolve organics and to remove organic constituents that may create analytical interferences. Acid digestion is performed using conventional Parr® Bomb or microwave digestion techniques. The nitric acid and hydrogen peroxide impinger solution, the acidic potassium permanganate impinger solution, the HCl rinse solution, and the probe rinse and digested filter solutions are analyzed for mercury by cold vapor atomic absorption spectroscopy (CVAAS). The nitric acid and hydrogen peroxide solution and the probe rinse and digested filter solutions of the train catches are analyzed for Cr, Cd, Ni, Mn, Be, Cu, Zn, Pb, P, Ti, Ag, Sb, Ba, and As by inductively coupled argon plasma emission spectroscopy (ICAP) or atomic absorption spectroscopy (AAS). Graphite furnace atomic absorption spectroscopy (GFAAS) is used for analysis of antimony, arsenic, cadmium, lead, selenium, and thallium, if these

Using (1) the procedures described in this method, (2) the analytical detection limits described in the previous paragraph, (3) a volume of 300 ml, Fraction 1, for the front half and 150 ml, Fraction 2A, for the back half samples, and (4) a stack gas sample volume of 1.25 m³, the corresponding in-stack method detection limits are presented in Table A-1 and calculated as shown:

$$\frac{A \times B}{C} = D$$

where:

A=analytical detection limit, µg/ml.

B=volume of sample prior to aliquot for analysis, ml.

C=stack sample volume, dscm (dscm³).

D=in-stack detection limit, µg/m³.

Values in Table 3.1-1 are calculated for the front and back half and/or the total train.

To ensure optimum sensitivity in obtaining the measurements, the concentrations of target metals in the solutions are suggested to be at least ten times the analytical detection limits. Under certain conditions, and with greater care in the analytical procedure, this concentration can be as low as approximately three times the analytical detection limit. In all cases, on at least one sample (run) in the source test and for each metal analyzed, repetitive analyses, method of standard additions (MSA), serial dilution, or matrix spike addition, etc., shall be used to establish the quality of the data.

Actual in-stack method detection limits will be determined based on actual source sampling parameters and analytical results as described above. If required, the method in-stack detection limits can be made more sensitive than those shown in Table A-1 for a specific test by using one or more of the following options:

- A 1-hour sampling run may collect a stack gas sampling volume of about 1.25 m³. If the sampling time is increased and 5 m³ are collected, the in-stack method detection limits would be one fourth of the values shown in Table A-1 (this means that with this change, the method is four times more sensitive than a 1-hour run. Larger sample volumes (longer runs) would make it even more sensitive).

- The in-stack detection limits assume that all of the sample is digested (with exception of the aliquot for mercury) and the final liquid volumes for analysis are 300 ml, Fraction 1 for the front half and 150 ml, Fraction 2A, for the back-half sample. If the front-half volume is reduced from 300 ml to 30 ml, the front-half in-stack detection limits would be one tenth of the values shown above (ten times more sensitive). If the back-half volume is reduced from 150 ml to 25 ml, the in-stack detection limits would be

one sixth of the above values. Matrix effects checks are necessary on analyses of samples and typically are of greater significance for samples that have been concentrated to less than the normal original sample volume. Reduction to a volume of less than 25 ml may not allow redissolving of the residue and may increase interference by other compounds.

• When both of the above two improvements are used on one sample at the same time, the resultant improvements are multiplicative. For example, where stack gas volume is increased by a factor of five and the total liquid sample digested volume of both the front and back halves is reduced by a factor of six, the in-stack method detection limit is reduced by a factor of thirty (the method is thirty times more sensitive).

TABLE 3. 1-1—IN-STACK METHOD DETECTION LIMITS (ug/m³) FOR TRAIN FRACTIONS USING ICAP AND AAS

Metal	Front-half fraction 1 probe and filter	Back-half fraction 1-3	Back-half fraction 4-6	Total train
Antimony	7.7 (0.7)*	3.8 (0.4)*	11.5 (1.1)*	11.5 (1.1)*
Arsenic	12.7 (0.3)*	6.4 (0.1)*	18.1 (0.4)*	18.1 (0.4)*
Boron	0.5	0.3	0.8	0.8
Beryllium	0.07 (0.05)*	0.04 (0.03)*	0.11 (0.08)*	0.11 (0.08)*
Cadmium	1.0 (0.02)*	0.5 (0.01)*	1.5 (0.03)*	1.5 (0.03)*
Chromium	1.7 (0.2)*	0.8 (0.1)*	2.5 (0.3)*	2.5 (0.3)*
Copper	1.4	0.7	2.1	2.1
Lead	10.1 (0.2)*	5.0 (0.1)*	15.1 (0.3)*	15.1 (0.3)*
Manganese	0.5 (0.2)*	0.2 (0.1)*	0.7 (0.3)*	0.7 (0.3)*
Mercury	0.6*	3.0*	6.5*	6.5*
Nickel	3.6	1.8	5.4	5.4
Phosphorus	18	9	27	27
Selenium	18 (0.5)*	9 (0.1)*	27 (0.8)*	27 (0.8)*
Silver	1.7	0.9	2.6	2.6
Thallium	9.6 (0.2)*	4.8 (0.1)*	14.4 (0.3)*	14.4 (0.3)*
Zinc	0.5	0.3	0.8	0.8

[*] Detection limit when analyzed by GFAAS.

Detection limit when analyzed by CVAAS, estimated for Back Half and Total Train.

NOTE: Actual method in-stack detection limits will be determined based on actual source sampling parameters and analytical results as described earlier in this section.

• Conversely, reducing stack gas sample volume and increasing sample liquid volume will increase in-stack detection limits (the method would then be less sensitive). The front-half and back-half samples (Fractions 1 plus and 2A) can be combined proportionally (see section 3.1.1.2 of this methodology) prior to analysis. The resultant liquid volume (excluding the mercury fractions, which must be analyzed separately) is recorded. Combining the sample as described does not allow determination (whether front or back half) of where in the train the sample was captured. The in-stack method detection limit then becomes a single value for all metals except mercury, for which the contribution of the mercury fractions must be considered.

• The above discussion assumes no blank correction. Blank corrections are discussed later in this method.

3.1.2.3 Precision. The precision (relative standard deviation) for each metal detected in a method development test at a sewage sludge incinerator are as follows: Sb (12.7%), As (13.5%), Ba (20.6%), Cd (11.5%), Cr (11.3%), Cu (11.5%), Pb (11.5%), P (11.5%), Se (15.3%), Ti (12.3%), and Zn (11.8%). The precision for

similar to the 40 CFR part 60, appendix A method 5 train. The sampling train consists of the following components:

3.1.3.1.1 Probe Nozzle (Probe Tip) and Borelattice or Quartz Glass Probe Liner. Same as method 5, sections 2.1.1 and 2.1.2, except that glass nozzles are required unless an alternate probe tip prevents the possibility of contamination or interference of the sample with its materials of construction. If a probe tip other than glass is used, no correction (because of any effect on the sample by the probe tip) of the stack sample test results can be made.

3.1.3.1.2 Pilot Tube and Differential Pressure Gauge. Same as method 2, sections 2.1 and 2.2, respectively.

3.1.3.1.3 Filter Holder. Glass, same as method 5, section 2.1.5, except that a Teflon filter support or other non-metallic, non-contaminating support must be used to replace the glass frit.

3.1.3.1.4 Filter Heating System. Same as method 5, section 2.1.6.

3.1.3.1.5 Condenser. The following system shall be used for the condensation and collection of gaseous metals and for determining the moisture content of the stack gas. The condensing system should consist of four to seven impingers connected in series with leak-free ground glass fittings or other leak-free, non-contaminating fittings. The first impinger is optional and is recommended as a moisture knockout trap for use during test

conditions which require such a trap. The first impinger shall be appropriately-sized, if necessary, for an expected large moisture catch and generally constructed as described for the first impinger in method 5, paragraph 2.1.7. The second impinger (or the first HNO₃/H₂O₂ impinger) shall also be constructed as described for the first impinger in method 5. The third impinger (or the second HNO₃/H₂O₂ impinger) shall be the same as the Greenburg Smith impinger with the standard tip described as the second impinger in method 5, paragraph 2.1.7. All other impingers used in the methods train are the same as the first HNO₃/H₂O₂ impinger described in this paragraph. In summary, the first impinger which may be optional as described in this methodology shall be empty, the second and third shall contain known quantities of a nitric acid/hydrogen peroxide solution (section 3.1.4.2.1), the fourth shall be empty, the fifth and sixth shall contain a known quantity of acidic potassium permanganate solution (section 3.1.4.2.2), and the last impinger shall contain a known quantity of silica gel. A thermometer capable of measuring to within 1°C (2°F) shall be placed at the outlet of the last impinger. When the moisture knockout impinger is not needed, it is removed from the train and the other impingers remain the same. If mercury analysis is not to be performed, the potassium permanganate impingers and the empty impinger preceding them are removed.

nickel was 7.7% for another test conducted at a source simulator. Beryllium, manganese, and silver were not detected in the tests; however, based on the analytical sensitivity of the ICAP for these metals, it is assumed that their precisions should be similar to those for the other metals, when detected at similar levels.

3.1.2.4 Interferences. Iron can be a spectral interference during the analysis of arsenic, chromium, and cadmium by ICAP. Aluminum can be a spectral interference during the analysis of arsenic and lead by ICAP. Generally, these interferences can be reduced by diluting the sample, but this increases the method detection limit (in-stack detection limit). Refer to EPA method 6010 (SW-846) or the other analytical methods used for details on potential interferences for this method. The analyst must eliminate or reduce interferences to acceptable levels. For all GFAAS analyses, matrix modifiers should be used to limit interferences, and standards should be matrix matched.

3.1.3 Apparatus

3.1.3.1 Sampling Train. A schematic of the sampling train is shown in Figure 3.1-1. It is

Environmental Protection Agency

3.1.3.1.6 Metering System, Barometer, and Gas Density Determination Equipment. Same as method 5, sections 2.1.8 through 2.1.10, respectively.

3.1.3.1.7 Teflon Tape. For capping openings and sealing connections, if necessary, on the sampling train.

3.1.3.2 Sample Recovery. Same as method 5, sections 2.2.1 through 2.2.8 (Nonmetallic Probe-Liner and Probe-Nozzle Brushes or Swabs, Wash Bottles, Sample Storage Containers, Petri Dishes, Glass Graduated Cylinders, Plastic Storage Containers, Funnel and Rubber Policeman, and Glass Funnel), respectively, with the following exceptions and additions:

3.1.3.2.1 Nonmetallic Probe-Liner and Probe-Nozzle Brushes or Swabs. For quantitative recovery of materials collected in the front half of the sampling train: Description of acceptable all-terlon component brushes or swabs is to be included in EPA's Evaluation Measurement Technical Information Center (EMTIC) files.

3.1.3.2.2 Sample Storage Containers. Glass bottles with Teflon-lined caps which are non-reactive to the oxidizing solutions, with a capacity of 1000- and 500-ml, shall be used for KMnO_4 -containing samples and blanks. Polyethylene bottles may be used for other sample types.

3.1.3.2.3 Graduated Cylinder. Glasses or equivalent.

3.1.3.2.4 Funnel. Glasses or equivalent.

3.1.3.2.5 Labels. For identification of samples.

3.1.3.2.6 Polypropylene Tweezers and/or Plastic Gloves. For recovery of the filter from the sampling train filter holder.

3.1.3.3 Sample Preparation and Analysis. For the analysis, the following equipment is needed:

3.1.3.3.1 Volumetric Flasks, 100-ml, 250-ml, and 1000-ml. For preparation of standards and sample dilution.

3.1.3.3.2 Graduated Cylinders. For preparation of reagents.

3.1.3.3.3 Parr® Bombs or Microwave Pressure Relief Vessels with Capping Station (GEM Corporation model or equivalent).

3.1.3.3.4 Beakers and Watchglasses. 250-ml beakers for sample digestion with watchglasses to cover the tops.

3.1.3.3.5 Ring Stands and Clamps. For securing equipment such as filtration apparatus.

3.1.3.3.6 Filter Funnels. For holding filter paper.

3.1.3.3.7 Whatman 541 Filter Paper (or equivalent). For filtration of digested samples.

3.1.3.3.8 Disposable Pasteur Pipets and Bulbs.

3.1.3.3.9 Volumetric Pipets.

3.1.3.3.10 Analytical Balance. Accurate to within 0.1 mg.

3.1.3.3.1.1 Microwave or Conventional Oven. For heating samples at fixed power levels or temperatures.

3.1.3.3.1.2 Hot Plates.

3.1.3.3.1.3 Atomic Absorption Spectrometer (AAS). Equipped with a background corrector.

3.1.3.3.1.3.1 Graphite Furnace Attachment, with antimony, arsenic, cadmium, lead, selenium, thallium hollow cathode lamps (HCLs) or electrodeless discharge lamps (EDLs). (Same as EPA SW-846 methods 7041 (antimony), 7060 (arsenic), 7131 (cadmium), 7421 (lead), 7740 (selenium), and 7841 (thallium)).

3.1.3.3.1.3.2 Cold Vapor Mercury Attachment. With a mercury HCL or EDL. The equipment needed for the cold vapor mercury attachment includes an air recirculation pump, a quartz cell, an aerator apparatus, and a heat lamp or desiccator tube. The heat lamp should be capable of raising the ambient temperature at the quartz cell by 10°C such that no condensation forms on the wall of the quartz cell. (Same as EPA method 7470.)

3.1.3.3.1.4 Inductively Coupled Argon Plasma Spectrometer. With other a direct or sequential reader and an alumina torch. (Same as EPA method 6010.)

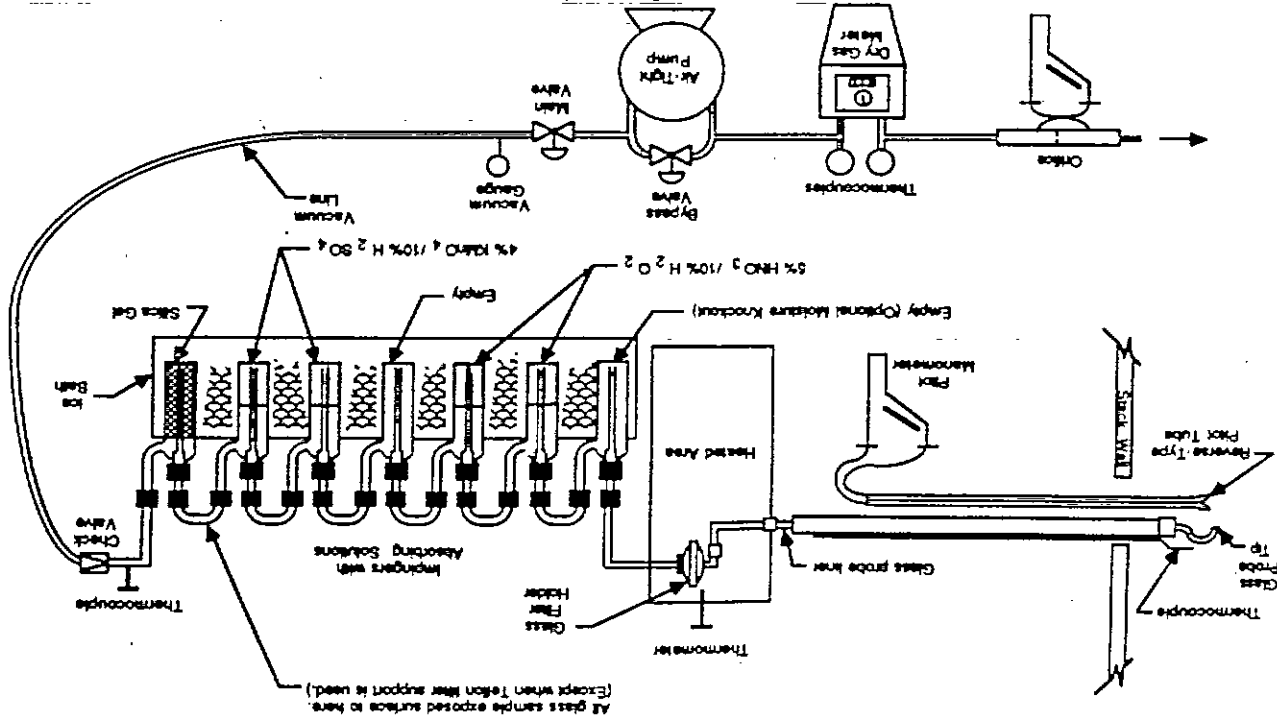
3.1.4 Reagents

The complexity of this methodology is such that to obtain reliable results, the test-reagents (including analytes) should be experienced and knowledgeable in source sampling. In handling and preparing (including mixing) reagents as described, and using adequate safety procedures and protective equipment in performing this method, including sampling, mixing reagents, digestions, and analyses. Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

3.1.4.1 Sampling. The reagents used in sampling are as follows:

3.1.4.1.1 Filters. The filters shall contain less than $1.3\text{ }\mu\text{g/in}^2$ of each of the metals to be measured. Analytical results provided by filter manufacturers are acceptable. However, if no such results are available, filter blanks must be analyzed for each target metal prior to emission testing. Quartz fiber or glass fiber (which meet the requirement of containing less than $1.3\text{ }\mu\text{g/in}^2$ of each metal) filters without organic binders shall be used. The filters should exhibit at least 99.95 percent efficiency (<0.05 percent penetration) on $0.3\text{ }\mu\text{m}$ diocetyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM Standard Method D2986-71 (incorporated by reference). For particulate determination in sources containing SO_2 or SO_3 , the filter material must be of a type that is unreactive to SO_2 .

Figure 3.1-1 Schematic of multiple metals sampling train configuration.



or SO_3 , as described in EPA method 5. Quartz fiber filters meeting these requirements are recommended for use in this method.

3.1.4.1.2 Water. To conform to ASTM Specification D193.77, Type II (incorporated by reference). If necessary, analyze the water for all target metals prior to field use. All target metal concentrations should be less than 1 ng/ml.

3.1.4.1.3 Nitric Acid. Concentrated. Baker Insta-analyzed or equivalent.

3.1.4.1.4 Hydrochloric Acid. Concentrated. Baker Insta-analyzed or equivalent.

3.1.4.1.5 Hydrogen Peroxide, 30 Percent (V/V).

3.1.4.1.6 Potassium Permanganate.

3.1.4.1.7 Sulfuric Acid. Concentrated.

3.1.4.1.8 Silica Gel and Crushed Ice. Same as method 5, sections 3.1.2 and 3.1.4, respectively.

3.1.4.2 Pretest Preparation for Sampling

Reagents.

3.1.4.2.1 Nitric Acid (HNO_3)/Hydrogen Peroxide (H_2O_2) Absorbing Solution, 5 Percent HNO_3 /10 Percent H_2O_2 . Carefully with stirring, add 50 ml of concentrated HNO_3 to a 1000-ml volumetric flask containing approximately 500 ml of water, and then, carefully with stirring, add 33 ml of 30 percent H_2O_2 . Dilute to volume (1000 ml) with water. Mix well. The reagent shall contain less than 2 ng/ml of each target metal.

3.1.4.2.2 Acidic Potassium Permanganate (KMnO_4) Absorbing Solution, 4 Percent KMnO_4 (W/V). 10 Percent H_2SO_4 (V/V). Prepare fresh daily. Mix carefully, with stirring, 100 ml of concentrated H_2SO_4 into 800 ml of water, and add water with stirring to make a volume of 1 L. This solution is 10 percent H_2SO_4 (V/V). Dissolve, with stirring, 40 g of KMnO_4 into 10 percent H_2SO_4 (V/V) and add 10 percent H_2SO_4 (V/V) with stirring to make a volume of 1 L; this is the acidic potassium permanganate absorbing solution. Prepare and store in glass bottles to prevent degradation. The reagent shall contain less than 2 ng/ml of Hg.

PRECAUTION: To prevent autocatalytic decomposition of the permanganate solution, filter the solution through Whatman 541 filter paper. Also, due to the potential reaction of the potassium permanganate with the acid, there may be pressure buildup in the sample storage bottle; these bottles shall not be fully filled and shall be vented both to relieve potential excess pressure and prevent explosion due to pressure buildup. Venting is required, but should not allow contamination of the sample; a No. 70-72 hole drilled in the container cap and Teflon liner has been used.

3.1.4.2.3 Nitric Acid, 0.1 N. With stirring, add 6.3 ml of concentrated HNO_3 (70 percent) to a flask containing approximately 900 ml of water. Dilute to 1000 ml with water. Mix well. The reagent shall contain less than 2 ng/ml of each target metal.

3.1.4.2.4 Hydrochloric Acid (HCl), 8 N. Make the desired volume of 8 N HCl in the following proportions. Carefully with stirring, add 690 ml of concentrated HCl to a flask containing 250 ml of water. Dilute to 1000 ml with water. Mix well. The reagent shall contain less than 2 ng/ml of Hg.

3.1.4.3 Glassware Cleaning Reagents.

3.1.4.3.1 Nitric Acid, Concentrated. Fisher ACS grade or equivalent.

3.1.4.3.2 Water. To conform to ASTM Specifications D193.77, Type II.

3.1.4.3.3 Nitric Acid, 10 Percent (V/V). With stirring, add 500 ml of concentrated HNO_3 to a flask containing approximately 4000 ml of water. Dilute to 5000 ml with water. Mix well. Reagent shall contain less than 2 ng/ml of each target metal.

3.1.4.4 Sample Digestion and Analysis Reagents.

3.1.4.4.1 Hydrochloric Acid, Concentrated.

3.1.4.4.2 Hydrofluoric Acid, Concentrated.

3.1.4.4.3 Nitric Acid, Concentrated. Baker Insta-analyzed or equivalent.

3.1.4.4.4 Nitric Acid, 50 Percent (V/V). With stirring, add 125 ml of concentrated HNO_3 to 100 ml of water. Dilute to 250 ml with water. Mix well. Reagent shall contain less than 2 ng/ml of each target metal.

3.1.4.4.5 Nitric Acid, 5 Percent (V/V). With stirring, add 50 ml of concentrated HNO_3 to 800 ml of water. Dilute to 1000 ml with water. Mix well. Reagent shall contain less than 2 ng/ml of each target metal.

3.1.4.4.6 Water. To conform to ASTM Specifications D193.77, Type II.

3.1.4.4.7 Hydroxylamine Hydrochloride and Sodium Chloride Solution. See EPA method 7470 for preparation.

3.1.4.4.8 Stannous Chloride. See method 7470.

3.1.4.4.9 Potassium Permanganate, 5 Percent (W/V). See method 7470.

3.1.4.4.10 Sulfuric Acid, Concentrated.

3.1.4.4.11 Nitric Acid, 50 Percent (V/V).

3.1.4.4.12 Potassium Persulfate, 5 Percent (W/V). See method 7470.

3.1.4.4.13 Nickel Nitrate, $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$.

3.1.4.4.14 Lanthanum Oxide, La_2O_3 .

3.1.4.4.15 AAS Grade Hg Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.16 AAS Grade Pb Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.17 AAS Grade As Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.18 AAS Grade Cd Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.19 AAS Grade Cr Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.20 AAS Grade Sb Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.21 AAS Grade Ba Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.22 AAS Grade Be Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.23 AAS Grade Cu Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.24 AAS Grade Mn Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.25 AAS Grade Ni Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.26 AAS Grade P Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.27 AAS Grade Se Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.28 AAS Grade Ag Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.29 AAS Grade Tl Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.30 AAS Grade Zn Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.31 AAS Grade Al Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.32 AAS Grade Fe Standard, 1000 $\mu\text{g}/\text{ml}$.

3.1.4.4.33 The metals standards may also be made from solid chemicals as described in EPA Method 200.7. EPA SW-846 Method 7470 or Standard Methods for the Analysis of Water and Wastewater, 15th Edition, Method 303F should be referred to for additional information on mercury standards.

3.1.4.4.34 Mercury Standards and Quality Control Samples. Prepare fresh weekly a 10 $\mu\text{g}/\text{ml}$ intermediate mercury standard by adding 5 ml of 1000 $\mu\text{g}/\text{ml}$ mercury stock solution to a 500-ml volumetric flask; dilute with stirring to 500 ml by first carefully adding 20 ml of 15 percent HNO_3 and then adding water to the 500-ml volume. Mix well. Prepare a 200 $\mu\text{g}/\text{ml}$ working mercury standard solution, fresh daily: Add 5 ml of the 10 $\mu\text{g}/\text{ml}$ intermediate standard to a 250-ml volumetric flask and dilute to 250 ml with 5 ml of 4 percent KMnO_4 , 5 ml of 15 percent HNO_3 , and then water. Mix well. At least six separate aliquots of the working mercury standard solution should be used to prepare the standard curve. These aliquots should contain 0.0, 1.0, 2.0, 3.0, 4.0, and 5.0 ml of the working standard solution containing 0, 250, 450, 550, 560, and 1000 ng mercury, respectively. Quality control samples should be prepared by making a separate 10 $\mu\text{g}/\text{ml}$ standard and diluting until in the range of the calibration.

3.1.4.4.35 ICAP Standards and Quality Control Samples. Calibration standards for ICAP analysis can be combined into four different mixed standard solutions as shown below.

MIXED STANDARD SOLUTIONS FOR ICAP ANALYSIS

Solution	Elements
I	As, Ba, Cd, Co, Mn, Pb, Se, Zn.
II	Ba, Co, Fe.
III	Al, Cr, Ni.
IV	Ag, P, Sb, Ti.

Prepare these standards by combining and diluting the appropriate volumes of the 1000 $\mu\text{g}/\text{ml}$ solutions with 5 percent nitric acid. A minimum of one standard and a blank can be

used to form each calibration curve. However, a separate quality control sample spiked with known amounts of the target metals in quantities in the midrange of the calibration curve should be prepared. Suggested standard levels are 25 $\mu\text{g}/\text{ml}$ for Al, Cr, and Pb, 15 $\mu\text{g}/\text{ml}$ for Fe, and 10 $\mu\text{g}/\text{ml}$ for the remaining elements. Standards containing less than 1 $\mu\text{g}/\text{ml}$ of metal should be prepared daily. Standards containing greater than 1 $\mu\text{g}/\text{ml}$ of metal should be stable for a minimum of 1 to 2 weeks.

3.1.4.4.36 Graphite Furnace AAS Standards. Antimony, arsenic, cadmium, lead, selenium, and thallium. Prepare a 10 $\mu\text{g}/\text{ml}$ standard by adding 1 ml of 1000 $\mu\text{g}/\text{ml}$ standard to a 100-ml volumetric flask. Dilute with stirring to 100 ml with 10 percent nitric acid. For graphite furnace AAS, the standards must be matrix matched. Prepare a 100 ng/ml standard by adding 1 ml of the 10 $\mu\text{g}/\text{ml}$ standard to a 110-ml volumetric flask and dilute to 100 ml with the appropriate matrix solution. Other standards should be prepared by dilution of the 100 ng/ml standards. At least five standards should be used to make up the standard curve. Suggested levels are 0, 10, 50, 75, and 100 ng/ml. Quality control samples should be prepared by making a separate 10 $\mu\text{g}/\text{ml}$ standard and diluting until it is in the range of the samples. Standards containing less than 1 $\mu\text{g}/\text{ml}$ of metal should be prepared daily. Standards containing greater than 1 $\mu\text{g}/\text{ml}$ of metal should be stable for a minimum of 1 to 2 weeks.

3.1.4.4.3 Matrix Modifiers.

3.1.4.4.3.1 Nickel Nitrate, 1 Percent (V/V). Dissolve 4.956 g of $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ in approximately 50 ml of water in a 100-ml volumetric flask. Dilute to 100 ml with water.

3.1.4.4.3.2 Nickel Nitrate, 0.1 Percent (V/V). Dilute 10 ml of the 1 percent nickel nitrate solution from section 3.1.4.4.3.1 above to 100 ml with water. Inject an equal amount of sample and this modifier into the graphite furnace during AAS analysis for As.

3.1.4.4.3.3 Lanthanum. Carefully dissolve 0.5664 g of La_2O_3 in 10 ml of concentrated HNO_3 , and dilute the solution by adding it with stirring to approximately 50 ml of water, and then dilute to 100 ml with water. Mix well. Inject an equal amount of sample and this modifier into the graphite furnace during AAS analysis for Pb.

3.1.5 Procedure

3.1.5.1 Sampling. The complexity of this method is such that, to obtain reliable results, testers and analysts should be trained and experienced with the test procedures, including source sampling, reagent preparation and handling, sample handling, analytical calculations, reporting, and descriptions specifically at the beginning of and throughout section 3.1.4 and all other sections of this methodology.

3.1.5.1.1 Pretest Preparation. Follow the same general procedure given in method 5, section 4.1.1, except that, unless particulate emissions are to be determined, the filter need not be decontaminated. All sampling train glassware should first be rinsed with hot tap water and then washed in hot soapy water. Next, glassware should be rinsed three times with tap water, followed by three additional rinses with water. All glassware should then be soaked in a 10 percent (V/V) nitric acid solution for a minimum of 4 hours, rinsed three times with water, rinsed a final time with acetone, and allowed to air dry. All glassware openings where contamination can occur should be covered until the sampling train is assembled for sampling.

3.1.5.1.2 Preliminary Determinations. Same as method 5, section 4.1.2.

3.1.5.1.3 Preparation of Sampling Train. Follow the same general procedures given in method 5, section 4.1.3, except place 100 ml of the nitric acid/hydrogen peroxide solution (section 3.1.4.2.1) in each of the two $\text{LiNO}_3/\text{H}_2\text{O}_2$ impingers as shown in Figure 3.1-1 (normally the second and third impingers), place 100 ml of the acidic potassium permanganate absorbing solution (section 3.1.4.2.2) in each of the two permanganate impingers as shown in Figure A-1, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the last impinger. Alternatively, the silica gel may be weighed directly in the impinger just prior to train assembly.

Several options are available to the tester based on the sampling requirements and conditions. The use of an empty first impinger can be eliminated if the moisture to be collected in the impingers will be less than approximately 100 ml. If necessary, use as applicable to this methodology the procedure described in section 7.1.1 of EPA method 101A, 40 CFR part 61, appendix B, to maintain the desired color in the last permanganate impinger.

Retain for reagent blanks volumes of the nitric acid/hydrogen peroxide solution per section 3.1.5.2.9 of this method and of the acidic potassium permanganate solution per section 3.1.5.2.10. These reagent blanks should be labeled and analyzed as described in section 3.1.7. Set up the sampling train as shown in Figure 3.1-1, or if mercury analysis is not to be performed in the train, then it should be modified by removing the two permanganate impingers and the impinger preceding the permanganate impingers. If necessary to ensure leak-free sampling train connections and prevent contaminating Teflon tape or other non-contaminating material should be used instead of silicone grease.

PRECAUTION: Extreme care should be taken to prevent contamination within the train. Prevent the mercury collection reagent (acidic potassium permanganate) from con-

tacting any glassware of the train which is washed and analyzed for Mn. Prevent hydrogen peroxide from mixing with the acidic potassium permanganate.

Mercury emissions can be measured, alternatively, in a separate train which measures only mercury emissions by using EPA method 101A with the modifications described below (and with the further modification that the permanganate containers shall be processed as described in the precaution in section 3.1.4.2.2 and the note in section 3.1.5.2.5 of this methodology). This alternative method is applicable for measurement of mercury emissions, and it may be of special interest to sources which must measure both mercury and manganese emissions.

Section 7.2.1 of method 101A shall be modified as follows after the 250 to 400-ml KMnO_4 rinse:

To remove any precipitated material and any residual brown deposits on the glassware following the permanganate rinse, rinse with approximately 100 ml of deionized distilled water, and add this water rinse carefully assuring transfer of all loose precipitated materials from the three permanganate impingers into the permanganate Container No. 1. If no visible deposits remain after this water rinse, do not rinse with 8 N HCl. However, if deposits do remain on the glassware after this water rinse, wash the impinger surfaces with 25 ml of 8 N HCl, and place the wash in a separate sample container labeled Container No. 1.A. containing 200 ml of water as follows. Place 200 ml of water in a sample container labeled Container No. 1.A. Wash the impinger walls and stem with the HCl by turning the impinger on its side and rotating it so that the HCl contacts all inside surfaces. Use a total of only 25 ml of 8 N HCl for rinsing all permanganate impingers combined. Rinse the first impinger, then pour the actual rinse used for the first impinger into the second impinger for its rinse, etc. Finally, pour the 25 ml of 8 N HCl rinse carefully with stirring into Container No. 1.A. Analyze the HCl rinse separately by carefully diluting with stirring the contents of Container No. 1.A. to 500 ml with deionized distilled water. Filter (if necessary) through Whatman 40 filter paper, and then analyze for mercury according to section 7.4, except limit the aliquot size to a maximum of 10 ml. Prepare and analyze a water diluted blank 8 N HCl sample by using the same procedure as that used by Container No. 1.A., except add 5 ml of 8 N HCl with stirring to 40 ml of water, and then dilute to 100 ml with water. Then analyze as instructed for the sample from Container No. 1.A. Because the previous separate permanganate solution rinse (section 7.2.1) and water rinse (as modified in these guidelines) have the capability to recover a very high percentage of the mercury from the permanganate impingers, the amount of mercury in the HCl rinse in Container No.

1.A. may be very small, possibly even insignificantly small. However, add the total of any mercury analyzed and calculated for the HCl rinse sample Container No. 1.A. to that calculated from the mercury sample from section 7.3.2 which contains the separate permanganate rinse (and water rinse as modified herein) for calculation of the total sample mercury concentration.

3.1.5.1.4 Leak-Check Procedures. Follow the leak-check procedures given in method 5, section 4.1.4.1 (Pretest Leak-Check), section 4.1.4.2 (Leak-Checks During the Sample Run), and section 4.1.4.3 (Post-Test Leak-Checks).

3.1.5.1.5 Sampling Train Operation. Follow the procedures given in method 5, section 4.1.5. For each run, record the data required on a data sheet such as the one shown in Figure 6-2 of method 5.

3.1.5.1.6 Calculation of Percent Isokinetic. Same as method 5, section 4.1.6.

3.1.5.2 Sample Recovery. Begin cleanup procedures as soon as the probe is removed from the stack at the end of a sampling period.

The probe should be allowed to cool prior to sample recovery. When it can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a rinsed, non-contaminating cap over the probe nozzle to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling. This normally causes a vacuum to form in the filter holder, thus causing the undesired result of drawing liquid from the impingers into the filter.

Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet. Be careful not to lose any condensate that might be

present. Cap the filter inlet, where the probe was fastened. Remove the umbilical cord from the last impinger and cap the impinger. Cap off the filter holder outlet and impinger inlet. Use noncontaminating caps, whether ground-glass stoppers, plastic caps, serum caps, or Teflon tape to close these openings. Alternatively, the train can be disassembled before the probe and filter holder/openers are completely cooled. If this procedure is followed: Initially disconnect the filter holder outlet/impinger inlet and loosely cap the open ends. Then disconnect the probe from the filter holder or cyclone inlet and loosely cap the open ends. Cap the probe tip and remove the umbilical cord as previously described.

Transfer the probe and filter-impinger assembly to a cleanup area that is clean and protected from the wind and other potential causes of contamination or loss of sample. Inspect the train before and during disassembly and note any abnormal conditions. The sample is recovered and treated as follows (see schematic in Figure 3.1-2). Ensure that all items necessary for recovery of the sample do not contaminate it.

3.1.5.2.1 Container No. 1 (Filter). Carefully remove the filter from the filter holder and place it in its identified petri dish container. Acid-washed polypropylene or Teflon coated tweezers or clean, disposable surgical gloves rinsed with water and dried should be used to handle the filters. If it is necessary to fold the filter, make certain the particulate cake is inside the fold. Carefully transfer the filter and any particulate matter or filter fibers that adhere to the filter holder gasket to the petri dish by using a dry (acid-cleaned) nylon bristle brush. Do not use any metal-containing materials when recovering this train. Seal the labeled petri dish.

Environmental Protection Agency

3.1.5.2.2 Container No. 2 (Acetone Rinse).

NOTE: Perform section 3.1.5.2.2 only if determination of particulate emissions are determined in addition to metals emissions. If only metals emissions are desired, skip section 3.1.5.2.2 and go to section 3.1.5.2.3. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover particulate matter and any condensate from the probe nozzle, probe fitting (plastic) such as Teflon, polypropylene, etc. fittings are recommended to prevent contamination by elemental fittings; further, if desired, a single glass place consisting of a combined probe and probe liner may be used, but such a combined glass place is not a requirement of this methodology, probe liner, and front half of the filter holder by washing these components in a glass container and placing the wash in a glass container.

Note: The use of exactly 100 ml is necessary for the subsequent blank correction procedures. Distilled water may be used instead of acetone when approved by the Administrator and shall be used when specified by the Administrator. In these cases, save a water blank and follow the Administrator's directions on analysis. Perform the acetone rinses as follows: Carefully remove the probe nozzle and clean the inside surface by rinsing with acetone from a wash bottle and brushing with a nonmetallic brush. Brush until the acetone rinse shows no visible particles, after which make a final rinse of the inside surface with acetone.

Brush and rinse the sample-exposed, inside parts of the fitting with acetone in a similar way until no visible particles remain.

Rinse the probe liner with acetone by tilting and rotating the probe while squirting acetone into its upper end so that all inside surfaces will be wetted with acetone. Allow the acetone to drain from the lower end into the sample container. A funnel may be used to aid in transferring liquid washings to the container. Follow the acetone rinse with a nonmetallic probe brush. Hold the probe in an inclined position, squirt acetone into the upper end as the probe brush is being pushed through the probe with a twisting action. Hold a sample container underneath the lower end of the probe, and catch any acetone and particulate matter which is brushed through the probe three times or more until no more remains in the probe liner on visual inspection. Rinse the brush with acetone, and quantitatively collect these washings in the sample container. After the brushing, make a final acetone rinse of the probe as described above.

Clean the inside of the front half of the filter holder by rubbing the surfaces with a

nonmetallic nylon bristle brush and rinsing with acetone. Rinse each surface three times or more if needed to remove visible particulate. Make a final rinse of the brush and filter holder. After all acetone washings and particulate matter have been collected in the sample container tighten the lid on the sample container so that acetone will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container clearly to identify its contents.

3.1.5.2.3 Container No. 3 (Probe Rinse).
Keep the probe assembly clean and free from contamination as described in section 3.1.5.2.2 of this method during the 0.1 N nitric acid rinse described below. Rinse the probe nozzle and fitting probe liner, and front half of the filter holder thoroughly with 100 ml of 0.1 N nitric acid and place the wash into a sample storage container.

NOTE: The use of exactly 100 ml is necessary for the subsequent blank correction procedures. Perform the rinses as applicable and generally as described in method 12, section 5.2.2. Record the volume of the combined rinse. Mark the height of the fluid level on the outside of the storage container and use this mark to determine if leakage occurs during transport. Seal the container and clearly label the contents. Finally, rinse the nozzle, probe liner, and front half of the fiber holder with water followed by acetone and discard these rinses.

3.1.5.2.4. Container No. 4 (Impingers 1 through 3, $\text{HNO}_3/\text{H}_2\text{O}$, Impingers and Moisture Knockout Impinger, when used, Containers and Rinses). Due to the potentially large quantity of liquid involved, the testee may place the impinger solutions from Impingers 1 through 3 in more than one container. Measure the liquid in the first three impingers volumetrically to within 0.5 ml using a graduated cylinder. Record the volume of liquid present. This information is required to calculate the moisture content of the sampled flue gas. Clean each of the first three impingers, the filter support, the back half of the filter housing, and connecting glassware by thoroughly rinsing with 100 ml of 0.1 N nitric acid using the procedure as applicable and generally as described in method 12, section 5.2.4.

Note: The use of exactly 100 ml of 0.1 N nitric acid rinses is necessary for the subsequent blank correction procedures. Combine the rinses and impinger solutions, measure and record the volume. Mark the height of the fluid level on the outside of the container to determine if leakage occurs during transport. Seal the container and clearly label the contents.

3.1.5.2.5 Container Nos. 5A, 5B, and 5C. 5A (0.1 N HNO_3), 5B ($\text{KMnO}_4/\text{H}_2\text{SO}_4$ absorbing solution), and 5C (8 N HCl rinse and dilution). (As described previously at the end of section 3.1.5.2.4).

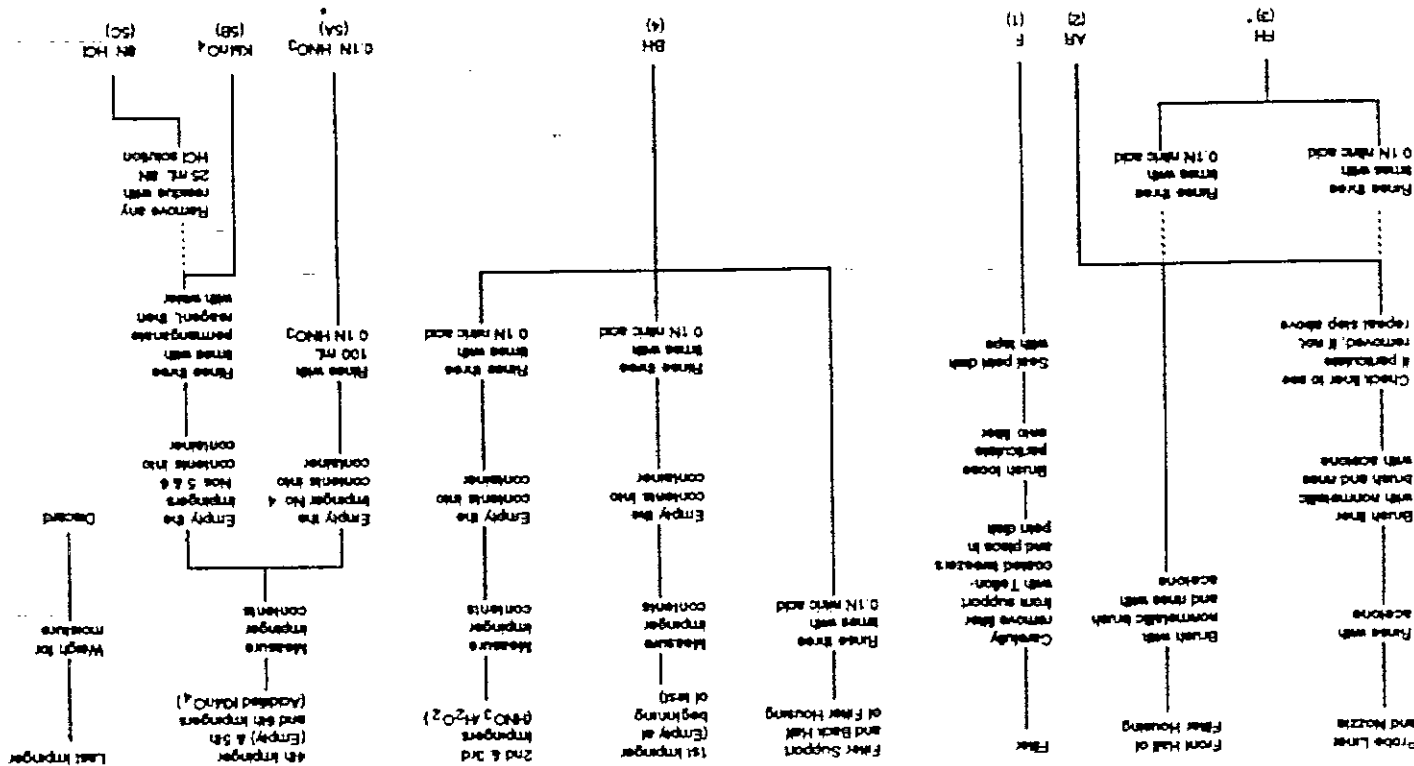


Figure 3.1-2 Sample recovery scheme.

OS-1 SOC 1

3.1.3.1.5 of this method. If mercury is not being measured in this train, then Impingers 4, 5, and 6, as shown in Figure 3.1-2, are not necessary and may be eliminated.) Pour all the liquid, if any, from the Impinger which was empty at the start of the run and which immediately precedes the two permanganate Impingers (normally Impinger No. 4) into a graduated cylinder and measure the volume to within 0.5 ml. This information is required to calculate the moisture content of the sampled flue gas. Place the liquid in Sample Container No. 5A. Rinse the Impinger (No. 4) with 100 ml of 0.1 N HNO_3 and place this into Container No. 5A.

Pour all the liquid from the two permanganate Impingers into a graduated cylinder and measure the volume to within 0.5 ml. This information is required to calculate the moisture content of the sampled flue gas. Place this KMnO_4 absorbing solution sample from the two permanganate Impingers into Container No. 5B. Using 100 ml total of fresh acidified potassium permanganate solution, rinse the two permanganate Impingers and connecting glass pieces a minimum of three times and place the rinses into Container No. 5B, carefully ensuring transfer of all loose precipitated materials from the two Impingers into Container No. 5B. Using 100 ml total of water, rinse the permanganate Impingers and connecting glass pieces a minimum of three times, and place the rinses into Container No. 5B, carefully ensuring transfer of all loose precipitated materials from the two Impingers into Container No. 5B. Mark the height of the fluid level on the outside of the bottle to determine if leakage occurs during transport. See the following note and the precaution in paragraph 3.1.4.2.2 and properly prepare the bottle and clearly label the contents.

NOTE: Due to the potential reaction of the potassium permanganate with the acid, there may be pressure buildup in the sample storage bottles. These bottles shall not be completely filled and shall be vented to relieve potential excess pressure. Venting is required. A No. 70-72 hole drilled in the container cap and Teflon liner has been used.

If no visible deposits remain after the above described water rinse, do not rinse with 8 N HCl. However, if deposits do remain on the glassware after this water rinse, wash the Impinger surfaces with 25 ml of 8 N HCl, and place the wash in a separate sample container labeled Container No. 5C containing 200 ml of water as follows: Place 200 ml of water in a sample container labeled Container No. 5C. Wash the Impinger walls and stem with the HCl by turning the Impinger on its side and rotating it so that the HCl contacts all inside surfaces. Use a total of only 25 ml of 8 N HCl for rinsing both permanganate Impingers combined. Rinse the first Impinger, then pour the actual rinse

used for the first Impinger into the second Impinger for its rinse. Finally, pour the 25 ml of 8 N HCl rinse carefully with stirring into Container No. 5C. Mark the height of the fluid level on the outside of the bottle to determine if leakage occurs during transport.

3.1.5.2.6 Container No. 6 (Silica Gel). Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. Transfer the silica gel from its Impinger to its original container and seal. The tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the Impinger.

The small amount of particles that may adhere to the Impinger wall need not be removed. Do not use water or other liquids to transfer the silica gel since weight gained in the silica gel Impinger is used for moisture calculations. Alternatively, if a balance is available in the field, record the weight of the spent silica gel (or silica gel plus Impinger) to the nearest 0.5 g.

3.1.5.2.7 Container No. 7 (Acetone Blank). If particulate emissions are to be determined, at least once during each field test, place a 100-ml portion of the acetone used in the sample recovery process into a labeled container for use in the front-half field reagent blank. Seal the container.

3.1.5.2.8 Container No. 8A (0.1 N Nitric Acid Blank). At least once during each field test, place 300 ml of the 0.1 N nitric acid solution used in the sample recovery process into a labeled container for use in the front-half and back-half field reagent blanks. Seal the container. Container No. 8B (water blank). At least once during each field test, place 100 ml of the water used in the sample recovery process into a labeled Container No. 8B. Seal the container.

3.1.5.2.9 Container No. 9 (5% Nitric Acid/10% Hydrogen Peroxide Blank). At least once during each field test, place 200 ml of the 5% nitric acid/10% hydrogen peroxide solution used as the nitric acid Impinger reagent into a labeled container for use in the back-half field reagent blank. Seal the container.

3.1.5.2.10 Container No. 10 (Acidified Potassium Permanganate Blank). At least once during each field test, place 100 ml of the acidified potassium permanganate solution used as the Impinger solution and in the sample recovery process into a labeled container for use in the back-half field reagent blank for mercury analysis. Prepare the container as described in section 3.1.5.2.5.

NOTE: Due to the potential reaction of the potassium permanganate with the acid, there may be pressure buildup in the sample storage bottles. These bottles shall not be completely filled and shall be vented to relieve potential excess pressure. Venting is required. A No. 70-72 hole drilled in the container cap and Teflon liner has been used.

3.1.5.2.11 Container No. 11 (8 N HCl Blank). At least once during each field test, perform both of the following: Place 200 ml of water into a sample container. Pour 25 ml of 8N HCl carefully with stirring into the 200 ml of water in the container. Mix well and seal the container.

3.1.5.2.12 Container No. 12 (Filter Blank). Once during each field test, place three unused blank filters from the same lot, as the sampling filters in a labeled petri dish. Seal the petri dish. These will be used in the front-half field reagent blank.

3.1.5.3 Sample Preparation. Note the level of the liquid in each of the containers and determine if any sample was lost during shipment. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. A diagram illustrating sample preparation and

analysis procedures for each of the sample train components is shown in Figure 3.1-3.

3.1.5.3.1 Container No. 1 (Filter). If particulate emissions are being determined, then desiccate the filter and filter catch without added heat and weigh to a constant weight as described in section 4.3 of method 5. For analysis of metals, divide the filter with its filter catch into portions containing approximately 0.5 g each and place into the analyst's choice of either individual microwave pressure relief vessels or Parr Bombs. Add 6 ml of concentrated nitric acid and 4 ml of concentrated hydrofluoric acid to each vessel. For microwave heating, microwave the sample vessels for approximately 12-15 minutes in intervals of 1 to 2 minutes at 600 Watts. For conventional heating, heat the Parr Bombs at 140°C (285°F) for 6 hours. Cool the samples to room temperature and combine with the acid digested probe rinse as required in section 3.1.5.3.3, below.

3.1.5.3.3. Containher No. 3 (Probe Rinse). The pH of this sample shall be 2 or lower. If the pH is higher, the sample should be acidified to pH 2 by the careful addition with stirring of concentrated nitric acid. The sample should be rinsed into a beaker with water and the beaker should be covered with a ribbed watchglass. The sample volume should be reduced to approximately 20 ml by heating on a hot plate at a temperature just below boiling. Digest the sample in microwave vessels or Parr® Bombs by quantitatively transferring the sample to the vessel or bomb, by carefully adding the 6 ml of concentrated nitric acid and 4 ml of concentrated hydrofluoric acid and then continuing to follow the procedures described in section 3.1.5.3.1; then combine the resultant sample directly with the acid digested portions of the filter prepared previously in section 3.1.5.3.1. The resultant combined sample is referred to as Fraction 1 precursor. Filtercor the combined solution of the acid digested filter and probe rinse samples using Whatman 541 filter paper. Dilute to 300 ml (or the appropriate volume for the expected metals concentration) with water. This dilution is Fraction 1. Measure and record the volume of the Fraction 1 solution to within

NOTE: All microwave heating times given are approximate and are dependent upon the number of samples being digested at a time. Heating times as given above have been found acceptable for simultaneous digestion of up to 12 (individual) samples. Sufficient

heating is evidenced by solvent reflux within the vessel.

3.1.5.3.5 Centrifuge the samples in Centrifuge Nos. 5A, 5B, and 5C (Impingers 4, 5, and 6). Keep these samples separate from each other and measure and record the volumes of 5A and 5B separately to within 0.5 ml. Dilute sample 5C to 500 ml with water. These samples 5A, 5B, and 5C are referred to respectively as Fractions 3A, 3B, and 3C. Follow the analysis procedures described in section 3.1.5.4.3.

Because the permanganate rinse and water rinse have the capability to recover a high percentage of the mercury from the permanganate impingers, the amount of mercury in the HCl rinse (Fraction 3C) may be very small, possibly even insignificantly small. However, as instructed in this method, add the total of any mercury measured in the HCl rinse (Fraction 3C) to that for Fractions 1B, 2B, 3A, and 3B for calculation of the total sample mercury concentration.

3.1.5.3.6 Container No. 6 (Silica Gel). Weigh the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g using a balance. (This step may be conducted in the field.)

3.1.5.4 Sample Analysis. For each sampling train, seven individual samples are generated for analysis. A schematic identifying each sample and the prescribed sample preparation and analysis scheme is shown in Figure 3.1-3. The first two samples, labeled Fractions 1A and 1B, consist of the digested samples from the front half of the train. Fraction 1A is for ICAP or AAS analysis as described in sections 3.1.5.4.1 and/or 3.1.5.4.2. Fraction 1B is for determination of front-half mercury as described in section 3.1.5.4.3. The back half of the train was used to prepare the third through seventh samples. The third and fourth samples, labeled Fractions 2A and 2B, contain the digested samples from the moisture knockout, if used, and HNO₃/H₂O₂ impingers 1 through 3. Fraction 2A is for ICAP or AAS analysis. Fraction 2B will be analyzed for mercury.

The fifth through seventh samples, labeled Fractions 3A, 3B, and 3C, consist of the impinger contents and rinses from the empty and permanganate impingers 4, 5, and 6. These samples are analyzed for mercury as described in section 3.1.5.4.3. The total background mercury catch is determined from the sum of Fraction 2B and Fractions 3A, 3B, and 3C.

3.1.5.4.1 ICAP Analysis. Fraction 1A and Fraction 2A are analyzed by ICAP using EPA

SW-846 method 6010 or method 200.7 (40 CFR 136, appendix C). Calibrate the ICAP, and set up an analysis program as described in method 6010 or method 200.7. The quality control procedures described in section 3.17.2.1 of this method shall be followed. Recommended wavelengths for use in the analysis are listed below:

Element	Wavelength (nm)
Aluminum	308.215
Antimony	208.833
Arsenic	193.686
Barium	455.403
Beryllium	313.042
Cadmium	228.502
Chromium	267.718
Copper	324.754
Iron	259.040
Lead	270.353
Manganese	257.610
Nickel	231.604
Phosphorus	214.914
Selenium	196.028
Silver	328.068
Thallium	190.664
Zinc	213.656

The wavelengths listed are recommended because of their sensitivity and overall acceptance. Other wavelengths may be substituted if they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference.

Initially, analyze all samples for the distributed target metals (except mercury) plus iron and aluminum. If iron and aluminum are present in the sample, the sample may have to be diluted so that each of these elements is at a concentration of less than 50 ppm to reduce their spectral interferences on arsenic, cadmium, chromium, and lead.

NOTE. When analyzing samples in a hydrofluoric acid matrix, an alumina torch should be used; since all front-half samples will contain hydrofluoric acid, use an alumina torch.

3.1.5.4.2 AAS by Direct Aspiration and/or Graphite Furnace. If analysis of metals in Fraction 1A and Fraction 2A using graphite furnace or direct aspiration AAS is desired, Table 3.1-2 should be used to determine which techniques and methods should be applied for each target metal. Table 3.1-2 should also be consulted to determine possible interferences and techniques to be followed for their minimization. Calibrate the instrument according to section 3.1.6.3 and follow the quality control procedures specified in section 3.1.7.3.2.

TABLE 3.1-2—APPLICABLE TECHNIQUES, METHODS, AND MINIMIZATION OF INTERFERENCE FOR AAS ANALYSIS

Metal	Technique	SW-846 Method No.	Wavelength (nm)	Cause	Interferences
Sb	Aspiration	7040	217.6	1000 mg/mL Pb, Ni, Cu, or acid.	Use secondary wavelength of 231.1 nm; match sample & standards' acid concentration or use nitrous oxide/acetylene flame.
Sb	Furnace	7041	217.6	High Pb	Secondary wavelength or Zeeman correction.
As	Furnace	7060	193.7	Arsenic volatilization	Spiked samples and acid nickel nitrate solution to digestates prior to analysis.
Ba	Aspiration	7080	553.6	Aluminum Calcium	Use Zeeman background correction. High hollow cathode current and narrow band slit.
Ba	Aspiration	7080	234.9	Barium ionization 500 ppm Al	2 mL of KCl per 100 mL of sample. Add 0.1% fluoride.
Ba	Furnace	7091	234.9	High Mg and Si	Use method of standard additions.
Cd	Aspiration	7130	228.8	Be in optical path Absorption and light scattering	Optimize parameters to minimize effects. Background correction is required.
Cd	Furnace	7131	228.8	As above Excess chloride	As above. Ammonium phosphate used as a matrix modifier.
Cr	Aspiration	7190	357.9	Pipet tips Alkal metal	Use cadmium-free tips. KCl ionization suppressant in samples and standards.
Cr	Furnace	7191	357.9	Absorption and scatter	Consult manufacturer's literature.
Cr	Aspiration	7210	324.7	Absorption and scatter	All calcium nitrate for a known constant effect and to eliminate effect of phosphate. Consult manufacturer's manual.
Fe	Aspiration	7380	248.3	Contamination	Great care taken to avoid contamination.
Pb	Aspiration	7420	283.3	217.0 nm alternate	Background correction required.
Pb	Furnace	7421	283.3	Poor recoveries	Matrix modifier, add 10 µL of phosphorus acid to 1 mL of prepared sample in sample cup.
Mn	Aspiration	7460	279.5	403.1 nm alternate	Background correction required.
Ni	Aspiration	7620	232.0	352.4 nm alternate Fe, Co, and Cr	Background correction required. Matrix matching or nitrous oxide/acetylene flame.
Sa	Furnace	7740	166.0	Nonlinear response Volatility	Sample dilution or use 350.3 nm line. Spike samples and reference materials and add nickel nitrate to minimize volatilization.
Ag	Aspiration	7760	328.1	Absorption & scatter AgCl insoluble	Background correction is required and Zeeman background correction can be useful.
Ti	Aspiration	7840	276.8	Viscosity	Background correction is required. Hydrochloric acid should not be used.
Ti	Furnace	7041	276.8	Hydrochloric acid or chloride.	Background correction is required. Verify that losses are not occurring for volatilization by spiked samples or standard addition; Palladium is a suitable matrix modifier.
Zn	Aspiration	7950	213.9	High Sn, Cu, & P Contamination	Siliconium removes Cu and phosphate. Great care taken to avoid contamination.

3.1.5.4.3 Cold Vapor AAS Mercury Analysis.

Fraction 1B, Fraction 2B, and Fractions 3A, 3B, and 3C should be analyzed separately for mercury using cold vapor atomic absorption spectroscopy following the method outlined in the second edition of the Standard Methods for Water and Wastewater Analysis, 15th Edition, Method 303F. Set up the calibration curve (zero to 1000 ng) as described in SW-846 method 7470 or similar to method 7470.

303F, using 300-ml BOD bottles instead of Erlenmeyer. Dilute separately, as described below, a 1 ml to 10 ml aliquot of each original sample to 100 ml with water. Record the amount of the aliquot used for dilution to 100 ml. If no prior knowledge exists of the expected amount of mercury in the sample, a 5-ml aliquot is suggested for the first dilution to 100 ml and analysis. To determine the stack emission value for mercury, the amount of the aliquot of the sample used for dilution and analysis is dependent on the amount of mercury in the aliquot. The total amount of mercury in the aliquot used for analysis shall be less than 1 µg, and within the range (zero to 100 ng) of the calibration curve. Place each sample aliquot into a separate 300-ml BOD bottle and add enough Type II water to make a total volume of 100 ml. Then analyze the 100 ml for mercury by adding to it sequentially the sample preparation solutions and performing the sample preparation and analysis as described in the procedures of SW-846 method 7470 or method 303F. If, during the described analysis, the reading maximum(s) are off-scale (because the aliquot of the original sample analyzed contained more mercury than the maximum of the calibration range) including the analysis of the 100-ml dilution of the 1-ml aliquot of the original sample causing a reading maximum which is off-scale, then perform the following: Dilute the original sample (or a portion of it) with 0.15% HNO₃ in water (1.5 ml concentrated HNO₃ per liter aqueous solution) so that when a 1-ml to 10-ml aliquot of the dilution of the original sample is then further diluted to 100 ml in the BOD bottle, and analyzed by the procedures described above, it will yield an analysis within the range of the calibration curve.

3.1.6 Calibration

Maintain a laboratory log of all calibrations.

3.1.6.1 Sampling Train Calibration. Calibrate the sampling train components according to the indicated sections of method 5: Probe Nozzle (section 5.1); Pilot Tube (section 5.2); Metering System (section 5.3); Probe Heater (section 5.4); Temperature Gauges (section 5.5); Leak-Check of the Metering System (section 5.6); and Barometer (section 5.7).

3.1.6.2 Inductively Coupled Argon Plasma Spectrometer Calibration. Prepare standards as outlined in section 3.1.4.4. Profile and calibrate the instrument according to the instrument manufacturer's recommended procedures using the above standards. The instrument calibration should be checked once per hour. If the instrument does not reproduce the concentrations of the standard within 10 percent, the complete calibration procedures should be performed.

3.1.6.3 Atomic Absorption Spectrometer - Direct Aspiration, Graphite Furnace and

Cold Vapor Mercury Analysis. Prepare the standards as outlined in section 3.1.4.4. Calibrate the spectrometer using these prepared standards. Calibration procedures are also outlined in the EPA methods referred to in Table 3.1-2 and in SW-846 Method 7470 or Standard Methods for Water and Wastewater, 15th Edition, method 303F (for mercury). Each standard curve should be run in duplicate and the mean values used to calculate the calibration line. The instrument should be recalibrated approximately once every 10 to 12 samples.

3.1.7 Quality Control

3.1.7.1 Sampling. Field Reagent Blanks. When analyzed, the blank samples in Container Numbers 7 through 12 produced previously in sections 3.1.5.2.7 through 3.1.5.2.12, respectively, shall be processed, digested, and analyzed as follows: Digest and process one of the filters from Container No. 12 per section 3.1.5.3.1, 100 ml from Container No. 7, per section 3.1.5.3.2, and 100 ml from Container No. 8A per section 3.1.5.3.3. This produces Fraction Blank 1A and Fraction Blank 1B from Fraction Blank 1. (If desired, the other two filters may be digested separately according to section 3.1.5.3.1, diluted separately to 300 ml each, and analyzed separately to produce a blank value for each of the two additional filters. If these analyses are performed, they will produce two additional values for each of Fraction Blank 1A and Fraction Blank 1B. The three Fraction Blank 1A values will be calculated as three values of M_{1A} in Equation 3 of section 3.1.8.4.3, and then the three values shall be totalled and divided by 3 to become the value, M_{1A} , to be used in the computation of M_1 by Equation 3. Similarly, the three Fraction Blank 1B values will be calculated separately as three values of M_{1B} in Equation 3, and used as the value for M_{1B} in Equation 3. The analyses of the two extra filters are optional and are not a requirement of this method, but if the analyses are performed, the results must be considered as described above.) Combine 100 ml of Container No. 8A with 200 ml of the contents of Container No. 9 and digest and process the resultant volume per section 3.1.5.3.4. This produces concentrated Fraction Blank 2A and Fraction Blank 2B from Fraction Blank 2. A 100-ml portion of Container No. 8A is Fraction Blank 3A. Combine 100 ml of the contents of Container No. 10 with 33 ml of the contents of Container No. 8B. This produces Fraction Blank 3B (use 400 ml as the volume of Fraction Blank 3B when calculating the blank value. Use the actual volume when calculating all the other blank values). Dilute 225 ml of the contents of Container No. 11 to 500 ml with water. This produces Fraction Blank 3C. Analyze Fraction Blank 1A and Fraction Blank 2A per section 3.1.5.4.1

and/or 3.1.5.4.2. Analyze Fraction Blank 1B, Fraction Blank 2B, and Fraction Blanks 3A, 3B, and 3C per section 3.1.5.4.3. The analysis of Fraction Blank 1A produces the front-half reagent blank correction values for the method except mercury; the analysis of Fraction Blank 1B produces the front-half reagent blank correction value for mercury. The analysis of concentrated Fraction Blank 2A produces the back-half reagent blank correction values for the metals except mercury, while separate analysis of Fraction Blanks 2B, 3A, 3B, and 3C produce the back-half reagent blank correction value for mercury.

3.1.7.2 An attempt may be made to determine if the laboratory reagents used in section 3.1.5.3 caused contamination. They should be analyzed by the procedures in section 3.1.5.4. The Administrator will determine whether the laboratory blank reagent values can be used in the calculation of the stationary source test results.

3.1.7.3 Quality Control Samples. The following quality control samples should be analyzed:

3.1.7.3.1 ICAP Analysis. Follow the quality control shown in section 8 of method 6010. For the purposes of a three-run test series, these requirements have been modified to include the following: Two instrument check standard runs, two calibration blank runs, one interference check sample at the beginning of the analysis (must be within 25% or analyze by the method of standard additions), one quality control sample to check the accuracy of the calibration standards (must be within 25% of calibration), and one duplicate analysis (must be within 10% of average or repeat all analyses).

3.1.7.3.2 Direct Aspiration and/or Graphite Furnace AAS Analysis for antimony, arsenic, barium, beryllium, cadmium, copper, chromium, lead, nickel, manganese, mercury, phosphorus, selenium, silver, thallium, and zinc. All samples should be analyzed in duplicate. Perform a matrix spike on at least one front-half sample and one back-half sample or one combined sample. If recoveries are less than 75 percent or greater than 125 percent are obtained for the matrix spike, analyze each sample by the method of standard additions. A quality control sample should be analyzed to check the accuracy of the calibration standards. The results must be within 10% of the calibration reported.

3.1.7.3.3 Cold Vapor AAS Analysis for Mercury. All samples should be analyzed in duplicate. A quality control sample should be analyzed to check the accuracy of the calibration standards (within 15% or repeat calibration). Perform a matrix spike on one sample from the nitric impinger portion (must be within 25% or samples must be analyzed by the method of standard additions). Additional information on quality control can be obtained from EPA SW-846 method 7470 or in Standard Methods for the Examination of

Water and Wastewater, 15th Edition, method 303F.

3.1.8 Calculations

3.1.8.1 Dry Gas Volume. Using the data from this test, calculate V_{stack} , the dry gas sample volume at standard conditions as outlined in Section 6.3 of Method 5.

3.1.8.2 Volume of Water Vapor and Moisture Content. Using the data obtained from this test, calculate the volume of water vapor $V_{\text{H}_2\text{O}}$ and the moisture content $B_{\text{H}_2\text{O}}$ of the stack gas. Use Equations 5-2 and 5-3 of Method 5.

3.1.8.3 Stack Gas Velocity. Using the data from this test and Equation 2-9 of Method 2, calculate the average stack gas velocity.

3.1.8.4 Metals (Except Mercury) in Source Sample.

3.1.8.4.1 Fraction 1A, Front Half, Metals (except Hg). Calculate separately the amount of each metal collected in Fraction 1 of the sampling train using the following equation:

$$M_{1A} = C_1 \cdot F_1 \cdot V_{1A} \quad \text{Eq. 1}$$

where:

M_{1A} = total mass of each metal (except Hg) collected in the front half of the sampling train (Fraction 1), µg.

C_1 = concentration of metal in sample Fraction 1A as read from the standard curve (µg/ml).

F_1 = dilution factor (F_1 = the inverse of the fractional portion of the concentrated sample in the solution actually used in the instrument to produce the reading C_1). For example, when 2 ml of Fraction 1A are diluted to 10 ml, $F_1 = 5$.

V_{1A} = total volume of digested sample solution (Fraction 1), ml.

3.1.8.4.2 Fraction 2A, Back Half, Metals (except Hg). Calculate separately the amount of each metal collected in Fraction 2 of the sampling train using the following equation:

$$M_{2A} = C_2 \cdot F_2 \cdot V_{2A} \quad \text{Eq. 2}$$

where:

M_{2A} = total mass of each metal (except Hg) collected in the back half of the sampling train (Fraction 2), µg.

C_2 = concentration of metal in sample concentrated Fraction 2A, as read from the standard curve (µg/ml).

F_2 = dilution factor, volume of Fraction 2 divided by volume of aliquot Fraction 2A (see section 3.1.5.3.4).

V_{2A} = total volume of digested sample solution (concentrated Fraction 2A), ml (see section 3.1.5.3.4.1 or 3.1.5.3.4.2, as applicable).

* If Fractions 1A and 2A are combined, proportional aliquots must be used. Appropriate changes must be made in Equations 1-3 to reflect this approach.

3.1.8.4.3 Total Train. Metals (except Hg). Calculate the total amount of each of the quantified metals collected in the sampling train as follows:

$$M_t = (M_m - M_{mb}) + (M_{hb} - M_{bb}) \quad \text{Eq. 3}$$

where:

M_t =total mass of each metal (separately stated for each metal) collected in the sampling train, μg .

M_{mb} =blank correction value for mass of metal detected in front-half field reagent blank, μg .

M_{bb} =blank correction value for mass of metal detected in back-half field reagent blank, μg .

NOTE: If the measured blank value for the front half (m_{mb}) is in the range 0.0 to A μg (where A μg equals the value determined by multiplying 1.4 μg per square inch (1.4 $\mu\text{g}/\text{in}^2$) times the actual area in square inches (in^2) of the filter used in the emission sample) m_{mb} may be used to correct the emission sample value (m_m); if m_{mb} exceeds A μg , the greater of the two following values (either I, or II,) may be used:

I. A μg , or

II. the lesser of (a) m_{mb} , or (b) 5 percent of m_m .

If the measured blank value for the back half (m_{bb}) is in the range of 0.0 to 1 μg , m_{bb} may be used to correct the emission sample value (m_{mb}); if m_{bb} exceeds 1 μg , the greater of the two following values may be used: 1 μg or 5 percent of m_{mb} .

3.1.8.5 Mercury in Source Sample.

3.1.8.5.1 Fraction 1B, Front Half. Hg. Calculate the amount of mercury collected in the front half, Fraction 1, of the sampling train using the following equation:

$$\text{Hg}_m = \frac{Q_m}{V_{m,1}} \times V_{m,1} \quad \text{Eq. 4}$$

where:

Hg_m =total mass of mercury collected in the front half of the sampling train (Fraction 1), μg .

Q_m =quantity of mercury in analyzed sample, μg .

$V_{m,1}$ =total volume of digested sample solution (Fraction 1), ml.

$V_{m,2}$ =volume of Fraction 1B analyzed, ml. See the following notice.

NOTE: $V_{m,1}$ is the actual amount of Fraction 1B analyzed. For example, if 1 ml of Fraction 1B were diluted to 100 ml to bring it into the proper analytical range, and 1 ml of the 100-ml dilution were analyzed, $V_{m,1}$ would be 0.01 ml.

3.1.8.5.2 Fraction 2B and Fractions 3A, 3B, and 3C, Back Half. Hg. Calculate the amount of mercury collected in Fractions 2 using Equation 5 and in Fractions 3A, 3B, and 3C using Equation 6. Calculate the total amount

of mercury collected in the back half of the sampling train using Equation 7.

$$\text{Hg}_{hb} = \frac{Q_{hb}}{V_{hb}} \times V_{m,2} \quad \text{Eq. 6}$$

where:

Hg_{hb} =total mass of mercury collected in Fraction 2, μg .

Q_{hb} =quantity of mercury in analyzed sample, μg .

$V_{m,2}$ =total volume of Fraction 2, ml.

V_{hb} =volume of Fraction 2B analyzed, ml (see the following note).

NOTE: V_{hb} is the actual amount of Fraction 2B analyzed. For example, if 1 ml of Fraction 2B were diluted to 10 ml to bring it into the proper analytical range, and 5 ml of the 10-ml dilution was analyzed, V_{hb} would be 0.5.

Use Equation 6 to calculate separately the back-half mercury for Fractions 3A, then 3B, then 3C.

$$\text{Hg}_{b3A,B,C} = \frac{Q_{b3A,B,C}}{V_{b3A,B,C}} \times V_{m,3A,B,C} \quad \text{Eq. 6}$$

where:

$\text{Hg}_{b3A,B,C}$ =total mass of mercury collected separately in Fraction 3A, 3B, or 3C, μg .

$Q_{b3A,B,C}$ =quantity of mercury in separately analyzed samples, μg .

$V_{m,3A,B,C}$ =volume of Fraction 3A, 3B, or 3C analyzed, ml (see Note in sections 3.1.8.5.1 and 3.1.8.5.2, and calculate similarly).

$V_{m,3A,B,C}$ =total volume of Fraction 3A, 3B, or 3C, ml.

$\text{Hg}_{b3} = \text{Hg}_{b3A} + \text{Hg}_{b3B} + \text{Hg}_{b3C}$ Eq. 7

where:

Hg_{b3} =total mass of mercury collected in the back half of the sampling train, μg .

3.1.8.5.3 Total Train Mercury Catch. Calculate the total amount of mercury collected in the sampling train using Equation 8.

$$\text{Hg}_t = (\text{Hg}_m - \text{Hg}_{mb}) + (\text{Hg}_{hb} - \text{Hg}_{bb}) \quad \text{Eq. 8}$$

where:

Hg_t =total mass of mercury collected in the sampling train, μg .

Hg_{mb} =blank correction value for mass of mercury detected in front-half field reagent blank, μg .

Hg_{bb} =blank correction value for mass of mercury detected in back-half field reagent blank, μg .

NOTE: If the total of the measured blank values ($\text{Hg}_{mb} + \text{Hg}_{bb}$) is in the range of 0 to 6 μg , then the total may be used to correct the emission sample value ($\text{Hg}_m + \text{Hg}_{hb}$); if it exceeds 6 μg , the greater of the following two values may be used: 6 μg or 5 percent of the emission sample value ($\text{Hg}_m + \text{Hg}_{hb}$).

3.1.8.6 Metal Concentration of Stack Gas. Calculate each metal separately for the cad-

mium, total chromium, arsenic, nickel, manganese, beryllium, copper, lead, phosphorus, thallium, silver, barium, zinc, selenium, antimony, and mercury concentrations in the stack gas (dry basis, adjusted to standard conditions) as follows:

$$C_s = K_1(M_s/V_{m,sc}) \quad \text{Eq. 9}$$

where:

C_s =concentration of each metal in the stack gas, ng/dscm .

$K_1 = 10^{-3} \text{ mg}/\mu\text{g}$.

M_s =total mass of each metal collected in the sampling train, μg ; (substitute Hg_t for M_s for the mercury calculation).

$V_{m,sc}$ =volume of gas sample as measured by the dry gas meter, corrected to dry standard conditions, dscm .

3.1.8.7 Isokinetic Variation and Acceptable Results. Same as method 5, sections 6.11 and 6.12, respectively.

3.1.9 Bibliography

3.1.9.1 Method 303F in Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980. Available from the American Public Health Association, 1015 18th Street NW., Washington, DC 20036.

3.1.9.2 EPA Methods 6010, 7000, 7041, 7060, 7131, 7421, 7470, 7740, and 7841. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846, Third Edition, September 1989. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC 20460.

3.1.9.3 EPA Method 200.7, Code of Federal Regulations, title 40, part 136, appendix C, July 1, 1987.

3.1.9.4 EPA Methods 1 through 5, and 12 Code of Federal Regulations, title 40, part 60, appendix A, July 1, 1987.

3.2 Determination of Hexavalent Chromium Emissions from Stationary Sources (Method Cr⁺⁺)

3.2.1 Applicability and Principle

3.2.1.1 Applicability. This method applies to the determination of hexavalent chromium (Cr⁺⁺) emissions from hazardous waste incinerators, municipal waste combustors, sewage sludge incinerators, and boilers and industrial furnaces. With the approval of the Administrator, this method may also be used to measure total chromium. The sampling train, constructed of Teflon components, has only been evaluated at temperatures less than 300 °F. Trains constructed of other materials, for testing at higher temperatures, are currently being evaluated.

3.2.1.2 Principle. For incinerators and combustors, the Cr⁺⁺ emissions are collected isokinetically from the source. To eliminate the possibility of Cr⁺⁺ reduction between the nozzle and impinger, the emission samples are collected with a recirculatory train

where the impinger reagent is continuously recirculated to the nozzle. Recovery procedures include a post-sampling purge and filtration. The impinger train samples are analyzed for Cr⁺⁺ by an ion chromatograph equipped with a post-column reactor and a visible wavelength detector. The IC/PCR separates the Cr⁺⁺ as chromate (CrO⁴⁻) from other components in the sample matrices that may interfere with the Cr⁺⁺-specific diphenylcarbazide reaction that occurs in the post-column reactor. To increase sensitivity for trace levels of chromium, a preconcentration system is also used in conjunction with the IC/PCR.

3.2.2 Range, Sensitivity, Precision, and Interference

3.2.2.1 Range. Employing a preconcentration procedure, the lower limit of the detection range can be extended to 16 nanograms per dry standard cubic meter (ng/dscm) with a 3 dscm gas sample (0.1 ppb in solution). With sample dilution, there is no upper limit.

3.2.2.2 Sensitivity. A minimum detection limit of 8 ng/dscm with a 3 dscm gas sample can be achieved by preconcentration (0.05 ppb in solution).

3.2.2.3 Precision. The precision of the IC/PCR with sample preconcentration is 5 to 10 percent. The overall precision for sewage sludge incinerators emitting 120 ng/dscm of Cr⁺⁺ and 3.5 $\mu\text{g}/\text{dscm}$ of total chromium is 25% and 9% for Cr⁺⁺ and total chromium, respectively; for hazardous waste incinerators emitting 300 ng/dscm of Cr⁺⁺ it is 20 percent.

3.2.2.4 Interference. Components in the sample matrix may cause Cr⁺⁺ to convert to trivalent chromium (Cr³⁺) or cause Cr³⁺ to convert to Cr⁺⁺. A post-sampling nitrogen purge and sample filtration are included to eliminate many of these interferences. The chromatographic separation of Cr⁺⁺ using ion chromatography reduces the potential for other metals to interfere with the post-column reaction. For the IC/PCR analysis, only compounds that coelute with Cr⁺⁺ and affect the diphenylcarbazide reaction will cause interference. Periodic analysis of deionized (DI) water blanks is used to demonstrate that the analytical system is essentially free from contamination. Sample cross-contamination that can occur when high-level and low-level samples or standards are analyzed alternately is eliminated by thorough purging of the sample loop. Purging can easily be achieved by increasing the injection volume of the samples to ten times the size of the sample loop.

3.2.3 Apparatus

3.2.3.1 Sampling Train. Schematics of the recirculating sampling trains employed in this method are shown in Figures 3.2-1 and 3.2-2. The recirculatory train is readily as-

sembled from commercially available components. All portions of the train in contact with the sample are either glass, quartz, Teflon, or Teflon, and are to be cleaned as per subsection 32.5.1.1.

The metering system is identical to that specified by Method 5 (see section 3.8.1); the sampling train consists of the following components:

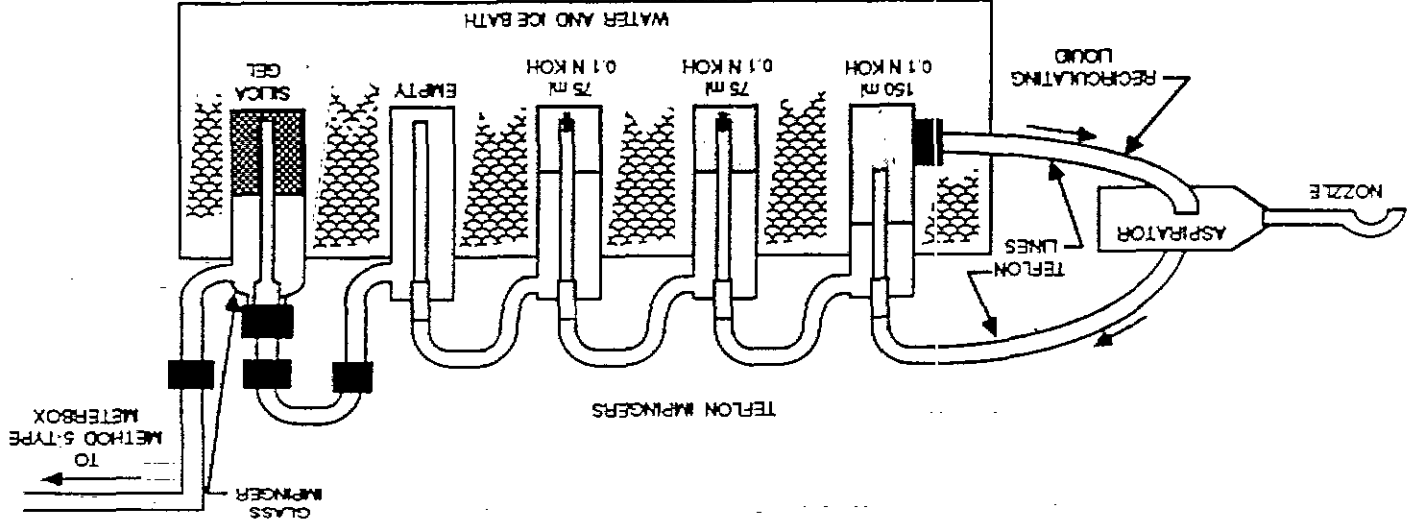


Figure 3.2-1 Schematic of recirculatory impinger train with aspirator assembly.

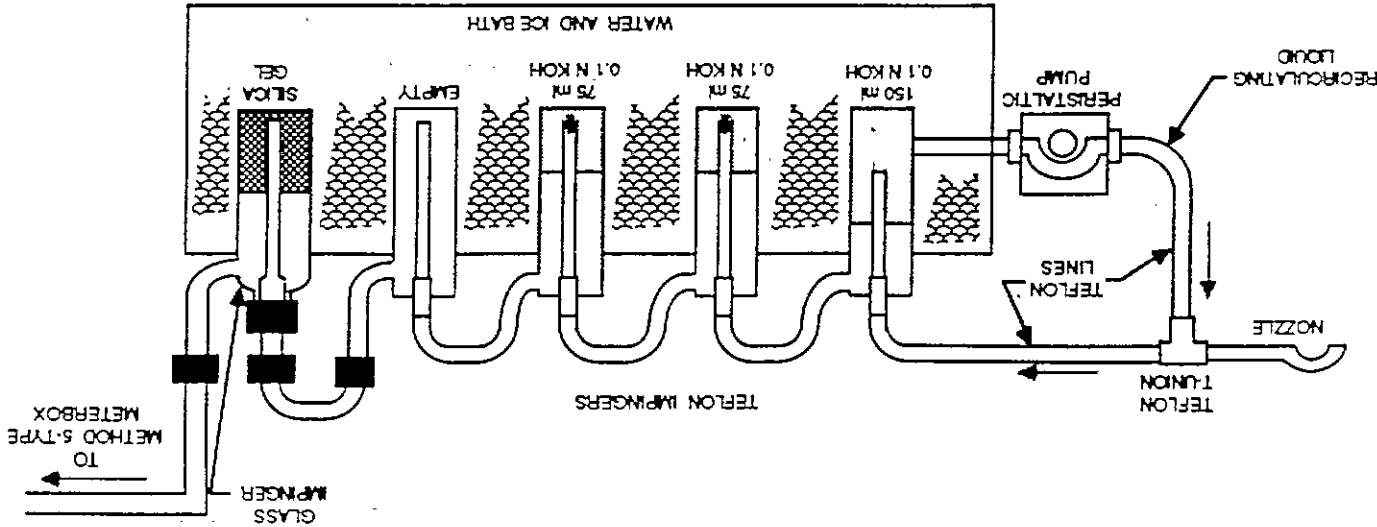


Figure 3.2-2 Schematic of recirculation impinger train with pump/sprayer assembly

4215 790

3.2.3.1.1 Probe Nozzle. Glass or Teflon with a sharp, tapered leading edge. The angle of taper shall be $\leq 30^\circ$ and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook or elbow design, unless otherwise specified by the Administrator.

A range of nozzle sizes suitable for isokinetic sampling should be available, e.g., 0.32 to 1.27 cm ($\frac{1}{8}$ to $\frac{1}{2}$ in) (or larger if higher volume sample trains are used) inside diameter (ID) nozzles in increments of 0.16 cm ($\frac{1}{16}$ in). Each nozzle shall be calibrated according to the procedures outlined in section 3.2.6.

3.2.3.1.2 Teflon Aspirator or Pump/Sprayer Assembly. Teflon aspirator capable of recirculating absorbing reagent at 50 ml/min while operating at 0.75 cfm. Alternatively, a pump/sprayer assembly may be used instead of the Teflon aspirator. A Teflon union-T is connected behind the nozzle to provide the absorbing reagent/sample gas mix; a peristaltic pump is used to recirculate the absorbing reagent at a flow rate of at least 60 ml/min. Teflon fittings, Teflon ferrules, and Teflon nuts are used to connect a glass or Teflon nozzle, recirculating line, and sample line to the Teflon aspirator or union-T. Tygon, C-flex** or other suitable inert tubing for use with peristaltic pump.

3.2.3.1.3 Teflon Sample Line. Teflon, $\frac{3}{8}$ " outside diameter (OD) and $\frac{1}{4}$ " inside diameter (ID), or $\frac{1}{2}$ " OD x $\frac{3}{8}$ " ID, of suitable length to connect aspirator (or T-union) to first Teflon impinger.

3.2.3.1.4 Teflon Recirculation Line. Teflon, $\frac{1}{4}$ " O.D. and $\frac{1}{4}$ " I.D., of suitable length to connect first impinger to aspirator (or T-union).

3.2.3.1.5 Teflon Impingers. Four Teflon impingers; Teflon tubes and fittings, such as made by Saville** can be used to construct

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

Impingers 2" diameter by 12" long, with vacuum-tight $\frac{3}{8}$ " O.D. Teflon compression fittings. Alternatively, standard glass impingers that have been Teflon-lined, with Teflon stems and U-tubes, may be used. Inlet fittings on impinger top to be bored through to accept $\frac{3}{8}$ " O.D. tubing as impinger stem. The second and third $\frac{3}{8}$ " OD Teflon stem has a $\frac{1}{4}$ " OD Teflon tube, 2" long, inserted at its end to duplicate the effects of the Greenburg-Smith impinger stem. The first impinger stem should extend 2" from impinger bottom, high enough in the impinger reagent to prevent air from entering recirculating line; the second and third impinger stems should extend to $\frac{1}{2}$ " from impinger bottom. The first impinger should include a $\frac{1}{4}$ " O.D. Teflon compression fitting for recirculation line. The fourth impinger serves as a knockout impinger.

3.2.3.1.6 Glass Impinger. Silica gel impinger. Vacuum-tight impingers, capable of containing 400 g of silica gel, with compatible fittings. The silica gel impinger will have a modified stem ($\frac{1}{2}$ " ID at tip of stem).

3.2.3.1.7 Thermometer. (Identical to that specified by Method 5) at the outlet of the silica gel impinger, to monitor the exit temperature of the gas.

3.2.3.1.8 Metering System, Barometer, and Gas Density Determinations Equipment. Same as method 5, sections 2.1.8 through 2.1.10, respectively.

3.2.3.2 Sample Recovery. Clean all items for sample handling or storage with 10% nitric acid solution by soaking, where possible, and rinse thoroughly with DI water before use.

3.2.3.2.1 Nitrogen Purge Line. Inert tubing and fittings capable of delivering 0 to 1 scfm (continuously adjustable) of nitrogen gas to the impinger train from a standard gas cylinder (see Figure 3.2.3). Standard $\frac{3}{8}$ -inch Teflon tubing and compression fittings in conjunction with an adjustable pressure regulator and needle valve may be used.

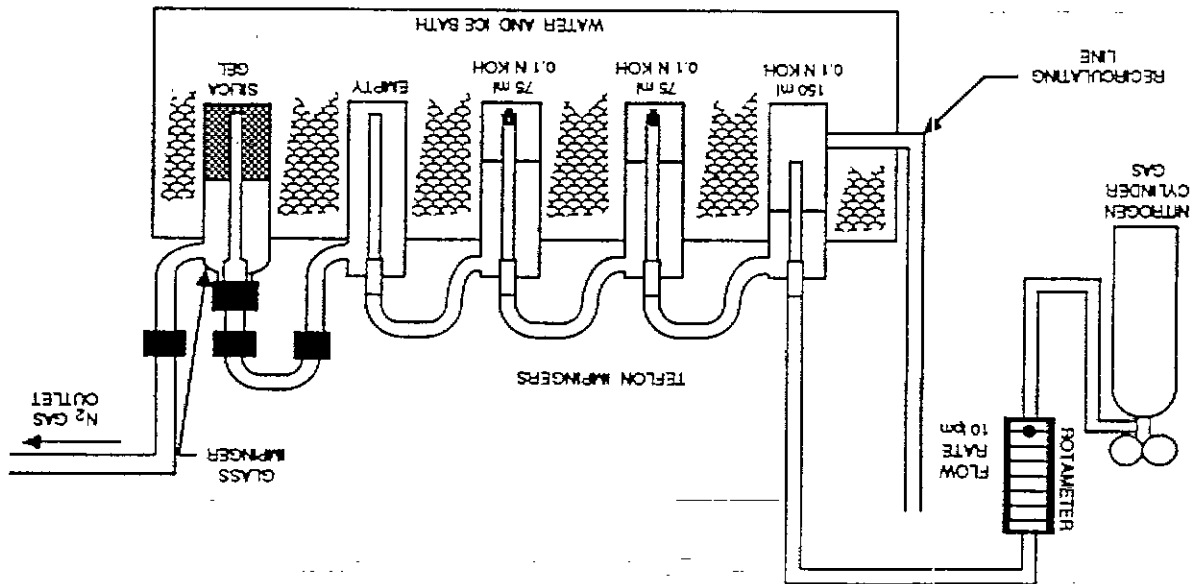


Figure 3-2-3 Schematic of post test nitrogen purge system.

4215 790

3.2.3.2.2 Wash bottles. Two polyethylene wash bottles, for DI water and nitric rinses solution.

3.2.3.2.3 Sample Storage Containers. Polyethylene, with leak-free screw cap, 500-ml or 1000-ml.

3.2.3.2.4 1000-ml Graduated Cylinder.

3.2.3.2.5 Plastic Storage Containers. Air tight containers to store silica gel.

3.2.3.2.6 Funnel and Rubber Polyceman. To aid in transfer of silica gel from impinger to storage container; not necessary if silica gel is weighed directly in the impinger.

3.2.3.2.7 Balance.

3.2.3.3 Sample Preparation for Analysis. Sample preparation prior to analysis includes purging the sample train immediately following the sample run, and filtering the recovered sample to remove particulate matter immediately following recovery.

3.2.3.3.1 Beakers, Funnels, Volumetric Flasks, Volumetric Pipets, and Graduated Cylinders. Assorted sizes, Teflon or glass, for preparation of samples, sample dilution, and preparation of calibration standards. Prepare initially following procedure described in section 3.2.3.1.3 and rinse between use with 0.1 N HNO₃ and DI water.

3.2.3.3.2 Filtration Apparatus. Teflon, or equivalent, for filtering samples, and Teflon filter holder. Teflon impinger components have been found to be satisfactory as a sample reservoir for pressure filtration using nitrogen.

3.2.3.4 Analysis.

3.2.3.4.1 IC/PCIT System. High performance liquid chromatograph pump, sample injection valve, post-column reagent delivery and mixing system, and a visible detector, capable of operating at 520 nm, all with a non-metallic (or inert) flow path. An electronic recording integrator operating in the peak area mode is recommended, but other recording devices and integration techniques are acceptable provided the repeatability criteria and the linearity criteria for the calibration curve described in section 3.2.5.5 can be satisfied. A sample loading system will be required if preconcentration is employed.

3.2.3.4.2 Analytical Column. A high performance ion chromatograph (HPIC) non-metallic column with anion separation characteristics and a high loading capacity designed for separation of metal chelating compounds to prevent metal interference. Resolution described in section 3.2.5.4 must be obtained. A non-metallic guard column with the same ion-exchange material is recommended.

3.2.3.4.3 Preconcentration Column. An HPIC non-metallic column with acceptable anion retention characteristics and sample loading rates as described in section 3.2.5.5.

3.2.3.4.4 0.45 µm filter cartridge. For the removal of insoluble material. To be used just prior to sample injection/analysis.

3.2.4 Reagents

All reagents should, at a minimum, conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. All prepared reagents should be checked by IC/PCIT analysis for Cr⁶⁺ to ensure that contamination is below the analytical detection limit for direct injection or, if selected, preconcentration. If total chromium is also to be determined, the reagents should also be checked by the analytical technique selected to ensure that contamination is below the analytical detection limit.

3.2.4.1 Sampling.

3.2.4.1.1 Water. Deionized water. It is recommended that water blanks be checked prior to preparing sampling reagents to ensure that the Cr⁶⁺ content is less than the analytical detection limit.

3.2.4.1.2 Potassium Hydroxide, 0.1 N. Add 5.6 gm of KOH(s) to approximately 900 ml of DI water and let dissolve. Dilute to 1000 ml with DI water.

NOTE: At sources with high concentrations of acids and/or SO₂, the concentration of KOH should be increased to 0.5 N to ensure that the pH of the solution is above 8.5 after sampling.

3.2.4.1.3 Silica Gel and Crushed Ice. Same as Method 5, sections 3.1.2 and 3.1.4, respectively.

3.2.4.2 Sample Recovery. The reagents used in sample recovery are as follows:

3.2.4.2.1 Water. Same as subsection 3.2.4.1.1.

3.2.4.2.2 Nitric Acid, 0.1 N. Add 6.3 ml of concentrated HNO₃ (70 percent) to a graduated cylinder containing approximately 900 ml of DI water. Dilute to 1000 ml with DI water, and mix well.

3.2.4.2.3 pH Indicator Strip. pH indicator capable of determining pH of solution between the pH range of 7 and 12, at 0.5 pH intervals.

3.2.4.3 Sample Preparation

3.2.4.3.1 Water. Same as subsection 3.2.4.1.1.

3.2.4.3.2 Nitric Acid, 0.1 N. Same as subsection 3.2.4.2.2.

3.2.4.3.3 Filters. Acetate membrane, or equivalent, filters with 0.45 micrometer or smaller pore size to remove insoluble material.

3.2.4.4 Analysis

3.2.4.4.1 Chromatographic Eluent. The eluent used in the analytical system is ammonium sulfate based. It is prepared by adding 6.5 ml of 29 percent ammonium hydroxide (NH₄OH) and 33 grams of ammonium sulfate ((NH₄)₂SO₄) to 500 ml of DI water. The mixture should then be diluted to 1 liter with DI water and mixed well. Other combinations of eluents and/or columns may be employed provided peak resolution, as described in sec-

tion 3.2.5.4, repeatability and linearity, as described in section 3.2.6.2, and analytical sensitivity are acceptable.

3.2.4.4.2 Post-Column Reagent. An effective post-column reagent for use with the chromatographic eluent described in section 3.2.4.4.1 is a diphenylcarbazide (DPC) based system. Dissolve 0.5 g of 1,5-diphenylcarbazide (DPC) in 100 ml of ACS grade methanol. Add to 500 ml of degassed DI water containing 50 ml of 96 percent spectrophotometric grade sulfuric acid. Dilute to 1 liter with degassed DI water.

3.2.4.4.3 Cr⁺⁺ Calibration Standard. Prepare Cr⁺⁺ standards from potassium dichromate (K₂Cr₂O₇, FW 294.19). To prepare a 1000 µg/ml Cr⁺⁺ stock solution, dissolve 2.829 g of dry K₂Cr₂O₇ in 1 liter of DI water. To prepare working standards, dilute the stock solution to the chosen standard concentrations for instrument calibration with 0.05 N KOH to achieve a matrix similar to the actual field samples.

3.2.4.4.4 Performance Audit Sample. A performance audit sample shall be obtained from the Quality Assurance Division of EPA and analyzed with the field samples. The mailing address to request audit samples is: U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory, Quality Assurance Division, Source Branch, Mail Drop 77-A, Research Triangle Park, North Carolina 27711.

The audit sample should be prepared in a suitable sample matrix at a concentration similar to the actual field samples.

3.2.5 Procedure

SAFETY FIRST—WEAR SAFETY GLASSES AT ALL TIMES DURING THIS TEST METHOD

3.2.5.1 Sampling. The complexity of this method is such that to obtain reliable results, testers should be trained and experienced with test procedures.

3.2.5.1.1 Pretest Preparation. All components shall be maintained and calibrated according to the procedures described in APTD-0576, unless otherwise specified herein.

Rinse all sample train components from the glass nozzle up to the silica gel impinger and sample containers with hot tap water followed by washing with hot soapy water. Next, rinse the train components and sample containers three times with tap water followed by three rinses with DI water. All the components and containers should then be soaked overnight, or a minimum of 4 hours, in a 10 percent (v/v) nitric acid solution, then rinsed three times with DI water. Allow the components to air dry prior to covering all openings with Parafilm, or equivalent.

3.2.5.1.2 Preliminary Determinations. Same as method 5, section 4.1.2.

3.2.5.1.3 Preparation of Sampling Train. Measure 300 ml of 0.1 N KOH into a graduated

cylinder (or tare-weighed precleaned polyethylene container). Place approximately 150 ml of the 0.1 N KOH reagent in the first Teflon impinger. Split the rest of the 0.1 N KOH between the second and third Teflon impingers. The next Teflon impinger is left dry. Place a preweighed 200- to 400-g portion of indicating silica gel in the final glass impinger. (For sampling periods in excess of two hours, or for high moisture sites, 400-g of silica gel is recommended.)

Retain reagent blanks of the 0.1 N KOH equal to the volumes used with the field samples.

3.2.5.1.4 Leak-Check Procedure. Follow the leak-check procedure given in Method 5, section 4.1.4.1 (Pretest Leak-Check). Section 4.1.4.2 (Leak-Checks During the Sample Run), and Section 4.1.4.3 (Post-Test Leak-Checks).

3.2.5.1.5 Sampling Train Operation. Follow the procedures given in method 5, section 4.1.5. The sampling train should be fed down with water and ice to ensure heat transfer with the Teflon impingers.

NOTE: If the gas to be sampled is above 300 °F, it may be necessary to wrap three or four feet of the Teflon sample and recirculating lines inside the ice bath to keep the recirculating reagent cool enough so it does not turn to steam.

For each run, record the data required on a data sheet such as the one shown in Figure 5.2 of method 5.

At the end of the sampling run, determine the pH of the reagent in the first impinger using a pH indicator strip. The pH of the solution shall be greater than 8.5.

3.2.5.1.6 Calculation of Percent Isokinetic. Same as method 5, section 4.1.6.

3.2.5.2 Post-Test Nitrogen Purge. The nitrogen purge is used as a safeguard against the conversion of hexavalent chromium to the trivalent oxidation state. The purge is effective in the removal of SO₂ from the impinger contents.

Attach the nitrogen purge line to the input of the impinger train. Check to ensure the output of the impinger train is open, and that the recirculating line is capped off. Open the nitrogen gas flow slowly and adjust the delivery rate to 10 L/min. Check the recirculating line to ensure that the pressure is not forcing the impinger reagent out through this line. Continue the purge under these conditions for one-half hour, periodically checking the flow rate.

3.2.5.3 Sample Recovery. Begin cleanup procedures as soon as the train assembly has been purged at the end of the sampling run. The probe assembly may be disconnected from the sample train prior to sample purging.

The probe assembly should be allowed to cool prior to sample recovery. Disconnect the umbilical cord from the sample train. When the probe assembly can be safely han-

dled, wipe off all external particulate matter near the tip of the nozzle, and cap the nozzle prior to transporting the sample train to a cleanup area that is clean and protected from the wind and other potential causes of contamination or loss of sample. Inspect the train before and during disassembly and note any abnormal conditions.

3.2.5.3.1 Container No. 1 (Impingers 1 through 3). Disconnect the first impinger from the second impinger and disconnect the recirculation line from the aspirator or portable pump. Drain the Teflon impingers into a precleaned graduated cylinder or tare-weighed precleaned polyethylene sample container and measure the volume of the liquid to within 1 ml or 1 g. Record the volume of liquid present as this information is required to calculate the moisture content of the flue gas sample. If necessary, transfer the sample from the graduated cylinder to a precleaned polyethylene sample container. With DI water, rinse four times the insides of the glass nozzle, the aspirator, the sample and recirculation lines, the impingers, and the connecting tubing, and combine the rinses with the impinger solution in the sample container.

3.2.5.3.2 Container No. 2 (HNO₃ rinse optional for total chromium). With 0.1 N HNO₃, rinse three times the entire train assembly, from the nozzle to the fourth impinger and combine the rinses into a separate precleaned polyethylene sample container for possible total chromium analysis. Repeat the rinse procedure a final time with DI water, and discard the water rinses. Mark the height of the fluid level on the container or, alternatively if a balance is available, weigh the container and record the weight to permit determination of any leakage during transport. Label the container clearly to identify its contents.

3.2.5.3.3 Container No. 3 (Silica Gel). Note the color of the indicating silica gel to determine if it has been completely spent. Quantitatively transfer the silica gel from its impinger to the original container, and seal the container. A funnel and a rubber policeman may be used to aid in the transfer. The small amount of particulate that may adhere to the impinger wall need not be removed. Do not use water or other liquids to transfer the silica gel. Alternatively, if a balance is available in the field, record the weight of the spent silica gel (or the silica gel plus impinger) to the nearest 0.5 g.

3.2.5.3.4 Container No. 4 (0.1 N KOH Blank). Once during each field test, place a volume of reagent equal to the volume placed in the sample train into a precleaned

polyethylene sample container, and seal the container. Mark the height of the fluid level on the container or, alternatively if a balance is available, weigh the container and record the weight to permit determination of any leakage during transport. Label the container clearly to identify its contents.

3.2.5.3.5 Container No. 5 (DI Water Blank). Once during each field test, place a volume of DI water equal to the volume employed to rinse the sample train into a precleaned polyethylene sample container, and seal the container. Mark the height of the fluid level on the container or, alternatively if a balance is available, weigh the container and record the weight to permit determination of any leakage during transport. Label the container clearly to identify its contents.

3.2.5.3.6 Container No. 6 (0.1 N HNO₃ Blank). Once during each field test if total chromium is to be determined, place a volume of 0.1 N HNO₃ reagent, equal to the volume employed to rinse the sample train into a precleaned polyethylene sample container, and seal the container. Mark the height of the fluid level on the container or, alternatively if a balance is available, weigh the container and record the weight to permit determination of any leakage during transport. Label the container clearly to identify its contents.

3.2.5.4 Sample Preparation. For determination of Cr⁺⁺, the sample should be filtered immediately following recovery to remove any insoluble matter. Nitrogen gas may be used as a pressure assist to the filtration process (see Figure Cr⁺⁺-4).

Filter the entire impinger sample through a 0.45-micrometer acetate filter (or equivalent), and collect the filtrate in a 1000-ml graduated cylinder. Rinse the sample container with DI water three separate times, pass these rinses through the filter, and add the rinses to the sample filtrate. Rinse the Teflon reservoir with DI water three separate times, pass these rinses through the filter, and add the rinses to the sample. Determine the final volume of the filtrate and rinses and return them to the rinsed polyethylene sample container. Label the container clearly to identify its contents. Rinse the Teflon reservoir once with 0.1 N HNO₃, and once with DI water and discard these rinses.

If total chromium is to be determined, quantitatively recover the filter and residue and place them in a vial. (The acetate filter may be digested with 5 ml of 70 percent nitric acid; this digestion solution may then be diluted with DI water for total chromium analysis.)

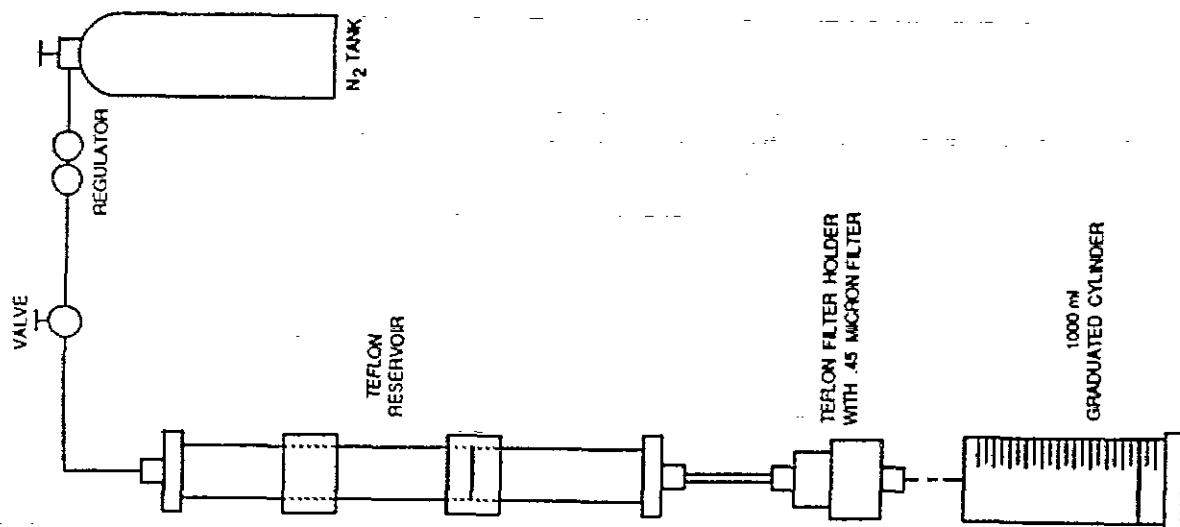


Figure 3.2-4 Schematic of sample filter system.

Note: If the source has a large amount of particulate in the effluent stream, testing teams may wish to filter the sample twice, once through a 2 to 5-micrometer filter, and then through the 0.45-micrometer filter.

3.2.5.4.1 Container 2 (HNO₃ rinse, optional for total chromium). This sample shall be analyzed in accordance with the selected procedure for total chromium analysis. At a minimum, the sample should be subjected to a digestion procedure sufficient to solubilize all chromium present.

3.2.5.4.2 Container 3 (Silica Gel). Weigh the spent silica gel to the nearest 0.5 g using a balance. (This step may be conducted in the field.)

3.2.5.5 Sample analysis. The Cr⁺⁺ content of the sample filtrate is determined by ion chromatography coupled with a post-column reactor (IC/PCR). To increase sensitivity for trace levels of chromium, a preconcentration system is also used in conjunction with the IC/PCR.

Prior to preconcentration and/or analysis, all field samples will be filtered through a 0.45-μ filter. This filtration should be conducted just prior to sample injection/analysis.

The preconcentration is accomplished by selectively retaining the analyte on a solid absorbent (as described in 3.2.3.4.3), followed by removal of the analyte from the absorbent. The sample is injected into a sample loop of the desired size (repeated loadings or larger size loop for greater sensitivity) and the Cr⁺⁺ is collected on the resin bed of the column. When the injection valve is switched, the eluent displaces the concentrated Cr⁺⁺ sample moving it off the preconcentration column and onto the IC anion separation column. After separation from other sample components, Cr⁺⁺ forms a specific complex in the post-column reactor with a diphenylcarbazide reaction solution, and the complex is then detected by visible absorbance at a wavelength of 520 nm. The amount of absorbance measured is proportional to the concentration of the Cr⁺⁺ complex formed. The IC retention time and absorbance of the Cr⁺⁺ complex is compared with known Cr⁺⁺ standards analyzed under identical conditions to provide both qualitative and quantitative analyses.

Prior to sample analysis, establish a stable baseline with the detector set at the required attenuation by setting the eluent flowrate at approximately 1 ml/min and post-column reagent flowrate at approximately 0.5 ml/min.

Note: As long as the ratio of eluent flowrate to PCR flowrate remains constant, the standard curve should remain linear. Inject a sample of DI water to ensure that no Cr⁺⁺ appears in the water blank.

First, inject the calibration standards prepared, as described in section 3.2.4.4, to cover the appropriate concentration range, starting with the lowest standard first. Next,

inject, in duplicate, the performance audit sample, followed by the 0.1 N KOH field blank and the field samples. Finally, repeat the injection of the calibration standards to allow for compensation of instrument drift. Measure areas or heights of the Cr⁺⁺/DPC complex chromatogram peak. The response for replicate, consecutive injections of samples must be within 5 percent of the average response, or the injection should be repeated until the 5 percent criterion can be met. Use the average response (peak areas or heights) from the duplicate injections of calibration standards to generate a linear calibration curve. From the calibration curve, determine the concentration of the field samples employing the average response from the duplicate injections.

The results for the analysis of the performance audit sample must be within 10 percent of the reference value for the field sample analysis to be valid.

3.2.6 Calibration. Maintain a written log of all calibration activities.

3.2.6.1 Sample Train Calibration. Calibrate the sample train components according to the indicated sections of method 5: Probe Nozzle (section 5.1); Pilot Tube (section 5.2); Metering System (section 5.3); Temperature Gauges (section 5.5); Leak-Check of the Metering System (section 5.6); and Barometer (section 5.7).

3.2.6.2 Calibration Curve for the IC/PCR. Prepare working standards from the stock solution described in section 3.2.4.4 by dilution with a DI water solution to approximate the field sample matrix. Prepare at least four standards to cover one order of magnitude that bracket the field sample concentrations. Run the standards with the field samples as described in section 3.2.5.5. For each standard, determine the peak areas (recommended) or the peak heights, calculate the average response from the duplicate injections, and plot the average response against the Cr⁺⁺ concentration in μg/L. The individual responses for each calibration standard determined before and after field sample analysis must be within 5 percent of the average response for the analysis to be valid. If the 5 percent criteria is exceeded, excessive drift and/or instrument degradation may have occurred, and must be corrected before further analyses are performed.

Employing linear regression, calculate a predicted value for each calibration standard with the average response for the duplicate injections. Each predicted value must be within 7 percent of the actual value for the calibration curve to be considered acceptable. If not acceptable, remake and/or rerun the calibration standards. If the calibration curve is still unacceptable, reduce the range of the curve.

3.2.7 Calculations

3.2.7.1 Dry Gas Volume. Using the data from the test, calculate $V_{d, \text{wet}}$, the dry gas sample volume at standard conditions as outlined in Section 6.3 of Method 5.

3.2.7.2 Volume of Water Vapor and Moisture Content. Using the data from the test, calculate $V_{w, \text{wet}}$ and $R_{w, \text{wet}}$, the volume of water vapor and the moisture content of the stack gas, respectively, using Equations 5-2 and 5-3 of Method 5.

3.2.7.3 Stack Gas Velocity. Using the data from the test and Equation 2-9 of Method 2, calculate the average stack gas velocity.

3.2.7.4 Total $\mu\text{g Cr}^{+6}$ per Sample. Calculate as described below:

$$m = (S-B) \times V_{d, \text{wet}} \times d$$

where:

m = Mass of Cr^{+6} in the sample, μg .

S = Concentration of sample, $\mu\text{g Cr}^{+6}/\text{ml}$.

B = Concentration of blank, $\mu\text{g Cr}^{+6}/\text{ml}$.

$V_{d, \text{wet}}$ = Volume of sample after filtration, ml.

d = Dilution factor (1 if not diluted).

3.3 Measurement of HCl and Cl_2

3.3.1 Isokinetic HCl/ Cl_2 Emission Sampling Train (Method 0050)

3.3.1.1 Scope and Application.

3.3.1.1.1 This method describes the collection of hydrogen chloride (HCl, CAS Registry Number 7647-01-0) and chlorine (Cl_2 , CAS Registry Number 7782-50-5) in stack gas emission samples from hazardous waste incinerators' municipal waste combustors, and boilers and industrial furnaces. The collected samples are analyzed using Method 9057. This method collects the emission sample isokinetically and is therefore particularly suited for sampling at sources, such as those controlled by wet scrubbers, emitting acid particulate matter (e.g., HCl dissolved in water droplets). A midjet impinger train sampling method designed for sampling sources of HCl/ Cl_2 emissions not in particulate form is presented in method 0051.

3.3.1.1.2 This method is not acceptable for demonstrating compliance with HCl emission standards less than 20 ppm.

3.3.1.1.3 This method may also be used to collect samples for subsequent determination of particulate emissions (by EPA method 5, reference 1) following the additional sampling procedures described.

3.3.1.2 Summary of Method.

3.3.1.2.1 Gaseous and particulate pollutants are withdrawn from an emission source and are collected in an optional cyclone, on

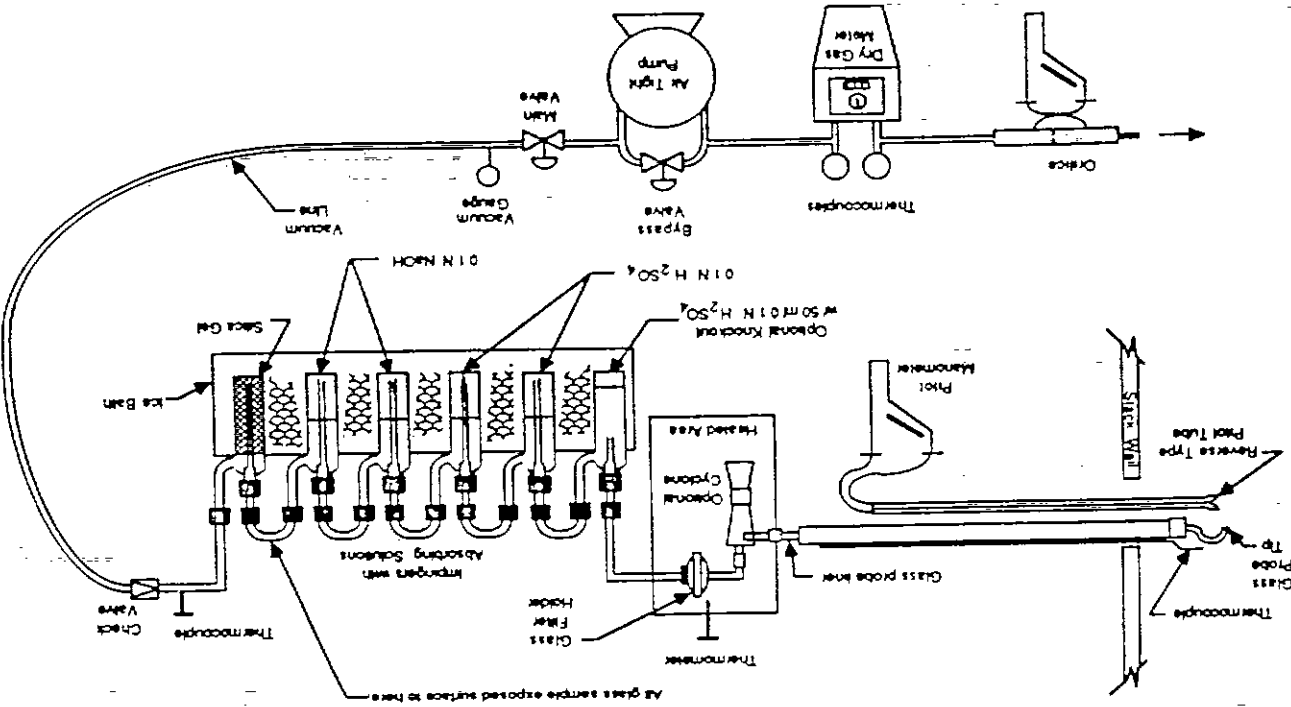


FIGURE 3.3-1 Isokinetic HCl/ Cl_2 Sampling Train

a filter, and in absorbing solutions. The cyclone collects any liquid droplets and is not necessary if the source emissions do not contain liquid droplets. The Teflon mat or quartz-fiber filter collects other particulate matter including chlorite salts. Acidic and alkaline absorbing solutions collect gaseous HCl and Cl_2 , respectively. Following sampling of emissions containing liquid droplets, any HCl/ Cl_2 dissolved in the liquid in the cyclone and/or on the filter is vaporized and ultimately collected in the impingers by pulling Ascarite II[®] conditioned ambient air through the sampling train. In the acidified water absorbing solution, the HCl gas is solubilized and forms chloride (Cl^-) ions. The Cl_2 gas present in the emissions has a very low solubility in acidified water and passes through to the alkaline absorbing solution where it undergoes hydrolysis to form a proton (H^+), Cl^- , and hypochlorous acid (HClO). The Cl^- ions in the separate solutions are measured by ion chromatography (method 9057). If desired, the particulate matter recovered from the filter and the probe is analyzed following the procedures in EPA Method 5 (reference 1).

3.3.1.3 Interferences.

3.3.1.3.1 Volatile materials which produce chloride ions upon dissolution during sampling are obvious interferences in the measurement of HCl. One interferant for HCl is diatomic chlorine (Cl_2), gas which disproportionates to HCl and hypochlorous acid (HClO) upon dissolution in water. Cl_2 gas exhibits a low solubility in water, however, and the use of acidic rather than neutral or basic solutions for collection of hydrogen chloride gas greatly reduces the dissolution of any chlorine present.

3.3.1.4 Apparatus and Materials.

3.3.1.4.1 Sampling Train.

3.3.1.4.1.1 A schematic of the sampling train used in this method is shown in Figure 3.3-1. This sampling train configuration is adapted from EPA method 5 procedures, and as such, the majority of the required equipment is identical to that used in EPA Method 5 determinations. The new components required are a glass nozzle and probe, a Teflon union, a quartz-fiber or Teflon mat filter (see section 3.3.1.5.5), a Teflon frit, and acidic and alkaline absorbing solutions.

3.3.1.4.1.2 Construction details for the basic train components are provided in section 3.4 of EPA's Quality Assurance Handbook, Volume III (reference 2); commercial models of this equipment are also available.

Additionally, the following subsections identify allowable train configuration modifications.

3.3.1.4.1.3 Basic operating and maintenance procedures for the sampling train are also described in Reference 2. As correct usage is important in obtaining valid results, all users should refer to Reference 2 and adopt the operating and maintenance procedures outlined therein unless otherwise specified. The sampling train consists of the components detailed below.

3.3.1.4.1.3.1 Probe nozzle. Glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant I.D. The nozzle shall be buttonhook or elbow design. The nozzle should be coupled to the probe liner using a Teflon union. It is recommended that a stainless steel nut be used on this union. In cases where the stack temperature exceeds 210 °C (410 °F), a one-piece glass nozzle/liner assembly must be used. A range of nozzle sizes suitable for isokinetic sampling should be available. Each nozzle shall be calibrated according to the procedures outlined in EPA Method 5 (see References 1 and 2).

3.3.1.4.1.3.2 Probe liner. Borosilicate or quartz-glass tubing with a heated system capable of maintaining a gas temperature of 120 ± 14 °C (248 ± 25 °F) at the exit and during sampling. Because the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed and calibrated according to the procedure in Reference 2 are considered acceptable. Either borosilicate or quartz-glass probe liners may be used for stack temperatures up to about 480 °C (900 °F). Quartz liners shall be used for temperatures between 480 and 900 °C (900 and 1650 °F). (The softening temperature for borosilicate is 820 °C (1508 °F), and for quartz is 1500 °C (2732 °F).) Water-cooling of the stainless steel sheath will be necessary at temperatures approaching and exceeding 550 °C.

3.3.1.4.1.3.3 Pilot tube. Type S, as described in section 2.1 of EPA Method 2 (Reference 1). The pilot tube shall be attached to the probe to allow constant monitoring of the stack-gas velocity. The impact (high-pressure) opening plane of the pilot tube shall be even with or above the nozzle entry plane (see section 3.1.1 of Reference 2) during sampling. The Type S pilot tube assembly shall have a known coefficient, determined as outlined in section 3.1.1 of Reference 2.

3.3.1.4.1.3.4 Differential pressure gauge. Inclined manometer or equivalent device as described in section 2.2 of EPA method 2 (Reference 1). One manometer shall be used for velocity-head (delta P) readings and the other for orifice differential pressure (delta I) readings.

3.3.1.4.1.3.5 Cyclone (optional). Glass.

3.3.1.4.1.3.6 Filter holder. Borosilicate glass, with a Teflon frit filter support and a

sealing gasket. The sealing gasket shall be constructed of Teflon or equivalent materials. The holder design shall provide a positive seal against leakage at any point along the filter circumference. The holder shall be attached immediately to the outlet of the cyclone.

3.3.1.4.1.3.7 Filter heating system. Any heating system capable of maintaining a temperature of 120/14 °C (248/25 °F) around the filter and cyclone during sampling. A temperature gauge capable of measuring temperature to within 3 °C (5.4 °F) shall be installed so that the temperature around the filter holder can be regulated and monitored during sampling.

3.3.1.4.1.3.8 Impinger train. The following system shall be used to determine the stack gas moisture content and to collect HCl and Cl₂: five or six impingers connected in series with leak-free ground glass fittings or any similar leak-free non-contaminating fittings. The first impinger shown in Figure 1 (knock-out or condensate impinger) is optional and is recommended as a water knockout trap for use under test conditions which require such a trap. If used, this impinger should be constructed as described below for the alkaline impingers, but with a shortened stem, and should contain 50 ml of 0.1 N H₂SO₄. The following two impingers (acid impingers) which each contain 100 ml of 0.1 N H₂SO₄ shall be of the Greenburg-Smith design with the standard tip (see method 5, paragraph 2.1.7). The next two impingers (alkaline impingers) which each contain 100 ml of 0.1 N NaOH and the last impinger (containing silica gel) shall be of the Greenburg-Smith design (see method 5, paragraph 2.1.7). The design of the impingers shall be modified by replacing the tip with a 1.3-cm (½-in) I.D. glass tube extending about 1.3 cm (½ in) from the bottom of the impinger (see method 5, paragraph 2.1.7). The condensate, acid, and alkaline impingers shall contain known quantities of the appropriate absorbing reagents. The last impinger shall contain a known weight of silica gel or equivalent desiccant.

3.3.1.4.1.3.9 Metering system. The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 °C (5.4 °F), dry-gas meter capable of measuring volume to within 1 percent, an orifice meter, (rate meter), and related equipment, as shown in Figure 1. At a minimum, the pump should be capable of 4 cfm free flow, and the dry-gas meter should have a recording capacity of 0-999.9 cu ft with a resolution of 0.005 cu ft. Other metering systems capable of maintaining sampling rates within 10 percent of isokinetically and of determining sample volumes to within 2 percent may be used. The metering system should be used in conjunction with a pilot tube to enable checks of isokinetic sampling rates.

mopheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby National Weather Service station, in which case the station value (which is the absolute barometric pressure) is requested and an adjustment for elevation differences between the weather station and sampling point is applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 900-m (100 ft) elevation increase (vice versa for elevation decrease).

3.3.1.4.1.3.11 Gas density determination equipment. Temperature sensor and pressure gauge (as described in sections 2.3 and 2.4 of EPA method 2), and gas analyzer, if necessary (as described in EPA method 3, Reference 1). The temperature sensor ideally should be permanently attached to the pilot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor must be placed in an interference-free arrangement with respect to the Type S pilot tube openings (see EPA method 2, Figure 2-7). As a second alternative, if the stack gas is saturated, the stack temperature may be measured at a single point near the center of the stack.

3.3.1.4.1.3.12 Ascarite tube for conditioning ambient air. Tube tightly packed with approximately 150 g of fresh 8 to 20 mesh Ascarite II® sodium hydroxide coated silica, or equivalent, to dry and remove acid gases from the ambient air used to remove moisture from the filter and optional cyclone. The inlet and outlet ends of the tube should be packed with at least 1 cm thickness of glass wool or filter material suitable to prevent escape of Ascarite II fines. Fit one end with flexible tubing, etc. to allow connection to probe nozzle.

3.3.1.4.2 Sample Recovery

3.3.1.4.2.1 Probe liner. Probe and nozzle brushes; nylon bristle brushes with stainless steel wire handles are required. The probe brush shall have extensions of stainless steel, Teflon, or inert material at least as long as the probe. The brushes shall be properly sized and shaped to brush out the probe liner and the probe nozzle.

3.3.1.4.2.2 Wash bottles. Two. Polyethylene or glass, 500 ml or larger.

3.3.1.4.2.3 Glass sample storage containers. Glass, 500- or 1000-ml. Screw-cap liners shall be Teflon and constructed so as to be leak-free. Narrow-mouth glass bottles have been found to exhibit less tendency toward leakage.

3.3.1.4.2.4 Petri dishes. Glass or plastic, sealed around the circumference with Teflon tape, for storage and transport of filter samples.

3.3.1.4.2.5 Graduated cylinder and/or balances. To measure condensed water to the nearest 1 ml or 1 g. Graduated cylinders shall have subdivisions not >2 ml. Laboratory triple-beam balances capable of weighing to 1 0.5 g or better are required.

3.3.1.4.2.6 Plastic storage containers. Screw-cap polypropylene or polyethylene containers to store silica gel.

3.3.1.4.2.7 Funnel and rubber policeman. To aid in transfer of silica gel to container (not necessary if silica gel is weighed in field).

3.3.1.4.2.8 Funnels. Glass, to aid in sample recovery.

3.3.1.5 Reagents

3.3.1.5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently higher purity to permit its use without lessening the accuracy of the determination.

3.3.1.5.2 ASTM Type II water (ASTM D193-77 (1983)). All references to water in the method refer to ASTM Type II unless otherwise specified. It is advisable to analyze a blank sample of this reagent prior to sampling, since the reagent blank values obtained during the field sample analysis must be less than 10 percent of the sample values (see method 9057).

3.3.1.5.3 Sulfuric acid (0.1 N). H₂SO₄. Used as the HCl absorbing reagent in the impinger train. To prepare 1 L, slowly add 2.80 ml of concentrated H₂SO₄ to about 900 ml of water while stirring, and adjust the final volume to 1 L using additional water. Shake well to mix the solution. It is advisable to analyze a blank sample of this reagent prior to sampling, since the reagent blank values obtained during the field sample analysis must be less than 10 percent of the sample values (see method 9057).

3.3.1.5.4 Sodium hydroxide (0.1 N). NaOH. Used as the Cl₂ absorbing reagent in the impinger train. To prepare 1 L, dissolve 4.00 g of solid NaOH in about 900 ml of water and adjust the final volume of 1 L using additional water. Shake well to mix the solution. It is advisable to analyze a blank sample of this reagent prior to sampling, since the reagent blank values obtained during the field sample analysis must be less than 10 percent of the sample values (see Method 9067).

3.3.1.5.5 Filter. Quartz-fiber or Teflon mat (e.g., Pallflex® TX40H45) filter.

3.3.1.5.6 Silica gel. Indicating type, 6-16 mesh. If previously used, dry at 175 °C (350 °F) for 2 hours before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better)

may be used, subject to the approval of the Administrator.

3.3.1.5.7 Acetone. When using this train for determination of particulate emissions, reagent grade acetone, <0.001 percent residue, in glass bottles is required. Acetone from metal containers should not be used. Acetone bottles and should not be used. Sometimes suppliers transfer acetone to glass bottles from metal containers; thus, acetone blanks shall be run prior to field use and only acetone with low blank values (<0.001 percent) shall be used. In no case shall a blank value greater than 0.001 percent of the weight of acetone used be subtracted from the sample weight.

3.3.1.5.8 Crushed ice. Quantities ranging from 10-50 lbs may be necessary during a sampling run, depending on ambient air temperature.

3.3.1.5.9 Stopcock grease. Acetone-insoluble, heat-stable silicone grease may be used, if needed. Silicone grease usage is not necessary if screw-on connectors or Teflon sleeves on ground-glass joints are used.

3.3.1.5 Sample Collection, Preservation, and Handling.

3.3.1.6.1 Sample collection is described in this method. The analytical procedures for HCl and Cl₂ are described in method 9057 and for particulate matter in EPA method 5 (Reference 1).

3.3.1.6.2 Samples should be stored in clearly labeled, tightly sealed containers between sample recovery and analysis. They may be analyzed up to four weeks after collection.

3.3.1.7 Procedure.

3.3.1.7.1 Preparation for Field Test.

3.3.1.7.1.1 All sampling equipment shall be maintained and calibrated according to the procedures described in section 3.4.2 of EPA's Quality Assurance Handbook, Volume III (Reference 2).

3.3.1.7.1.2 Weigh several 200- to 300-g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger just prior to train assembly.

3.3.1.7.1.3 Check filters visually against light for irregularities and flaws or pinholes leaks. Label the shipping containers (glass or plastic Petri dishes) and keep the filters in these containers at all times except during sampling (and weighing for particulate analysis).

3.3.1.7.1.4 If a particulate determination will be conducted, deaerate the filters at 20±5.6°C (68±10°F) and ambient pressure for at least 24 hours, and weigh at intervals of at least 6 hours to a constant weight (i.e., <0.5-mg change from previous weighing), recording results to the nearest 0.1 mg. During each weighing, the filter must not be exposed for more than a 2-min period to the laboratory atmosphere and relative humidity

above 60 percent. Alternatively (unless otherwise specified by the Administrator), the filters may be oven-dried at 105°C (220°F) for 2-3 hours, desiccated for 2 hours, and weighed.

3.3.1.7.2 Preliminary Field Determinations.

3.3.1.7.2.1 Select the sampling site and the minimum number of sampling points according to EPA method 1 or as specified by the Administrator. Determine the stack pressure, temperature, and range of velocity heads using EPA method 2. It is recommended that a leak-check of the plot lines (see EPA method 2, section 3.1) be performed. Determine the stack-gas moisture content using EPA method 4 or its alternatives to establish estimates of isochoric sampling rate settings. Determine the stack gas dry molecular weight, as described in EPA method 2, section 3.6. If integrated EPA method 3 (Reference 1) sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as the sample run.

3.3.1.7.2.2 Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size to maintain isokinetic sampling rates. During the run, do not change the nozzle. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of EPA method 2).

3.3.1.7.2.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

3.3.1.7.2.4 The total sampling time should be two hours. Allocate the same time to all traverse points defined by EPA method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus one-half min. Size the condensate impinger for the expected moisture catch or be prepared to empty it during the run.

3.3.1.7.3 Preparation of Sampling Train.

3.3.1.7.3.1 Add 50 ml of 0.1 N H₂SO₄ to the condensate impinger, if used. Place 100 ml of 0.1 N H₂SO₄ in each of the next two impingers. Place 100 ml of 0.1 N NaOH in each of the following two impingers. Finally, transfer approximately 200-300 g of preweighed silica gel from its container to the last impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the silica gel container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

3.3.1.7.3.2 Using a tweezer or clean disposable surgical gloves, place a labeled (identified) filter (weighed, if particulate matter to

be determined) in the filter holder. Be sure that the filter is properly centered and the gasket properly placed to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

3.3.1.7.3.3 To use glass liners, install the selected nozzle using a Viton-A O-ring when stack temperatures are <260°C (500°F) and woven glass-fiber gasket when temperatures are higher. Other connecting systems utilizing either 316 stainless steel or Teflon ferrules may be used. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

3.3.1.7.3.4 Set up the train as in Figure 3.3-1. A minimal amount of silicone grease may be used on ground glass joints. Connect temperature sensors to the appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

3.3.1.7.3.5 Place crushed ice around the impingers.

3.3.1.7.3.6 Turn on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize.

3.3.1.7.4 Leak-Check Procedures.

3.3.1.7.4.1 Pretest leak-check. A pretest leak-check is recommended, but not required. If the tester opts to conduct the pretest leak-check, the following procedure shall be used.

3.3.1.7.4.1.1 If a Viton-A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 380-mm Hg (15-in. Hg) vacuum.

Note: A lower vacuum may be used, provided that it is not exceeded during the test.

3.3.1.7.4.1.2 If a woven glass-fiber gasket is used, do not connect the probe to the train during the leak-check. Instead, leak-check the train by first plugging the inlet to the cyclone, if used, or the filter holder and pulling a 380-mm Hg (15-in. Hg) vacuum (see Note above). Then, connect the probe to the train and leak-check at about 25-mm Hg (1-in. Hg) vacuum; alternatively, leak-check the probe with the rest of the sampling train in one step at 380-mm Hg (15-in. Hg) vacuum. Leakage rates in excess of 4 percent of the average sampling rate or 0.00057 m³/min (0.02 cfm), whichever is less, are unacceptable.

3.3.1.7.4.1.3 The following leak-check instructions for the sampling train may be helpful. Start the pump with bypass valve fully open and coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse direction of the bypass valve; this will cause water to back up into the filter holder. If the desired volume is exceeded, of-

ther leak-check at this higher vacuum or end the leak-check, as shown below, and start over.

3.3.1.7.4.1.4 When the leak-check is completed, first slowly remove the plug from the inlet to the probe, cyclone, or filter holder and immediately turn off the vacuum pump. This prevents the liquid in the impingers from being forced backward into the filter holder and silica gel from being entrained backward to the fifth impinger.

3.3.1.7.4.2 Leak-checks during sample run. If during the sampling run, a component (e.g., filter assembly or impinger) change becomes necessary or a port change is conducted, a leak-check shall be conducted immediately after the interruption of sampling and before the change is made. The leak-check shall be conducted according to the procedure outlined in Section 3.3.1.7.4.1, except that it shall be conducted at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 m³/min (0.02 cfm) or 4 percent of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester shall void the sampling run. Immediately after a component change or port change, and before sampling is relinitiated, another leak-check similar to a pre-test leak-check is recommended.

3.3.1.7.4.3 Post-test, leak-check. A leak-check is mandatory at the conclusion of each sampling run. The leak-check shall be done using the same procedures as those with the pre-test leak-check, except that it shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 m³/min (0.02 cfm) or 4 percent of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester shall void the sampling run.

3.3.1.7.5 Train Operation.

3.3.1.7.5.1 During the sampling run, maintain an isokinetic sampling rate to within 10 percent of true isokinetic, unless otherwise specified by the Administrator. Maintain a temperature around the filter (and cyclone, if used) of 120±14°C (248±25°F).

3.3.1.7.5.2 For each run, record the data required on a data sheet such as the one shown in Figure 3.3-2. Be sure to record the initial dry gas meter reading. Record the dry gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made before and after each leak-check, and when sampling is halted. Take other readings required by Figure 3.3-2 at least once at each sample point during each time increment and additional readings when significant changes (20 percent variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because

the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

3.3.1.7.5.3 Clean the stack access ports prior to the test run to eliminate the chance of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pitot tube and probe are positioned properly. Position the nozzle at the first traverse point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions using a calculator or a nomograph. Nomographs are designed for use when the Type S pitot tube coefficient is 0.8449.02 and the stack gas equivalent density (dry molec-

ular weight) is equal to 29.4. If the stack gas molecular weight and the pilot tube coefficient are outside the above ranges, do not use the nomographs unless appropriate slope are taken to compensate for the deviations (see Reference 3).

3.3.1.7.5.4 When the stack is under significant negative pressure (equivalent to the height of the Impinger stem), take care to close the coarse adjust valve before inserting the probe into the stack, to prevent water from backing into the filter holder. If necessary, the pump may be turned on with the coarse adjust valve closed.

3.3.1.7.6.5 When the probe is in position, block off the openings around the probe and stack access port to prevent unrepresentative dilution of the gas stream;

Schematic of Stack Cross Section

--

Plant _____
Location _____
Operator _____
Date _____
Run No. _____
Sample Box No. _____
Master Box No. _____
Inspector _____
C Factor _____
Filter Type Coefficient C _____

[illegible]

Figure 3.3-2 Field Data Form

[illegible]

3.3.1.7.5.6 Traverse the stack cross section, as required by EPA Method 1 or as specified by the Administrator, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

3.3.1.7.5.7 During the test run, make periodic adjustments to keep the temperature around the filter holder (and cyclone, if used) at the proper level. Add more ice, and, if necessary, salt to maintain a temperature of $<20^{\circ}\text{C}$ (68°F) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

3.3.1.7.5.8 If the pressure drop across the filter becomes too high, making isokinetic sampling difficult to maintain, it may be replaced in the midst of a sample run. Using another complete filter holder assembly is recommended, rather than attempting to change the filter itself. After a new filter assembly is installed, conduct a leak-check. If determined, the total particulate weight shall include the summation of all filter assembly catches.

3.3.1.7.5.9 If the condensate impinger becomes too full, it may be emptied, recharged with 50 ml of 0.1 N H_2SO_4 , and replaced during the sample run. The condensate emptied must be saved and included in the measurement of the volume of moisture collected and included in the sample for analysis. The additional 50 ml of absorbing reagent must also be considered in calculating the moisture. After the impinger is reinstalled in the train, conduct a leak-check.

3.3.1.7.5.10 A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. In all other situations, the use of two or more trains will be subject to the approval of the Administrator.

3.3.1.7.5.11 Note that when two or more trains are used, separate analyses of the particulate catch (if applicable) and the HCl and Cl_2 impinger catches from each train shall be performed, unless identical nozzle sizes were used on all trains. In that case, the particulate catch and the HCl and Cl_2 impinger catches from the individual trains may be combined, and a single particulate analysis and single HCl and Cl_2 analyses of the impinger contents may be performed.

3.3.1.7.5.12 At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, and record the final dry gas meter reading.

3.3.1.7.5.13 If there is any possibility that liquid has collected in the glass cyclone and/or on the filter, connect the Ascarite tube at the probe inlet and operate the train with

the filter heating system at $120\pm 4^{\circ}\text{C}$ ($249\pm 2^{\circ}\text{F}$) at a low flow rate (e.g., 1 l/min) sufficient to vaporize the liquid and any HCl in the cyclone or on the filter and pull it through the train into the impingers. After 30 minutes, turn off the flow, remove the Ascarite tube, and examine the cyclone and filter for any visible moisture. If moisture is visible, repeat this step for 15 minutes.

3.3.1.7.5.14 Conduct a post-test leak check. Also, leak-check the plot lines as described in EPA method 2. The lines must pass this leak-check in order to validate the velocity-head data.

3.3.1.7.5.15 If the moisture value is available, calculate percent isokineticity (see section 3.3.1.7.7.10) to determine whether the run was valid or another test run should be conducted.

3.3.1.7.6 Sample Recovery.

3.3.1.7.6.1 Allow the probe to cool. When the probe can be handled safely, wipe off all the external surfaces of the tip of the probe nozzle and place a cap over the tip. Do not cap the probe tip tightly while the sampling train is cooling down because this will create a vacuum in the filter holder, drawing water from the impingers into the holder.

3.3.1.7.6.2 Before moving the sampling train to the cleanup site, remove the probe, wipe off any silicone grease, and cap the open outlet, being careful not to lose any condensate that might be present. Wipe off any silicone grease and cap the filter or cyclone inlet. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the first impinger and the filter holder, disconnect it at the filter holder and let any condensed water drain into the first impinger. Wipe off any silicone grease and cap the filter holder outlet and the impinger inlet. Ground glass stoppers, plastic caps, serum caps, Teflon tape, Parafilm[®], or aluminum foil may be used to close these openings.

3.3.1.7.6.3 Transfer the probe and filter/impinger assembly to the cleanup area. This area should be clean and protected from the weather to minimize sample contamination or loss.

3.3.1.7.6.4 Save portions of all washing solutions used for cleanup (acetone and Type II water) and the absorbing reagents (0.1 N H_2SO_4 and 0.1 N NaOH) as blanks. Transfer 200 ml of each solution directly from the wash bottle being used (rinse solutions) or the supply container (absorbing reagents) and place each in a separate, prelabeled glass sample container.

3.3.1.7.6.5 Inspect the train prior to and during disassembly and note any abnormal conditions.

3.3.1.7.6.6 Contain No. 1 (filter catch for particulate determination). Carefully remove the filter from the filter holder and place it in its identified 1-pint dish container. Use one or more pair of tweezers to handle

the filter. If it is necessary to fold the filter, ensure that the particulate cake is inside the fold. Carefully transfer to the Petri dish any particulate matter or filter fibers that adhere to the filter holder gasket, using a dry nylon bristle brush or sharp-edged blade, or both. Label the container and seal with Teflon tape around the circumference of the lid.

3.3.1.7.6.7 Contain No. 2 (front-half rinse for particulate determination). Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover particulate matter or any condensate from the probe nozzle, probe fitting, probe liner, and front half of the filter holder by washing these components with acetone into a glass container. Retain an acetone blank and analyze with the samples.

3.3.1.7.6.8 Perform rinses as follows: Carefully remove the probe nozzle and clean the inside surface by rinsing with acetone from a wash bottle and brushing with a nylon bristle brush. Brush until the rinse shows no visible particles; then make a final rinse of the inside surface with the acetone. Brush and rinse the inside parts of the Swagelok fitting with the acetone in a similar way until no visible particles remain.

3.3.1.7.6.9 Have two people rinse the probe liner with acetone by tilting and rotating the probe while squirting acetone into its upper end so that all inside surfaces will be wetted with solvent. Let the acetone drain from the lower end into the sample container. A glass funnel may be used to aid in transferring liquid washed to the container.

3.3.1.7.6.10 Follow the acetone rinse with a probe brush. Hold the probe in an inclined position and squirt acetone into the upper end while pushing the probe brush through the probe with a twisting action; place a sample container underneath the lower end of the probe and catch any acetone and particulate matter that is brushed from the probe. Run the brush through the probe three or more times until no visible particulate matter is carried out with the acetone or until none remains in the probe liner on visual inspection. Rinse the brush with acetone and quantitatively collect those washings in the sample container. After the brushing, make a final acetone rinse of the probe as described above. Between sampling runs, keep brushes clean and protected from contamination.

3.3.1.7.6.11 Clean the inside of the front half of the filter holder and cyclone by rubbing the surfaces with a nylon bristle brush and rinsing with acetone. Rinse each surface three times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder. Carefully rinse out the glass cyclone and cyclone flask (if applicable). Brush and rinse any particulate material adhering to the inner surfaces of these components into the front-half rinse sample.

After all rinses and particulate matter have been collected in the sample container, tighten the lid on the sample container so that acetone will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Label the container to identify its contents.

3.3.1.7.6.12 Contain No. 3 (knockout and acid impinger catch for moisture and HCl determination). Disconnect the impingers. Measure the liquid in the acid and knockout impingers to within $\pm 1\text{ ml}$ by using a graduated cylinder or by weighing it to within $\pm 0.5\text{ g}$ by using a balance (if one is available). Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas. Quantitatively transfer this liquid to a leak-free sample storage container. Rinse these impingers, connecting glassware (and tubing, if used), and the back half of the filter holder with water and add these rinses to the storage container. Seal the container, shake to mix, and label. The fluid level should be marked so that if any sample is lost during transport, a correction proportional to the lost volume can be applied. Retain rinse water and acidic absorbing solution blanks and analyze with the samples.

3.3.1.7.6.13 Contain No. 4 (alkaline impinger catch for Cl_2 and moisture determination). Measure and record the liquid in the alkaline impingers as described in section 3.3.1.7.6.12. Quantitatively transfer this liquid to a leak-free sample storage container. Rinse these two impingers and connecting glassware with water and add these rinses to the container. Seal the container, shake to mix, and label; mark the fluid level. Retain alkaline absorbing solution blank and analyze with the samples.

3.3.1.7.6.14 Contain No. 5 (silica gel for moisture determination). Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the last impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere strongly to the impinger wall. Because the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, weigh the container and its contents to 0.5 g or better.

3.3.1.7.6.15 Prior to shipment, recheck all sample containers to ensure that the caps are well secured. Seal the lids of all containers around the circumference with Teflon tape. Ship all liquid samples upright and all particulate filters with the particulate catch facing upward.

3.3.1.7.7 Calculations. Retain at least one extra decimal figure beyond those contained in the available data in intermediate calculations, and round off only the final answer appropriately.

3.3.1.7.7.1 Nomenclature.

A_s = Cross-sectional area of nozzle, m^2 (ft^2).

B_w = Water vapor in the gas stream, proportion by volume.

C_s = Acetone blank residue concentration, mg/mg .

C_p = Type S pilot tube coefficient (nominally 0.84 ± 0.02), dimensionless.

C_t = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, $g/dscm$ ($g/dscf$).

I = Percent of isokinetic sampling.

m_s = Mass of residue of acetone after evaporation, mg .

M_t = Total amount of particulate matter collected, mg .

M_g = Stack-gas dry molecular weight, g/g -mole (lb/lb -mole).

M_w = Molecular weight of water, 18.0 g/g -mole (18.0 lb/lb -mole).

P_{bar} = Barometric pressure at the sampling site, mm Hg ($in.$ Hg).

P_s = Absolute stack-gas pressure, ms Hg ($in.$ Hg).

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 $in.$ Hg).

R = Ideal gas constant, 0.06236 mm Hg- m^3 (K - g -mole (21.85 $in.$ Hg- ft^3)- lb -mole).

T_m = Absolute average dry-gas meter temperature (see Figure 2), $^{\circ}K$ ($^{\circ}R$).

T_s = Absolute average stack-gas temperature (see Figure 2), $^{\circ}K$ ($^{\circ}R$).

T_{std} = Standard absolute temperature, 293 $^{\circ}K$ (528 $^{\circ}R$).

V_k = Total volume of liquid collected in the impingers and silica gel, ml .

V_s = Volume of gas sample is measured by dry-gas meter, $dscm$ ($dscf$).

V_{moj} = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, $dscm$ ($dscf$).

V_{moj} = Volume of water vapor in the gas sample, corrected to standard conditions, $dscm$ ($dscf$).

V_t = Stack-gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec).

W_s = Weight of residue in acetone wash, mg .

V_s = Volume of acetone blank, ml .

V_w = Volume of acetone used in wash, ml .

Y = Dry-gas-meter calibration factor, dimensionless.

ΔH = Average pressure differential across the orifice meter, mm H_2O ($in.$ H_2O).

ρ_s = Density of acetone, mg/ml (see label on bottle).

ρ_w = Density of water, 0.982 g/ml (0.002201 lb/ml).

θ = Total sampling time, min .

13.6 = Specific gravity of mercury.

60 = Sec/min .

100 = Conversion to percent.

3.3.1.7.7.9 Particulate concentration.

$$C_p = (0.001 \text{ g/mg}) (m_s/V_{moj}) \quad (6)$$

3.3.1.7.7.10 Isokinetic variation.

3.3.1.7.7.10.1 Calculation from raw data.

$$I = \frac{100 T_s [K_3 F_{s,1} (V_w/V_{moj}) + T_m (P_{bar} + H/13.6)]}{60 \theta V_s A_s} \quad (7)$$

where:

$K_3 = 0.003454$ mm Hg- m^3/ml - K for metric units, or

$K_3 = 0.002659$ $in.$ Hg- ft^3/ml - K for English units.

3.3.1.7.7.10.2 Calculation for Intermediate values.

$$I = \frac{T_s V_{moj} P_{std} 100}{T_{moj} V_s A_s P_{std} (1 - B_w)} \quad (8)$$

$$K_4 = \frac{T_s V_{moj}}{P_s V_s A_s \theta (1 - B_w)} \quad (9)$$

where:

$K_4 = 4.320$ for metric units, or

$K_4 = 0.09450$ for English units.

3.3.1.7.7.10.3 Acceptable units. If 90 percent- Δ -10 percent, the results are acceptable. If the results are low in comparison with the standard and I is beyond the acceptable range, or if I is less than 90 percent, the Administrator may opt to accept the results.

3.3.1.8 Quality Control.

3.3.1.8.1 Sampling. See EPA Manual 6004-77-027b for Method 5 quality control.

3.3.1.8.2 Analysis. At the present time, a validated audit material does not exist for this method. Analytical quality control procedures are detailed in Method 8057.

3.3.1.9 Method Performance.

3.3.1.9.1 The in-stack detection limit for the method is approximately 0.02 μg of HCl per liter of stack gas. The method has a negative bias below 20 ppm HCl (Reference 6).

3.3.1.9.2 It is preferable to include the cyclone in the sampling train to protect the cyclone from any moisture present. There is research in progress regarding the necessity of the cyclone at low moisture sources and the use of Ascarite II in the drying procedure (Section 3.3.1.7.5.12).

References

- U.S. Environmental Protection Agency, 40 CFR part 60, appendix A, Methods 1-5.
- U.S. Environmental Protection Agency, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods," Publication No. EPA-600/4-77-027b, August 1977.
- Shigehara, R.T., Adjustments in the EPA Nomenclature for Different Pitot Tube Coefficients and Dry Molecular Weights, Stack Sampling News, 2:4-11 (October 1974).
- Steinberger, S.C. and J.H. Margeson, "Laboratory and Field Evaluation of a Methodology for Determination of Hydrogen Chloride Emissions from Municipal and Hazardous Waste Incinerators," U.S. Environmental Protection Agency, Office of Research and Development, Report No. EPA 600/3-89/064, NTIS PB89 220586-AS.
- State of California, Air Resources Board, method 421, "Determination of Hydrochloric Acid Emissions from Stationary Sources," March 18, 1987.
- Entropy Environmentalists, Inc., "Laboratory Evaluation of a Sampling and Analysis Method for Hydrogen Chloride Emissions from Stationary Sources; Interim Report," EPA Contract No. 68-02-4442, Research Triangle Park, North Carolina, January 22, 1989.
- 3.3.2 Midget Impinger HCl/C₂ Emission Sampling Train (Method 0051)
- 3.3.2.1 Scope and Application.
- 3.3.2.1.1 This method describes the collection of hydrogen chloride (HCl, CAS Registry Number 7647-01-6) and chlorine (Cl₂, CAS Registry Number 7782-50-6) in stack gas emission samples from hazardous waste incinerators, municipal waste combustors, and boilers and industrial furnaces. The collected samples are analyzed using method 9057. This method is designed to collect HCl/C₂ in their gaseous forms. Sources, such as those controlled by wet scrubbers, that emit acid particulate matter (e.g., HCl) dissolved in water droplets must be sampled using an isokinetic HCl/C₂ sampling train (see Method 0050).
- 3.3.2.2 Summary of Method.
- 3.3.2.2.1 An integrated gas sample is extracted from the stack and passes through a particulate filter, acidified water, and finally through an alkaline solution. The filter serves to remove particulate matter such as chloride salts which could potentially react and form analyte in the absorbing solutions. In the acidified water absorbing solution, the

NOTE: In saturated or water-droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made: one from the impinger analysis (Equation 3) and a second from the assumption of saturated conditions. The lower of the two values of B_w shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the Note to section 1.2 of Method 4. For the purposes of this method, the average stack gas temperature from Figure 2 may be used to make this determination, provided that the accuracy of the stack temperature sensor is $\pm 1^{\circ}C$ ($2^{\circ}F$).

3.3.1.7.7.6 Acetone blank concentration. For particulate determination.

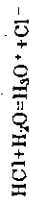
$$G_s = \frac{m_s}{V_s A_s} \quad (4)$$

3.3.1.7.7.7 Acetone wash blank. For particulate determination.

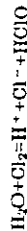
$$W_s = C_s V_w A_s \quad (5)$$

3.3.1.7.7.8 Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from Container Nos. 1 and 2 less the acetone blank (W_s).

HCl gas is solubilized and forms chloride ions (Cl^-) as follows:



The Cl_2 gas present in the emissions has a very low solubility in acidified water and passes through to the alkaline absorbing solution where it undergoes hydrolysis to form a proton (H^+), Cl^- , and hypochlorous acid (HClO) as follows:

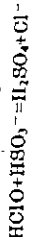


The Cl^- ions in the separate solutions are measured by ion chromatography (Method 9057).

3.3.2.3 Interferences.

3.3.2.3.1 Volatile materials which produce chloride ions upon dissolution during sampling are obvious interferences in the measurement of HCl . One interferent for HCl is diatomic chlorine (Cl_2) gas which disproportionates to HCl and hypochlorous acid (HClO) upon dissolution in water. Cl_2 gas exhibits a low solubility in water, however, and the use of acidic rather than neutral or basic solutions for collection of hydrogen chloride gas greatly reduces the dissolution of any chlorine present. Sampling a 400 ppm HCl gas stream containing 50 ppm Cl_2 with this method does not cause a significant bias. Sampling a 220 ppm HCl gas stream containing 180 ppm Cl_2 results in a positive bias of 3.4 percent in the HCl measurement.

3.3.2.3.2 Reducing agents such as SO_2 may cause a positive bias in the Cl_2 measurement by the following reaction:



3.3.2.4 Apparatus and Materials.

3.3.2.4.1 Sampling Train. The sampling train is shown in Figure 1 and component parts are discussed below.

3.3.2.4.1.1 Probe. Borosilicate glass, approximately $\frac{3}{16}$ -in (9-mm) inside diameter, with a heating system to prevent condensation. When the concentration of alkaline particulate matter in the emissions is high, a $\frac{3}{16}$ -in (9-mm) inside diameter Teflon elbow should be attached to the inlet of the probe; a 1-in (25-mm) length of Teflon tubing with a $\frac{3}{16}$ -in (9-mm) inside diameter should be attached at the open end of the elbow to permit the opening of the probe to be burned away from the gas stream, thus reducing the amount of particulate entering the train. When high concentrations of particulate matter are not present, the Teflon elbow is not necessary, and the probe inlet can be perpendicular to the gas stream. When sampling at locations where gas temperatures are greater than approximately 400°F, such as wet scrubber inlets, glass or quartz elbows must be used. In no case should a glass wool plug be used to remove particulate matter; use of such a filtering device could result in a bias in the data. (1) Instead, a Teflon filter

should be used as specified in section 3.3.2.5.5.

3.3.2.4.1.2 Three-way stopcock. A borosilicate, three-way glass stopcock with a heating system to prevent condensation. The heated stopcock should connect directly to the outlet of the probe and filter assembly and the inlet of the first impinger. The heating system should be capable of preventing condensation up to the inlet of the first impinger. Silicone grease may be used, if necessary, to prevent leakage.

3.3.2.4.1.3 Impingers. Five 30-ml midgeet impingers with leak-free glass connectors. Silicone grease may be used, if necessary, to prevent leakage. For sampling at high moisture sources or for extended sampling times greater than one hour, a midgeet impinger with a shortened stem (such that the gas sample does not bubble through the collected condensate) should be used in front of the first impinger.

3.3.2.4.1.4 Mae West Impinger or drying tube. Mae West design impinger (or drying tube, if a moisture determination is not to be conducted) filled with silica gel, or equivalent, to dry the gas sample and to protect the dry gas meter and pump.

3.3.2.4.1.5 Sample Line, Leak-free, with compatible fittings to connect the last impinger to the needle valve.

3.3.2.4.1.6 Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby National Weather Service station, in which case the station value (which is the absolute barometric pressure) shall be requested and an adjustment for the elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft) elevation increase or vice versa for elevation decrease.

3.3.2.4.1.7 Purge pump, purge line, drying tube, needle valve, and rate meter. Pump capable of purging sample probe at 2 liters/min. with drying tube, filled with silica gel or equivalent, to protect pump, and a rate meter, 0 to 5 liters/min.

3.3.2.4.1.8 Metering system. The following items comprise the metering system which is identical to that used for EPA Method 6 (see Reference 5).

3.3.2.4.1.8.1 Valve. Needle valve, to regulate sample gas flow rate.

3.3.2.4.1.8.2 Pump. Leak-free diaphragm pump, or equivalent, to pull gas through train. Install a small surge tank between the pump and the rate meter to eliminate the pulsation effect of the diaphragm pump on the rotameter.

3.3.2.4.1.8.3 Rate meter. Rotameter, or equivalent, capable of measuring flow rate within 2 percent of selected flow rate of 2 liters/min.

3.3.2.4.1.8.4 Volume meter. Dry gas meter, sufficiently accurate to measure the sample volume within 2 percent, calibrated at the selected flow rate and conditions encountered during sampling, and equipped with a temperature gauge (dial thermometer or equivalent) capable of measuring temperature to within 3°C (5.4°F).

3.3.2.4.1.8.5 Vacuum gauge. At least 760 mm Hg (30 in. Hg) gauge to be used for leak check of the sampling train.

3.3.2.4.2 Sample Recovery.

3.3.2.4.2.1 Wash bottles. Polyethylene or glass, 500 ml or larger, two.

3.3.2.4.2.2 Storage bottles. Glass, with Teflon-lined lids, 100 ml, to store impinger samples (two per sampling run).

3.3.2.5 Reagents.

3.3.2.5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

3.3.2.5.2 ASTM Type II Water (ASTM D193-77 (1983)). All references to water in the method refer to ASTM Type II unless otherwise specified. It is advisable to analyze a blank sample of this reagent prior to sampling, since the reagent blank value obtained during the field sample analysis must be less than 10 percent of the sample values (see method 9057).

3.3.2.5.3 Sulfuric acid (0.1 N), H_2SO_4 . Used as the HCl absorbing reagent. To prepare 100 ml, slowly add 0.28 ml of concentrated H_2SO_4 to about 90 ml of water while stirring, and adjust the final volume to 100 ml using additional water. Shake well to mix the solution. It is advisable to analyze a blank sample of this reagent prior to sampling, since the reagent blank value obtained during the field sample analysis must be less than 10 percent of the sample values (see method 9057).

3.3.2.5.4 Sodium hydroxide (0.1 N), NaOH . Used as the Cl_2 absorbing reagent. To prepare 100 ml, dissolve 0.40 g of solid NaOH in about 90 ml of water and adjust the final volume to 100 ml using additional water. Shake well to mix the solution. It is advisable to analyze a blank sample of this reagent prior to sampling, since the reagent blank value obtained during the field sample analysis must be less than 10 percent of the sample values (see method 9057).

3.3.2.5.5 Filter. Teflon mat Pallflex® TX401175 or equivalent. Locate in a glass, quartz, or Teflon filter holder with a Teflon filter support in a filter box heated to 250°F. 3.3.2.5.6 Stopcock grease. Autone-Insoluble, heat-stable silicone grease may be used, if necessary.

3.3.2.5.7 Silica gel. Indicating type, 6- to 16-mesh. If the silica gel has been used previously, dry at 176°C (350°F) for 2 hours. Now silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

3.3.2.6 Sample Collection, Preservation, and Handling.

3.3.2.6.1 Sample collection is described in this method. The analytical procedures are described in method 9057.

3.3.2.6.2 Samples should be stored in clearly labeled, tightly sealed containers between sample recovery and analysis. They may be analyzed up to four weeks after collection.

3.3.2.7 Procedure.

3.3.2.7.1 Calibration. Section 3.5.2 of EPA's Quality Assurance Handbook, Volume III (Reference 4) may be used as a guide for those operations.

3.3.2.7.1.1 Dry Gas Metering System.

3.3.2.7.1.1.1 Initial calibration. Before its initial use in the field, first leak check the metering system (sample line, drying tube, if used, vacuum gauge, needle valve, pump, rate meter, and dry gas meter) as follows: plug the inlet end of the sampling line, pull a vacuum of 250 mm (10 in) Hg, plug off the outlet of the dry gas meter, and turn off the pump. The vacuum should remain stable for 30 seconds. Carefully release the vacuum from the system by slowly removing the plug from the sample line inlet. Remove the sampling line (and drying tube, if applicable), and connect the dry gas metering system to an appropriately sized wet meter (e.g., 1 liter per revolution). Make three independent calibration runs, using at least five revolutions of the dry gas meter per run. Calculate the calibration factor, Y (wet test meter calibration volume divided by the dry gas meter volume, with both volumes adjusted to the same reference temperature and pressure), for each run, and average the results. If any Y value deviates by more than 2 percent from the average, the metering system is unacceptable for use. Otherwise, use the average as the calibration factor for subsequent test runs.

3.3.2.7.1.1.2 Post-test calibration check. After each field test series, conduct a calibration check as in section 3.3.2.7.1.1.1 above, except for the following variations: (a) The leak check is not to be conducted; (b) three or more revolutions of the dry gas meter may be used; (c) only two independent runs need to be made. If the calibration factor does not deviate by more than 5 percent from the initial calibration factor (determined in section 3.3.2.7.1.1.1), the dry gas meter volumes obtained during the test series are acceptable. If the calibration factor deviates by more than 5 percent, recalibrate the metering system as section 3.3.2.7.1.1.1, and for the calculations, use the calibration factor (initial or recalibration) that yields the lower gas volume for each test run.

3.3.2.7.1.2 Thermometer(s). Prior to each field test, calibrate against mercury-in-glass thermometers at ambient temperature. If the thermometer being calibrated reads within 2°C (3.6°F) of the mercury-in-glass thermometer, it is acceptable. If not, adjust the thermometer or use an appropriate correction factor.

3.3.2.7.1.3 Rate meter. The rate meter need not be calibrated, but should be cleaned and maintained according to the manufacturer's instructions.

3.3.2.7.1.4 Barometer. Prior to each field test, calibrate against a mercury barometer. The field barometer should agree within 0.1 in. Hg with the mercury barometer. If it does not, the field barometer should be adjusted.

3.3.2.7.2 Sampling.

3.3.2.7.2.1 Preparation of collection train. Prepare the sampling train as follows: The first or knockout impinger should have a shortened stem and be left empty to condense moisture in the gas stream. The next two midge impingers should each be filled with 16 ml of 0.1 N H_2SO_4 , and the fourth and fifth impingers should each be filled with 16 ml of 0.1 N NaOH. Place a fresh charge of silica gel, or equivalent, in the Mae West impinger (or the drying tube). Connect the impingers in series with the knockout impinger first, followed by the two impingers containing the acidified reagent, the two impingers containing the alkaline reagent, and the Mae West impinger containing the silica gel. If the moisture will be determined, weigh the impinger assembly to the nearest ± 0.5 g and record the weight.

3.3.2.7.2.2 Leak check procedures. Leak check the probe and three-way stopcock prior to inserting the probe into the stack. Connect the stopcock to the outlet of the probe, and connect the sample line to the needle valve. Plug the probe inlet, turn on the sample pump, and pull a vacuum of at least 250 mm Hg (10 in. Hg). Turn off the needle valve, and note the vacuum gauge reading. The vacuum should remain stable for at least 30 seconds. Place the probe in the stack at the sampling location, and adjust the filter heating system to 250°F and the probe and stopcock heating systems to a temperature sufficient to prevent water condensation. Connect the first impinger to the stopcock, and connect the sample line to the last impinger and the needle valve. Upon completion of a sampling run, remove the probe from the stack and leak check as described above. If a leak has occurred, the sampling run must be voided. Alternatively, the portion of the train behind the probe may be leak checked between multiple runs at the same site as follows: Close the stopcock to the first impinger (see Figure 3.3-3A), and turn on the sample pump. Pull a vacuum of at least 250 mm Hg (10 in. Hg), turn off the needle valve, and note the vacuum gauge reading. The vacuum should remain stable for at least 30 seconds. Release the vacuum on the impinger train by turning the stopcock to the vent position to permit ambient air to enter (see Figure 3.3-3B). If this procedure is used, the full train leak check described above must be conducted following the final run and all preceding sampling runs voided if a leak has occurred.

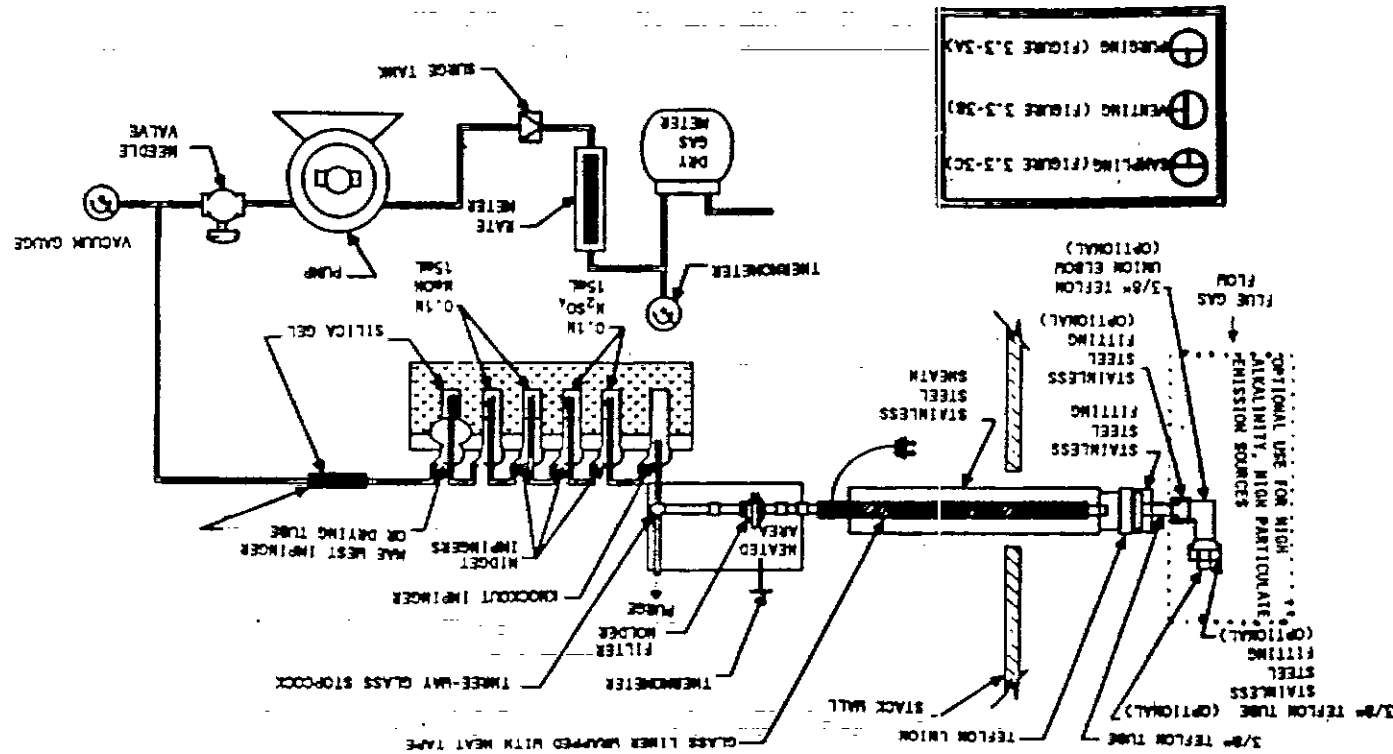


Figure 3.3-3 Midget Impinger HCl/Cl₂ Sampling Train

3.3.2.7.2.3 Purge procedure. Immediately prior to sampling, connect the purge line to the stopcock and turn the stopcock to permit the purge pump to purge the probe (see Figure 3.3-3A). Turn on the purge pump, and adjust the purge rate to 2 liters/min. Purge for at least 5 minutes prior to sampling.

3.3.2.7.2.4 Sample collection. Turn on sample pump, pull a slight vacuum of approximately 25 mm Hg (1 in. Hg) on the Impinger train, and turn the stopcock to permit stack gas to be pulled through the Impinger train (see Figure 3.3-3C). Adjust the sampling rate to 2 liters/min, as indicated by the rate meter, and maintain this rate within 10 percent during the entire sampling run. Take readings of the dry gas meter, the dry gas meter temperature, rate meter, and vacuum gauge at least once every five minutes during the run. A sampling time of one hour is recommended. However, if the expected condensate catch for this sampling run duration will exceed the capacity of the sampling train, (1) a larger knockout Impinger may be used or (2) two sequential half-hour runs may be conducted. At the conclusion of the sampling run, remove the train from the stack, cool, and perform a leak check as described in section 3.3.2.7.2.2.

3.3.2.7.3 Sample recovery. Following sampling, disconnect the Impinger train from the remaining sampling equipment at the inlet to the knockout Impinger and the outlet to the last Impinger. If performing a moisture determination, wipe off any moisture on the outside of the train and any excess silicone grease at the inlet and outlet openings; weigh the train to the nearest 0.5 g and record this weight. Then disconnect the Impingers from each other. Quantitatively transfer the contents of the first three Impingers (the knockout Impinger and the two 0.1 N H₂SO₄ Impingers) to a leak-free storage bottle. Add the water rinses of each of these Impingers and connecting glassware from the second set of Impingers (containing the 0.1 N NaOH) should be recovered in a similar manner if a Cl₂ analysis is desired. The sample bottle should be marked so that if any sample is lost during transport, a correction proportional to the lost volume can be applied. Save portions of the 0.1 N H₂SO₄ and 0.1 N NaOH used as Impinger reagents as reagent blanks. Take 50 ml of each and place in separate leak-free storage bottles. Label and mark the fluid levels as previously described.

3.3.2.7.4 Calculations. Retain at least one extra decimal figure beyond those contained in the available data in intermediate calculations, and round off only the final answer appropriately.

3.3.2.7.4.1 Nomenclature.

B_w = Water vapor in the gas stream, proportion by volume.
M_w = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

P_{bar} = Barometric pressure at the exit orifice of the dry gas meter, mm Hg (in. Hg).
P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

R = Ideal gas constant, 0.06236 mm Hg-m³/K-g-mole (21.85 in. Hg-ft³/R-lb-mole).

T_m = Average dry gas meter absolute temperature, °K (°F).

T_{std} = Standard absolute temperature, 293 °K (528 °R).

V_g = Total volume of liquid collected in Impingers and silica gel, ml (equivalent to the difference in weight of the Impinger train before and after sampling, 1 mg=1 ml).

V_m = Dry gas volume as measured by the dry gas meter, dm (dcf).

V_{mstd} = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dcm (dcf).

V_{wstd} = Volume of water vapor in the gas sample, corrected to standard conditions, acm (dcf).

Y = Dry gas meter calibration factor.
ρ_w = Density of water, 0.9982 g/ml (0.002201 lb/ml).

3.3.2.7.4.2 Sample volume, dry basis, corrected to standard conditions. Calculate as described below:

$$V_{mstd} = V_m Y \left[\frac{T_{std}}{T_m} \right] \left[\frac{P_{bar}}{P_{std}} \right] \quad (1)$$

$$= K_1 Y \frac{V_m P_{bar}}{T_m} \quad (2)$$

where:

K₁ = 0.3858 °K/mm Hg for metric units.

K₁ = 17.64 °R/in. Hg for English units.

3.3.2.7.4.3 Volume of water vapor.

$$V_{wstd} = V_k \frac{P_w R T_{std}}{M_w P_{bar}} \quad (3)$$

$$= K_2 V_k \quad (4)$$

where:

K₂ = 0.001333 m³/ml for metric units.

K₂ = 0.04707 ft³/ml for English units.

3.3.2.7.4.4 Moisture content.

$$B_w = \frac{V_{wstd}}{V_{mstd} + V_{wstd}} \quad (5)$$

3.3.2.8 Quality Control.

3.3.2.8.1 At the present time, a validated audit material does not exist for this method. Analytical quality control procedures are detailed in Method 9057.

3.3.2.9 Method Performance.

3.3.2.9.1 The in-stack detection limit for the method is approximately 0.06 µg of HCl per liter of stack gas for a 1-hour sample.

3.3.2.9.2 The precision and bias for measurement of HCl using this sampling protocol combined with the analytical protocol of method 9057 have been determined. The within laboratory relative standard deviation is 6.2 percent and 3.2 percent at HCl concentrations of 3.9 and 15.3 ppm, respectively. The method does not exhibit any bias for HCl when sampling at Cl₂ concentrations less than 50 ppm.

References

1. Steinsberger, S.C. and J.H. Margeson, "Laboratory and Field Evaluation of a Methodology for Determination of Hydrogen Chloride Emissions from Municipal and Hazardous Waste Incinerators," U.S. Environmental Protection Agency, Office of Research and Development, Report No. EPA-600/4-89/064, NTIS PB 89 226585-AS.
2. State of California, Air Resources Board, Method 421, "Determination of Hydrochloric Acid Emissions from Stationary Sources," March 18, 1987.
3. Entropy Environmentalists, Inc., "Laboratory Evaluation of a Sampling and Analysis Method for Hydrogen Chloride Emissions from Stationary Sources: Interim Report," EPA Contract No. 68-02-4492, Research Triangle Park, North Carolina, January 22, 1988.
4. U.S. Environmental Protection Agency, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods," Publication No. EPA-600/4-77-027b, August 1977.
5. U.S. Environmental Protection Agency, 40 CFR part 60, appendix A, method 6.

3.3.3 Protocol for Analysis of Samples from HCl/Cl₂ Emission Sampling Train (Method 9057)

3.3.3.1 Scope and Application.

3.3.3.1.1 This method describes the analytical protocol for determination of hydrogen chloride (HCl), CAS Registry Number 7647-01-0 and chloride (Cl₂), CAS Registry Number 7782-50-6 in stack gas emission samples collected from hazardous waste and municipal waste incinerators using the midget Impinger HCl/Cl₂ sampling train (method 0051) or the Isokinetic HCl/Cl₂ sampling train (method 0050).

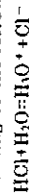
3.3.3.1.2 The lower detection limit is 0.1 µg of chloride (Cl⁻) per ml of sample solution. Samples with concentrations which exceed the linear range of the analytical instrumentation may be diluted.

3.3.3.1.3 This method is recommended for use only by analysts experienced in the use of ion chromatography and in the interpretation of ion chromatograms.

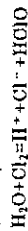
3.3.3.2 Summary of Method.

3.3.3.2.1 The stoichiometry of HCl and Cl₂ collection in the sampling train (see methods 0050 and 0051) is as follows: In the acidified water absorbing solution, the HCl gas is

solubilized and forms chloride ions (Cl⁻) according to the following formula:



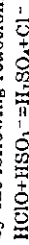
The Cl₂ gas present in the emissions has a very low solubility in acidified water and passes through to the alkaline absorbing solution where it undergoes hydrolysis to form a proton (H⁺), Cl⁻, and hypochlorous acid (HOCl) as shown:



Non-suppressed or suppressed ion chromatography (IC) is used for analysis of the Cl⁻. 3.3.3.3 Interferences.

3.3.3.3.1 Volatile materials which produce chloride ions upon dissolution during sampling are obvious interferences in the measurement of HCl. One likely interferent is diatomic chlorine (Cl₂) gas which disproportionates to HCl and hypochlorous acid (HOCl) upon dissolution in water. Cl₂ gas exhibits a low solubility in water, however, and the use of acidic rather than neutral or basic solutions for collection of hydrogen chloride gas greatly reduces the dissolution of any chlorine present. Sampling a 400 ppm HCl gas stream containing 50 ppm Cl₂ with this method does not cause a significant bias. Sampling a 220 ppm HCl gas stream containing 180 ppm Cl₂ results in a positive bias of 3.4 percent in the HCl measurement. Other interferences have not been encountered.

3.3.3.3.2 Reducing agents such as SO₂ may cause a positive bias in the Cl₂ measurement by the following reaction:



3.3.3.4 Apparatus and Materials.

3.3.3.4.1 Volumetric Flask, Class A, various sizes.

3.3.3.4.2 Volumetric Pipettes, Class A, assortment, to dilute samples to calibration range of the IC.

3.3.3.4.3 Ion Chromatograph. Suppressed or non-suppressed, with a conductivity detector and electronic integrator operating in the peak area mode. Other detectors, a strip chart recorder, and peak heights may be used provided the 5 percent repeatability criteria for sample analysis and the linearity criteria for the calibration curve can be met.

3.3.3.5 Reagents.

3.3.3.5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

3.3.3.5.2 ASTM Type II Water (ASTM D1937-77 (1983)). All references to water in the method refer to ASTM Type II unless otherwise specified.

3.3.3.5.3 Sulfuric acid (0.1 N), H_2SO_4 . To prepare 100 ml, slowly add 0.28 ml of concentrated H_2SO_4 to about 90 ml of water while stirring, and adjust the final volume to 100 ml using additional water. Shake well to mix the solution.

3.3.3.5.4 Sodium hydroxide (0.1 N), NaOH. To prepare 100 ml, dissolve 0.40 g of solid NaOH in about 90 ml of water and adjust the final volume to 100 ml using additional water. Shake well to mix the solution.

3.3.3.5.5 Reagent blank solutions. A separate blank solution of each sampling train reagent used and collected in the field (0.1 N H_2SO_4 and 0.1 N NaOH) should be prepared for analysis with the field samples. For midgeot Impinger train sample analysis, dilute 30 ml of each reagent with rinse water collected in the field as a blank to the final volume of the samples; for isokinetic train sample analysis, dilute 200 ml to the same final volume as the field samples also using the blank sample of rinse water.

3.3.3.5.6 Sodium chloride, NaCl, stock standard solution. Solutions containing a nominal certified concentration of 1000 mg/L NaCl are commercially available as convenient stock solutions from which working standards can be made by appropriate volumetric dilution. Alternatively, concentrated stock solutions may be produced from reagent grade NaCl that has been dried at 110 °C for two or more hours and then cooled to room temperature in a desiccator immediately before weighing. Accurately weigh 1.6 to 1.7 g of the dried NaCl to within 0.1 mg, dissolve in water, and dilute to 1 liter. The exact Cl⁻ concentration can be calculated using the equation:

$$\mu\text{g Cl}^-/\text{ml} = \text{g of NaCl} \times 10^3 \times 35.45/58.44$$

Refrigerate the stock standard solutions and store no longer than one month.

3.3.3.5.7 Chromatographic eluent. Effective eluents for non-suppressed ion chromatography using a resin- or silica-based weak ion exchange column are a 4 mM potassium hydrogen phthalate solution, adjusted to a pH of 4.0 using a saturated sodium borate solution, and a mM 4-hydroxy benzoate solution, adjusted to a pH of 8.6 using 1 N sodium hydroxide. An effective eluent for suppressed ion chromatography is a solution containing 3 mM sodium bicarbonate and 2.4 mM sodium carbonate. Other dilute solutions buffered to a similar pH that contain no ions interfering with the chromatographic analysis may be used. If using suppressed ion chromatography, the "water dip" resulting from sample injection is interfering with the chlorine peak, use a 2 mM sodium hydroxide/2.4 mM sodium bicarbonate eluent.

3.3.3.6 Sample Collection, Preservation, and Handling.

3.3.3.6.1 Sample collection using the midgeot Impinger HCl/Cl⁻ train or the isokinetic

HCl/Cl⁻ train is described in Method 0050 or 0050, respectively.

3.3.3.6.2 Samples should be stored in clearly labeled, tightly sealed containers between sample recovery and analysis. They may be analyzed up to four weeks after collection.

3.3.3.7 Procedure.

3.3.3.7.1 Sample preparation for analysis. Check the liquid level in each sample, and determine if any sample was lost during shipment. If a noticeable amount of leakage has occurred, the volume can be determined from the difference between the initial and final solution levels, and this value can be used to correct the analytical results. For midgeot Impinger train samples, quantitatively transfer each sample solution to a 100 ml volumetric flask and dilute to 100 ml with water. For isokinetic sampling train samples, quantitatively transfer each sample to a volumetric flask or graduated cylinder and dilute with water to a final volume appropriate for all samples.

3.3.3.7.2 Calibration of Ion Chromatograph.

3.3.3.7.2.1 The ion chromatographic conditions will depend on the type of analytical column used and whether suppressed or non-suppressed ion chromatography is used. Prior to calibration and sample analysis, establish a stable baseline. Next, inject a sample of water, and determine if any Cl⁻ appears in the chromatogram. If Cl⁻ is present, repeat the load/injection procedure until no Cl⁻ is present.

3.3.3.7.2.2 To prepare the calibration standards, dilute given amounts (1.0 ml or greater) of the stock standard solution to convenient volumes, using 0.1 H_2SO_4 , or 0.1 NaOH as appropriate. Prepare at least four standards that are within the linear range of the field samples. Inject the calibration standards, starting with the lowest concentration standard first, both before and after injection of the quality control check sample, reagent blank, and field samples. This allows compensation for any instrument drift occurring during sample analysis.

3.3.3.7.2.3 Determine the peak areas, or heights, of the standards and plot individual values versus Cl⁻ concentrations in $\mu\text{g/ml}$. Draw a smooth curve through the points. Use linear regression to calculate a formula describing the resulting linear curve.

3.3.3.7.3 Sample analysis. Between injections of the series of calibration standards, inject in duplicate the reagent blanks and the field samples, including a matrix spike sample. Measure the areas or heights (same as done for the calibration standards) of the Cl⁻ peaks. Use the average response to determine the concentrations of the field samples, matrix spike, and reagent blanks using the linear calibration curve. The results for a reagent blank should not exceed 10 percent of the corresponding value for a field sample.

Environmental Protection Agency

3.3.3.7.4 Calculations. Retain at least one extra decimal figure beyond those contained in the available data in intermediate calculations, and round off only the final answer appropriately.

3.3.3.7.4.1 Total $\mu\text{g HCl}$ per sample. Calculate as described below:

$$\mu\text{HCl} = (S - B) \times V_p \times 35.45/35.453 \quad (1)$$

where:

μHCl = Mass of HCl in sample, μg .

S = Analysis of sample, $\mu\text{g Cl}^-/\text{ml}$.

B = Analysis of reagent blank, $\mu\text{g Cl}^-/\text{ml}$.

V_p = Volume of filtered and diluted sample, ml.

3.3.3.7.4.2 Molecular weight of HCl, $\mu\text{g}/\mu\text{g-mole}$, and

35.45 = Atomic weight of Cl⁻, $\mu\text{g}/\mu\text{g-mole}$.

3.3.3.7.4.2 Total $\mu\text{g Cl}_2$ per sample. Calculate as described below:

$$\mu\text{Cl}_2 = (S - B) \times V_p \times 70.91/35.45 \quad (2)$$

where:

μCl_2 = Mass of Cl₂ in sample, μg .

70.91 = Molecular weight of Cl₂, $\mu\text{g}/\mu\text{g-mole}$, and

35.45 = Atomic weight of Cl⁻, $\mu\text{g}/\mu\text{g-mole}$.

3.3.3.7.4.3 Concentration of HCl in the flue gas. Calculate as described below:

$$C = K \times m/V_{\text{moles}} \quad (3)$$

where:

C = Concentration of HCl or Cl₂, dry basis, mg/dscm.

K = 10^{-3} mg/ μg .

m = Mass of HCl or Cl₂ in sample, μg , and V_{moles} = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscm (from Method 0050 or Method 0051).

3.3.3.8 Quality Control.

3.3.3.8.1 At the present time, a validated audit material does not exist for this method. However, it is strongly recommended that a quality control check sample and a matrix spike sample be used.

3.3.3.8.1.1 Quality control check sample. Chloride solutions of reliably known concentrations are available for purchase from the National Bureau of Standards (SRM 3182). The QC check sample should be prepared in the appropriate absorbing reagent at a concentration approximately equal to the mid range calibration standard. The quality control check sample should be injected in duplicate immediately after the calibration standards have been injected for the first time. The Cl⁻ value obtained for the check sample using the final calibration curve should be within 10 percent of the known value for the check sample.

3.3.3.8.1.2 Matrix spike sample. A portion of at least one field sample should be used to prepare a matrix spike sample. Spike the sample aliquot in the range of the expected concentration. Analyze the matrix spike sample in duplicate along with the field samples. Based on the matrix spike results, de-

termine the recovery for the spiked material. This should be within 10 percent of the known spike value.

3.3.3.9 Method Performance.

3.3.3.9.1 The lower detection limit of the analytical method is 0.1 μg of Cl⁻ per ml of sample solution. Samples with concentrations which exceed the linear range of the IC may be diluted.

3.3.3.9.2 The precision and bias for analysis of HCl using this analytical protocol have been measured in combination with the midgeot Impinger HCl/Cl⁻ train (method 0051) for sample collection. The within-laboratory relative standard deviation is 6.2 percent and 3.2 percent at HCl concentrations of 3.9 and 15.3 ppm, respectively. The method does not exhibit any bias for HCl when sampling at Cl₂ concentrations less than 50 ppm.

References

1. Steinsberger, S.C. and J.H. Marverson, "Laboratory and Field Evaluation of a Methodology for Determination of Hydrogen Chloride Emissions from Municipal and Hazardous Waste Incinerators," U.S. Environmental Protection Agency, Office of Research and Development, Report No. EPA 600/3-89/064, NTIS PB89-229566-AS.
2. State of California, Air Resources Board, Method 421, "Determination of Hydrochloric Acid Emissions from Stationary Sources," March 18, 1997.
3. Entropy Environmentalists, Inc., "Laboratory Evaluation of a Sampling and Analysis Method for Hydrogen Chloride emissions from Stationary Sources: Interim Report," EPA Contract No. 68-02-4442, Research Triangle Park, North Carolina, January 22, 1988.

3.4 Determination of Polychlorinated Dibenzop-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) From Stationary Sources (Method 23)

3.4.1 Applicability and Principle

3.4.1.1 Applicability. This method is applicable to the determination of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) from stationary sources.

3.4.1.2 Principle. A sample is withdrawn from the gas stream isokinetically and collected in the sample probe, on a glass fiber filter, and on a packed column of adsorbent material. The sample cannot be separated into a particulate vapor fraction. The PCDDs and PCDFs are extracted from the sample, separated by high resolution gas chromatography, and measured by high resolution mass spectrometry.

3.4.2.1.3 Sample Transfer Lines. The sample transfer lines, if needed, shall be heat-traced, heavy walled TFE (½ in. OD with ¼ in. wall) with connecting fittings that are capable of forming leak-free, vacuum-tight connections without using sealing greases. The line shall be as short as possible and must be maintained at 120 °C.

3.4.2.1.4 Filter Support. Teflon or Teflon-coated wire.

3.4.2.1.5 Condenser. Glass, coil type with compatible fittings. A schematic diagram is shown in Figure 3.4-2.

3.4.2.1.6 Water Bath. Thermostatically controlled to maintain the gas temperature exiting the condenser at 520 °C (68 °F).

3.4.2.1.7 Adsorbent. Module. Glass container to hold the solid adsorbent. A schematic diagram is shown in Figure 3.4-2. Other physical configurations of the resin trap/condenser assembly are acceptable. The connecting fittings shall form leak-free, vacuum tight seals. No sealant greases shall be used in the sampling train. A coarse glass frit is included to retain the adsorbent.

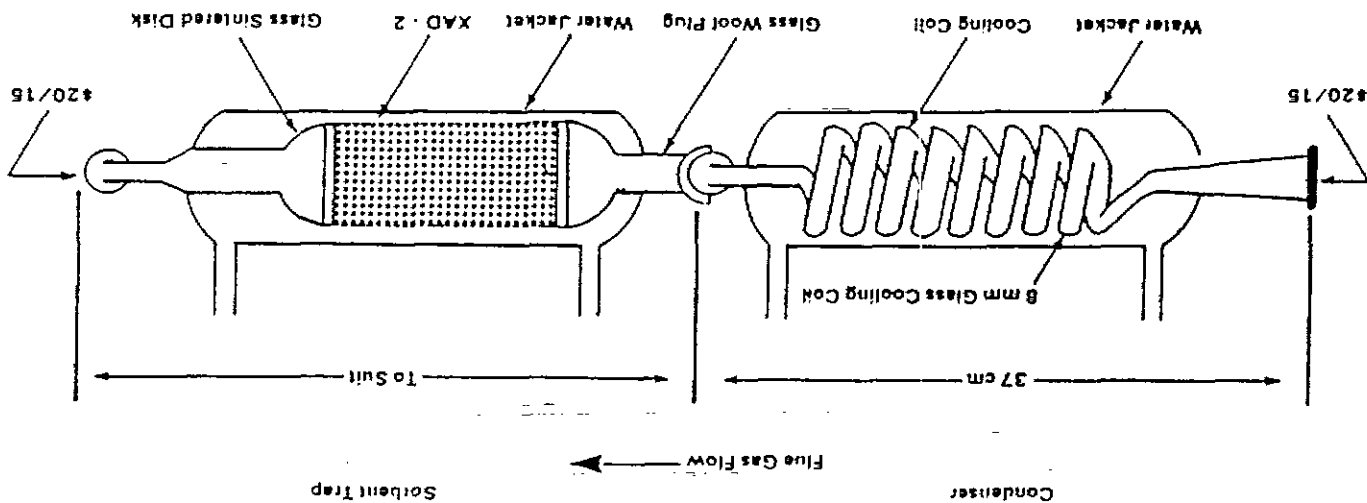


Figure 3.4-2 Condenser and adsorbent trap

3.4.2.2 Sample Recovery.
3.4.2.2.1 Fitting Caps. Ground glass, Teflon taps, or aluminum foil (Section 3.4.2.2.6) to cap off the sample-exposed sections of the train.

3.4.2.2.2 Wash Bottles. Teflon, 500-ml.
3.4.2.2.3 Probe-Liner. Probe-Nozzle, and Filter-Holder Brushes. Inert bristle brushes with pre-cleaned stainless steel or Teflon handles. The probe brush shall have extensions of stainless steel or Teflon, at least as long as the probe. The brushes shall be properly sized and shaped to brush out the nozzle, probe liner, and transfer line, if used.

3.4.2.2.4 Filter Storage Container. Sealed filter holder, wide-mouth amber glass jar with Teflon-lined cap, or glass petri dish.

3.4.2.2.5 Balance. Triple beam.

3.4.2.2.6 Aluminum Foil. Heavy duty, hexane-rinsed.

3.4.2.2.7 Metal Storage Container. Airtight container to store silica gel.

3.4.2.2.8 Graduated Cylinder. Glass, 250-ml with 2-ml graduation.

3.4.2.2.9 Glass sample Storage container. Amber glass bottle for sample glassware washes, 500- or 1000-ml, with leak-free Teflon-lined caps.

3.4.2.3 Analysis.

3.4.2.3.1 Sample Container. 125- and 250-ml flint glass bottles with Teflon-lined caps.

3.4.2.3.2 Test Tube. Glass.

3.4.2.3.3 Soxhlet Extraction Apparatus. Capable of holding 43 x 123 mm extraction thimbles.

3.4.2.3.4 Extraction Thimble. Glass, pre-cleaned cellulose, or glass fiber.

3.4.2.3.5 Pasteur Pipettes. For preparing liquid chromatographic columns.

3.4.2.3.6 Reacti-vials. Amber glass, 2-ml, silanized prior to use.

3.4.2.3.7 Rotary Evaporator. Buchi/Brinkman RE-121 or equivalent.

3.4.2.3.8 Nitrogen Evaporator Concentrator. N-Evap Analytical Evaporator Model III or equivalent.

3.4.2.3.9 Separatory Funnels. Glass, 2-liter.

3.4.2.3.10 Gas Chromatograph. Consisting of the following components:

3.4.2.3.10.1 Oven. Capable of maintaining the separation column at the proper operating temperature $\pm 1^\circ\text{C}$ and performing programmed increases in temperature at rates of at least $3^\circ\text{C}/\text{min}$.

3.4.2.3.10.2 Temperature Gauge. To monitor column, oven, detector, and exhaust temperatures $\pm 1^\circ\text{C}$.

3.4.2.3.10.3 Flow System. Gas metering system to measure sample, fuel, combustion gas, and carrier gas flows.

3.4.2.3.10.4 Capillary Columns. A fused silica column, 60 x 0.25 mm inside diameter (ID), coated with DB-5 and a fused silica column, 30 m x 0.25 mm ID coated with DB-225. Other column systems may be used provided that the user is able to demonstrate, using cali-

bration and performance checks, that the column system is able to meet the specifications of section 3.4.6.1.2.2.

3.4.2.3.11 Mass Spectrometer. Capable of routine operation at a resolution of 1:10000 with a stability of ± 5 ppm.

3.4.2.3.12 Data System. Compatible with the mass spectrometer and capable of monitoring at least five groups of 25 ions.

3.4.2.3.13 Analytical Balance. To measure within 0.1 mg.

3.4.3 Reagents

3.4.3.1 Sampling.

3.4.3.1.1 Filters. Glass fiber filters, without organic binder, exhibiting at least 99.96 percent efficiency (<0.05 percent penetration) on 0.3-micron dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM Standard Method D 2983-71 (Reapproved 1978) (incorporated by reference—see § 60.17).

3.4.3.1.1.1 Pre-cleaning. All filters shall be cleaned before their initial use. Place a glass extraction thimble, 1 g of silica gel, and a plug of glass wool into a Soxhlet apparatus, charge the apparatus with toluene, and reflux for a minimum of 3 hours. Remove the toluene and discard it, but retain the silica gel. Place no more than 50 fillers in the thimble onto the silica gel bed and top with the cleaned glass wool. Charge the Soxhlet with toluene and reflux for 16 hours. After extraction, allow the Soxhlet to cool, remove the toluene extract, and retain it for analysis. Remove the filters and dry them under a clean N_2 stream. Store the filters in a glass petri dish sealed with Teflon tape.

3.4.3.1.2 Adsorbent Resin. Amberlite XAD-2 resin, thoroughly cleaned before initial use.

3.4.3.1.2.1 Cleaning Procedure. This procedure may be carried out in a giant Soxhlet extractor. An all-glass filter thimble containing an extra-coarse frit is used for extraction of XAD-2. The frit is recessed 10-16 mm above a cranelated ring at the bottom of the thimble to facilitate drainage. The resin must be carefully retained in the extractor cup with a glass wool plug and a stainless steel ring because it floats on methylene chloride. This process involves sequential extraction in the following order:

Solvent	Procedure
Water	Initial rinse: Place resin in a beaker, fill once with water, and discard. Rinse with water a second time, let stand overnight, and discard.
Water	Extract with water for 8 hours.
Methanol	Extract for 22 hours.
Methylene Chloride	Extract for 22 hours.
Methylene Chloride (fresh)	Extract for 22 hours.

3.4.3.1.2.2 Drying.

3.4.3.1.2.2.1 Drying Column. Pyrex pipe, 10.2 cm ID by 0.6 m long, with suitable retainers.

3.4.3.1.2.2.2 Procedure. The adsorbent must be dried with clean inert gas. Liquid nitrogen from a standard commercial liquid nitrogen cylinder has proven to be a reliable source of large volumes of gas free from organic contaminants. Connect the liquid nitrogen cylinder to the column by a length of cleaned copper tubing, 0.95 cm ID, coiled to pass through a heat source. A convenient heat source is a water-bath heated from a steam line. The final nitrogen temperature should only be warm to the touch and not over 40°C . Continue flowing nitrogen through the adsorbent until all the residual solvent is removed. The flow rate should be sufficient to gently agitate the particles but not so excessive as to cause the particles to fracture.

3.4.3.1.2.3 Quality Control Check. The adsorbent must be checked for residual methylene chloride as well as PCDDs and PCDFs. 3.4.3.1.2.3.1 Extraction. Weigh a 1.0 g sample of dried resin into a small vial, add 9 ml of toluene, cap the vial, and shake it well. 3.4.3.1.2.3.2 Analysis. Inject a 2- μl sample of the extract into a gas chromatograph operated under the following conditions:

Column: 6 ft x $\frac{1}{8}$ in. stainless steel containing 10 percent OV-101 on 100/120 Supelcoport. Carrier Gas: Helium at a rate of 30 ml/min. Detector: Flame ionization detector operated at a sensitivity of 4×10^{-11} A/mV. Injection Port Temperature: 250°C .

Detector Temperature: 305°C . Oven Temperature: 30°C for 4 min; programmed to rise at $40^\circ\text{C}/\text{min}$ until it reaches 250°C ; return to 30°C after 17 minutes.

Compare the results of the analysis to the results from the reference solution. Prepare the reference solution by injecting 2.5 μl of methylene chloride into 100 ml of toluene. This corresponds to 100 μg of methylene chloride per g of adsorbent. The maximum acceptable concentration is 1000 $\mu\text{g/g}$ of adsorbent. If the adsorbent exceeds this level, drying must be continued until the excess methylene chloride is removed.

3.4.3.1.2.3.3 Storage. The adsorbent must be used within 4 weeks of cleaning. After cleaning, it may be stored in a wide mouth amber glass container with a Teflon-lined cap or placed in one of the glass adsorbent modules tightly sealed with glass stoppers. If pre-cleaned adsorbent is purchased in sealed containers, it must be used within 4 weeks after the seal is broken.

3.4.3.1.3 Glass Wool. Cleaned by sequential immersion in three aliquots of methylene chloride, dried in a 110°C oven, and stored in a methylene chloride-washed glass jar with a Teflon-lined screw cap.

3.4.3.1.4 Water. Deionized distilled and stored in a methylene chloride-rinsed glass container with a Teflon-lined screw cap.

3.4.3.1.5 Silica Gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175°C (350 $^\circ\text{F}$) for two hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the Administrator.

3.4.3.1.6 Chromic Acid Cleaning Solution. Dissolve 20 g of sodium dichromate in 15 ml of water, and then carefully add 400 ml of concentrated sulfuric acid.

3.4.3.2 Sample Recovery.

3.4.3.2.1 Acetone. Pesticide quality.

3.4.3.2.2 Methylene Chloride. Pesticide quality.

3.4.3.2.3 Toluene. Pesticide quality.

3.4.3.3 Analysis.

3.4.3.3.1 Potassium Hydroxide. ACS grade, 2-percent (weight/volume) in water.

3.4.3.3.2 Sodium Sulfate. Granulated, reagent grade. Purify prior to use by rinsing with methylene chloride and oven drying.

Store the cleaned material in a glass container with a Teflon-lined screw cap.

3.4.3.3.3 Sulfuric Acid. Reagent grade.

3.4.3.3.4 Sodium Hydroxide. 1.0 N. Weigh 40 g of sodium hydroxide into a 1-liter volumetric flask. Dilute to 1 liter with water.

3.4.3.3.5 Hexane. Pesticide grade.

3.4.3.3.6 Methylene Chloride. Pesticide grade.

3.4.3.3.7 Benzene. Pesticide grade.

3.4.3.3.8 Ethyl Acetate.

3.4.3.3.9 Methanol. Pesticide grade.

3.4.3.3.10 Toluene. Pesticide grade.

3.4.3.3.11 Nonylene. Pesticide grade.

3.4.3.3.12 Cyclohexane. Pesticide grade.

3.4.3.3.13 Basic Alumina. Activity grade 1, 100-200 mesh. Prior to use, activate the alumina by heating for 16 hours at 130°C before use. Store in a desiccator. Pre-activated alumina may be purchased from a supplier and may be used as received.

3.4.3.3.14 Silica Gel. Bio-Sil A, 100-200 mesh. Prior to use, activate the silica gel by heating for at least 30 minutes at 180°C . After cooling, rinse the silica gel sequentially with methanol and methylene chloride. Heat the rinsed silica gel at 60°C for 10 minutes, and then increase the temperature gradually to 180°C over 25 minutes and maintain it at this temperature for 90 minutes. Cool at room temperature and store in a glass container with a Teflon-lined screw cap.

3.4.3.3.15 Silica Gel Impregnated with Sulfuric Acid. Combine 100 g of silica gel with 44 g of concentrated sulfuric acid in a screw-capped glass bottle and agitate thoroughly. Disperse the solids with a stirring rod until a uniform mixture is obtained. Store the mixture in a glass container with a Teflon-lined screw cap.

3.4.3.3.16 Silica Gel Impregnated with Sodium Hydroxide. Combine 39 g of 1 N sodium hydroxide with 100 g of silica gel in a screw-capped glass bottle and agitate thoroughly.

Disperse solids with a stirring rod until a uniform mixture is obtained. Store the mixture in a glass container with a Teflon-lined screw cap.

3.4.3.3.17 Carbon/Cellite. Combine 10.7 g of AX-21 carbon with 124 g of Cellite 646 in a 250-ml glass bottle with a Teflon-lined screw cap. Agitate the mixture thoroughly until a uniform mixture is obtained. Store in the glass container.

3.4.3.3.18 Nitrogen. Ultra high purity.

3.4.3.3.19 Hydrogen. Ultra high purity.

3.4.3.3.20 Internal Standard Solution. Prepare a stock standard solution containing the isotopically labeled PCDDs and PCDFs at the concentrations shown in Table 3.4-1 under the heading "Internal Standards" in 10 ml of nonane.

3.4.3.3.21 Surrogate Standard Solution. Prepare a stock standard solution containing the isotopically labeled PCDDs and PCDFs at the concentrations shown in Table 1 under the heading "Surrogate Standards" in 10 ml of nonane.

3.4.3.3.22 Recovery Standard Solution. Prepare a stock standard solution containing the isotopically labeled PCDDs and PCDFs at the concentrations shown in Table 1 under the heading "Recovery Standards" in 10 ml of nonane.

TABLE 3.4-1.—COMPOSITION OF THE SAMPLE FORTIFICATION AND RECOVERY STANDARDS SOLUTIONS

Analyte	Concentration (pg/l)
Internal Standards:	
¹³ C ₁₇ 2,3,7,8-TCDD	100
¹³ C ₁₇ 1,2,2,7,8-PeCDD	100
¹³ C ₁₇ 1,2,3,6,7,8-HxCDD	100
¹³ C ₁₇ 1,2,3,4,6,7,8-HpCDD	100
¹³ C ₁₇ 2,3,7,8-TCDF	100
¹³ C ₁₇ 1,2,3,7,8-PeCDF	100
¹³ C ₁₇ 1,2,3,6,7,8-HxCDF	100
¹³ C ₁₇ 1,2,3,4,6,7,8-HpCDF	100
Surrogate Standards:	
¹³ C ₁₇ 2,3,7,8-TCDD	100
¹³ C ₁₇ 1,2,3,4,7,8-HxCDD	100
¹³ C ₁₇ 1,2,3,4,7,8-PeCDF	100
¹³ C ₁₇ 1,2,3,4,7,8-HxCDF	100
¹³ C ₁₇ 1,2,3,4,7,8,9-HpCDF	100
Recovery Standards:	
¹³ C ₁₇ 1,2,3,4-TCDD	500
¹³ C ₁₇ 1,2,3,7,8-HxCDD	500

3.4.4 Procedure

3.4.4.1 Sampling. The complexity of this method is such that, in order to obtain reliable results, analysts should be trained and experienced with the analytical procedures.

3.4.4.1.1 Preparation Prior to Analysis. 3.4.4.1.1.1 Cleaning Glassware. All glass components of the train upstream of and including the adsorbent module, shall be cleaned as described in Section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environ-

mental Samples." Special care shall be devoted to the removal of residual silicone grease sealants on ground glass connections of used glassware. Any residue shall be removed by soaking the glassware for several hours in a chromic acid cleaning solution prior to cleaning as described above.

3.4.4.1.2 Adsorbent Trap. The traps must be loaded in a clean area to avoid contamination. They may not be loaded in the field. Fill a trap with 20 to 40 g of XAD-2. Follow the XAD-2 with glass wool and tightly cap both ends of the trap. Add 100 µl of the surrogate standard solution (Section 3.4.3.3.21) to each trap.

3.4.4.1.3 Sample Train. It is suggested that all components be maintained according to the procedure described in AP-2D-0578.

3.4.4.1.4 Silica Gel. Weigh several 200 to 300 g portions of silica gel in an air-tight container to the nearest 0.6 g. Record the total weight of the silica gel plus container, on each container. As an alternative, the silica gel may be weighed directly in its impinger or sample holder just prior to sampling.

3.4.4.1.5 Filter. Check each filter against light for irregularities and flaws or pinholes. Pack the filters flat in a clean glass container.

3.4.4.1.6 Preliminary Determinations. Same as Section 4.1.2 of Method 6.

3.4.4.1.3.1 Preparation of Collection Train. 3.4.4.1.3.1 During preparation and assembly of the sampling train, keep all train openings where contamination can enter, sealed until just prior to assembly or until sampling is about to begin.

NOTE: Do not use sealant grease in assembling the train.

3.4.4.1.3.2 Place approximately 100 ml of water in the second and third impingers, leave the first and fourth impingers empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the fifth impinger.

3.4.4.1.3.3 Place the silica gel container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.6 g and recorded.

3.4.4.1.3.4 Assemble the train as shown in Figure 3.4-1.

3.4.4.1.3.5 Turn on the adsorbent module and condenser coil recirculating pump and begin monitoring the adsorbent module gas entry temperature. Ensure proper sorbent temperature gas entry temperature before proceeding and before sampling is initiated. It is extremely important that the XAD-2 adsorbent resin temperature never exceed 60 °C because thermal decomposition will occur. During testing, the XAD-2 temperature must not exceed 20 °C for effluent capture of the PCDDs and PCDFs.

3.4.4.1.4 Leak-Check Procedure. Same as method 6, section 4.1.4.

3.4.4.1.5 Sample Train Operation. Same as method 6, section 4.1.5.

3.4.4.2 Sample Recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Seal the nozzle end of the sampling probe with Teflon tape or aluminum foil.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe. Remove the probe from the train and close off both ends with aluminum foil. Seal off the inlet to the train with Teflon tape, a ground glass cap, or aluminum foil.

Transfer the probe and impinger assembly to the cleanup area. This area shall be clean and enclosed so that the chances of losing or contaminating the sample are minimized. Smoking, which could contaminate the sample, shall not be allowed in the cleanup area. Inspect the train prior to and during disassembly and note any abnormal conditions, e.g., broken filters, colored impinger liquid, etc. Treat the samples as follows:

3.4.4.2.1 Container No. 1. Either seal the filter holder or carefully remove the filter from the filter holder and place it in its identified container. Use a pair of cleaned tweezers to handle the filter. If it is necessary to fold the filter, do so such that the particulate cake is inside the fold. Carefully transfer to the container any particulate matter and filter fibers which adhere to the filter holder gasket, by using a dry inert bristle brush and a sharp-edged blade. Seal the container.

3.4.4.2.2 Adsorbent Module. Remove the module from the train, tightly cap both ends, label it, cover with aluminum foil, and store it on ice for transport to the laboratory.

3.4.4.2.3 Container No. 2. Quantitatively recover material deposited in the nozzle, probe transfer lines, the front half of the filter holder, and the cyclone, if used, first, by brushing while rinsing three times each with acetone, and then by rinsing the probe three times with methylene chloride. Collect all the rinses in Container No. 2.

Rinse the back half of the filter holder three times with acetone. Rinse the connecting line between the filter and the condenser three times with acetone. Soak the connecting line with three separate portions of methylene chloride for 5 minutes each. If using a separate condenser and adsorbent trap, rinse the condenser in the same manner as the connecting line. Collect all the rinses in Container No. 2 and mark the level of the liquid on the container.

3.4.4.2.4 Container No. 3. Repeat the methylene chloride-rinsing described in section 3.4.4.2.3 using toluene as the rinse solvent.

Collect the rinses in Container No. 3 and mark the level of the liquid on the container. 3.4.4.2.5 Impinger Water. Measure the liquid in the first three impingers to within ±1 ml by using a graduated cylinder or by weighing it to within ±0.5 g by using a balance. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight.

3.4.4.2.6 Silica Gel. Note the color of the indicating silica gel to determine if it has been completely spent and make a mention of its condition. Transfer the silica gel from the fifth impinger to its original container and seal.

3.4.5 Analysis

All glassware shall be cleaned as described in section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples." All samples must be extracted within 30 days of collection and analyzed within 45 days of extraction.

3.4.5.1 Sample Extraction.

3.4.5.1.1 Extraction System. Place an extractable thimble (section 3.4.2.3.4), 1 g of silica gel, and a plug of glass wool into the Soxhlet apparatus, charge the apparatus with toluene, and reflux for a minimum of 3 hours. Remove the toluene and discard it, but retain the silica gel. Remove the extraction thimble from the extraction system and place it in a glass beaker to catch the solvent rinses.

3.4.5.1.2 Container No. 1 (Filter). Transfer the contents of container number 1 directly to the glass thimble of the extraction system and extract them simultaneously with the XAD-2 resin.

3.4.5.1.3 Adsorbent Module. Suspend the adsorbent module directly over the extraction thimble in the beaker (see section 3.4.5.1.1). The glass frit of the module should be in the up position. Using a Teflon squeeze bottle containing toluene, flush the XAD-2 into the thimble onto the bed of cleaned silica gel. Thoroughly rinse the glass module catching the rinsings in the beaker containing the thimble. If the resin is wet, effective extraction can be accomplished by loosely packing the resin in the thimble. Add the XAD-2 glass wool plug to the thimble.

3.4.5.1.4 Container No. 2 (Acetone and Methylene Chloride Rinses). Concentrate the sample to a volume of about 1-5 ml using the rotary evaporator apparatus, at a temperature of less than 37 °C. Rinse the sample container three times with small portions of methylene chloride and add these to the concentrated solution and concentrate further to near dryness. This residue contains particulate matter removed in the rinses of the train probe and nozzle. Add the concentrate

to the filter and the XAD-2 resin in the Soxhlet apparatus described in section 3.4.5.1.1.

3.4.5.1.5 **Extraction.** Add 100 µl of the internal standard solution (section 3.4.3.3.20) to the extraction thimble containing the contents of the adsorbent cartridge, the contents of Container No. 1, and the concentrate from section 3.4.5.1.3. Cover the contents of the extraction thimble with the cleaned glass wool plug to prevent the XAD-2 resin from floating into the solvent reservoir of the extractor. Place the thimble in the extractor, and add the toluene contained in the beaker to the solvent reservoir. Pour additional toluene to fill the reservoir approximately ¾ full. Add Teflon boiling chips and assemble the apparatus. Adjust the heat source to cause the extractor to cycle three times per hour. Extract the sample for 16 hours. After extraction, allow the Soxhlet to cool. Transfer the toluene extract and three 10-ml rinses to the rotary evaporator. Concentrate the extract to approximately 10 ml. At this point the analyst may choose to split the sample in half. If so, split the sample, store one half for future use, and analyze the other according to the procedures in sections 3.4.5.2 and 3.4.5.3. In either case, use a nitrogen evaporative concentrator to reduce the volume of the sample being analyzed to near dryness. Dissolve the residue in 5 ml of hexane.

3.4.5.1.6 **Container No. 3 (Toluene Rinse).** Add 100 µl of the Internal Standard solution (section 3.4.3.3.20) to the contents of the container. Concentrate the sample to a volume of about 1-5 ml using the rotary evaporator apparatus at a temperature of less than 37 °C. Rinse the sample container three times with small portions of toluene and add these to the concentrated solution and concentrate further to near dryness. Analyze the extract separately according to the procedures in sections 3.4.5.2 and 3.4.5.3, but concentrate the solution in a rotary evaporator apparatus rather than a nitrogen evaporative concentrator.

3.4.5.2 **Sample Cleanup and Fractionation.**
3.4.5.2.1 **Silica Gel Column.** Pack one end of a glass column, 20 mm x 230 mm, with glass wool. Add in sequence, 1 g silica gel, 2 g of sodium hydroxide impregnated silica gel, 1 g silica gel, 4 g of acid-modified silica gel, and 1 g of silica gel. Wash the column with 30 ml of hexane and discard it. Add the sample extract, dissolved in 5 ml of hexane to the column with two additional 5-ml rinses. Elute the column with an additional 90 ml of hexane and retain the entire eluate. Concentrate this solution to a volume of about 1 ml using the nitrogen evaporative concentrator (section 3.4.2.3.8).

3.4.5.2.2 **Basic Alumina Column.** Shorten a 25-ml disposable Pasteur pipette to about 16 ml. Pack the lower section with glass wool and 12 g of basic alumina. Transfer the con-

centrated extract from the silica gel column to the top of the basic alumina column and elute the column sequentially with 120 ml of 0.5 percent methylene chloride in hexane followed by 120 ml of 35 percent methylene chloride in hexane. Discard the first 120 ml of eluate in hexane. Collect the second 120 ml of eluate and concentrate it to about 0.5 ml using the nitrogen evaporative concentrator.

3.4.5.2.3 **AX-21 Carbon/Celite 545 Column.** Remove the bottom 0.5 in. from the tip of a 9-ml disposable Pasteur pipette. Insert a glass fiber filter disk in the top of the pipette 2.5 cm from the construction. Add sufficient carbon/celite mixture to form a 2 cm column. Top with a glass wool plug. In some cases, AX-21 carbon fines may wash through the glass wool plug and enter the sample. This may be prevented by adding a celite plug to the exit end of the column. Rinse the column in sequence with 2 ml of 50 percent benzene in ethyl acetate, 1 ml of 50 percent methylene chloride in cyclohexane, and 2 ml of hexane. Discard these rinses. Transfer the concentrate in 1 ml of hexane from the basic alumina column to the carbon/celite column along with 1 ml of hexane rinse. Elute the column sequentially with 2 ml of 50 percent methylene chloride in hexane and 2 ml of 50 percent benzene in ethyl acetate and discard these eluates. Invert the column and elute in the reverse direction with 13 ml of toluene. Collect this eluate. Concentrate the eluate in a rotary evaporator at 50 °C to about 1 ml. Transfer the concentrate to a Reacti-vial using a toluene rinse and concentrate to a volume of 200 µl using a stream of N₂. Store extracts at room temperature, shielded from light, until the analysis is performed.

3.4.5.3 **Analysis.** Analyze the sample with a gas chromatograph coupled to a mass spectrometer (GC/MS) using the instrumental parameters in sections 3.4.5.3.1 and 3.4.5.3.2. Immediately prior to analysis, add a 20-µl aliquot of the Recovery Standard solution from Table 1 to each sample. A 2-µl aliquot of the extract is injected into the GC. Sample extracts are first analyzed using the DB-5 capillary column to determine the concentration of each isomer of PCDDs and PCDFs (tetra- through octa-). If tetra-chlorinated dibenzofurans are detected in this analysis, then analyze another aliquot of the sample in a separate run, using the DB-226 column to measure the 2,3,7,8-tetrachlorodibenzofuran isomer. Other column systems may be used, provided that the user is able to demonstrate, using calibration and performance checks, that the column system is able to meet the specifications of Section 3.4.5.1.2.2.

3.4.5.3.1 **Gas Chromatograph Operating Conditions.**

3.4.5.3.1.1 **Injector.** Configured for capillary column, splitless, 250 °C.

3.4.5.3.1.2 **Carrier Gas.** Helium, 1-2 ml/min.

3.4.5.3.1.3 **Oven.** Initially at 150 °C. Raise by at least 40 °C/min to 180 °C and then at 3 °C/min up to 300 °C.

3.4.5.3.2 **High Resolution Mass Spectrometer.**

3.4.5.3.2.1 **Resolution.** 10000 m/e.

3.4.5.3.2.2 **Ion type.** LOCK

3.4.5.3.2.3 **Source Temperature** 250 °C.

3.4.5.3.2.4 **Monitoring Mode.** Selected Ion monitoring. A list of the various ions to be monitored is summarized in Table 3.4-2.

3.4.5.3.2.5 **COM25**COM25*TABLE 3.4-2.—ELEMENTAL COMPOSITIONS AND EXACT MASSES OF THE IONS MONITORED BY HIGH RESOLUTION MASS SPECTROMETRY FOR PCDDs AND PCDFs**

Descriptor No.	Accurate mass*	Ion type	Elemental composition	Analyte
1	Not used	LOCK		
2	292.9826	M	C ₁₂ H ₁₀ Cl ₂ O	PFK
	303.9016	M	C ₁₂ H ₁₀ Cl ₂ O	TCDF
	305.8987	M+2	C ₁₂ H ₁₀ Cl ₂ O	TCDF
	315.9419	M	C ₁₂ H ₁₀ Cl ₂ O	TCDF (S)
	317.9389	M+2	C ₁₂ H ₁₀ Cl ₂ O	TCDF (S)
	319.8965	M	C ₁₂ H ₁₀ Cl ₂ O	TCDF
	321.8936	M+2	C ₁₂ H ₁₀ Cl ₂ O	TCDF
	327.8947	M	C ₁₂ H ₁₀ Cl ₂ O	TCDF (S)
	330.8922	QC	C ₁₂ H ₁₀ Cl ₂ O	PFK
	331.8908	M	C ₁₂ H ₁₀ Cl ₂ O	TCDF (S)
	333.8939	M+2	C ₁₂ H ₁₀ Cl ₂ O	TCDF (S)
	339.8597	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	341.8567	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	351.9000	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	353.8970	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	355.8546	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	357.8516	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	367.8849	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	369.8819	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	375.8304	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	408.7974	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	373.8208	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	375.8178	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	383.8639	M	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	385.8610	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	388.8157	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	391.8127	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	392.8760	LOCK	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	401.8559	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	403.8529	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	446.7655	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	430.9729	QC	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	407.7818	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	409.7789	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	417.8253	M	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	419.8220	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	423.7786	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	425.7737	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	435.8160	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	437.8140	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	479.7165	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	430.9729	LOCK	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	441.7428	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	443.7399	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	457.7377	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	458.7348	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	469.7776	M+2	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	471.7760	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF (S)
	513.6776	M+4	C ₁₂ H ₁₀ Cl ₂ O	PCDF
	442.9728	QC	C ₁₂ H ₁₀ Cl ₂ O	PCDF

*The following nucleic masses were used: H=1.007825, O=15.994915, C=12.000000, ³⁵Cl=34.968853, ³⁷Cl=36.965900, F=18.9984, S=32.0595, QC=ion selected for monitoring instrument stability during the GC/MS analysis.

TABLE 3.4-3.—ACCEPTABLE RANGES FOR ION-ABUNDANCE RATIOS OF PCDDs AND PCDFs

Number of Chlorine atoms	Ion type	Theoretical ratio	Control limits	
			Lower	Upper
1	MM+2	0.77	0.65	0.89

TABLE 3.4-3.—ACCEPTABLE RANGES FOR ION-ABUNDANCE RATIOS OF PCDDs AND PCDFs—Continued

	Number of chlorine atoms	Ion type	Theoretical ratio	Control limits	
				Lower	Upper
5		M+2M+4	1.55	1.32	1.78
6		M+2M+4	1.24	1.05	1.43
6*		MM+2	0.51	0.43	0.59
7		MM+2	0.44	0.37	0.51
7		M+2M+4	1.04	0.89	1.20
8		M+2M+4	0.89	0.78	1.02

*Used only for ¹³C-HxCDF

*Used only for ¹³C-HxCDF

3.4.5.3.2.5 Identification Criteria. The following identification criteria shall be used for the characterization of polychlorinated dibenzodioxins and dibenzofurans.

1. The integrated ion-abundance ratio (M/M+2 or M+2/M+4) shall be within 15 percent of the theoretical value. The acceptable ion-abundance ratio ranges for the identification of chlorine-containing compounds are given in Table 3.

2. The retention time for the analytes must be within 3 seconds of the corresponding ¹³C-labeled internal standard, surrogate or alternate standard.

3. The monitored ions, shown in Table 3.4-2 for a given analyte, shall reach their maximum within 2 seconds of each other.

4. The identification of specific isomers that do not have corresponding ¹³C-labeled standards is done by comparison of the relative retention time (RRT) of the analyte to the nearest internal standard retention time with reference (i.e., within 0.005 RRT units) to the comparable RRTs found in the continuing calibration.

5. The signal to noise ratio for all monitored ions must be greater than 2.5.

6. The confirmation of 2,3,7,8-TCDD and 2,3,7,8-TCDF shall satisfy all of the above identification criteria.

7. For the identification of PCDFs, no signal may be found in the corresponding PCDD channels.

3.4.6.3.2.6 Quantitation. The peak areas for the two ions monitored for each analyte are summed to yield the total response for each analyte. Each internal standard is used to quantitate the indigenous PCDDs or PCDFs in its homologous series. For example, the ¹³C₁₂-2,3,7,8-tetrachlorodibenzodioxin is used to calculate the concentrations of all other tetrachlorinated isomers. Recoveries of the tetra- and penta-internal standards are calculated using the ¹³C₁₂-1,2,3,4-TCDD. Recoveries of the hexa- through octa-inter-

nal standards are calculated using ¹³C₁₂-1,2,3,7,8-HxCDD. Recoveries of the surrogate standards are calculated using the corresponding homolog from the internal standard.

3.4.6 Calibration

Same as Method 5 with the following additions.

3.4.6.1 GC/MS System.

3.4.6.1.1 Initial Calibration. Calibrate the GC/MS system using the set of five standards shown in Table 3.4-4. The relative standard deviation for the mean response factor from each of the unlabeled analytes (Table 4) and of the internal, surrogate, and alternate standards shall be less than or equal to the values in Table 3.4-5. The signal to noise ratio for the GC signal present in every selected ion current profile shall be greater than or equal to 2.5. The ion abundance ratios shall be within the control limits in Table 3.4-3.

3.4.6.1.2 Daily Performance Check.

3.4.6.1.2.1 Calibration Check. Inject one µl of solution Number 3 from table 4. Calculate the relative response factor (RRF) for each compound and compare each RRF to the corresponding mean RRF obtained during the initial calibration. The analyzer performance is acceptable if the measured RRFs for the labeled and unlabeled compounds for the daily run are within the limits of the mean values shown in Table 3.4-5. In addition, the ion-abundance ratios shall be within the allowable control limits shown in Table 3.4-3.

3.4.6.1.2.2 Column Separation Check. Inject a solution of a mixture of PCDDs and PCDFs that documents resolution between 2,3,7,8-TCDD and other TCDD isomers. Resolution is defined as a valley between peaks that is less than 25 percent of the lower of the two peaks. Identify and record the retention time windows for each homologous series.

TABLE 3.4-4.—COMPOSITION OF THE INITIAL CALIBRATION SOLUTIONS

Compound	So- lu- tion No.	Concentrations (ppb/L)			
		1	2	3	4
Unlabeled Analytes					
2,3,7,8-TCDD	0.5	1	5	50	100
2,3,7,8-TCDF	0.5	1	5	50	100
1,2,3,7,8-PeCDD	2.5	5	25	250	500
1,2,3,7,8-PeCDF	2.5	5	25	250	500
2,3,4,7,8-PeCDF	2.5	5	25	250	500
1,2,3,4,7,8-HxCDD	2.5	5	25	250	500
1,2,3,6,7,8-HxCDD	2.5	5	25	250	500
1,2,3,7,8,9-HxCDD	2.5	5	25	250	500
1,2,3,4,7,8-HxCDF	2.5	5	25	250	500
1,2,3,6,7,8-HxCDF	2.5	5	25	250	500
1,2,3,7,8,9-HxCDF	2.5	5	25	250	500
2,3,4,6,7,8-HxCDD	2.5	5	25	250	500
1,2,3,4,6,7,8-HxCDD	2.5	5	25	250	500
1,2,3,4,6,7,8-HxCDF	2.5	5	25	250	500
1,2,3,4,7,8,9-HpCDD	2.5	5	25	250	500
OCDD	5.0	10	50	500	1000
OCDF	5.0	10	50	500	1000
Internal Standards					
¹³ C ₁₂ -2,3,7,8-TCDD	100	100	100	100	100
¹³ C ₁₂ -1,2,3,7,8-PeCDD	100	100	100	100	100
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	100	100	100	100	100
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	100	100	100	100	100
¹³ C ₁₂ -OCDD	200	200	200	200	200
¹³ C ₁₂ -2,3,7,8-TCDF	100	100	100	100	100
¹³ C ₁₂ -1,2,3,7,8-PeCDF	100	100	100	100	100
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	100	100	100	100	100
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	100	100	100	100	100
Surrogate Standards					
¹³ C ₁₂ -2,3,7,8-TCDD	0.5	1	5	50	100
¹³ C ₁₂ -2,3,4,7,8-PeCDD	2.5	5	25	250	500
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	2.5	5	25	250	500
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	2.5	5	25	250	500
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	2.5	5	25	250	500
Alternative Standard					
¹³ C ₁₂ -1,2,3,7,8,9-HxCDF	2.5	5	25	250	500
Recovery Standards					
¹³ C ₁₂ -1,2,3,4-TCDD	100	100	100	100	100
¹³ C ₁₂ -1,2,3,7,8,9-HxCDD	100	100	100	100	100

TABLE 3.4-5.—MINIMUM REQUIREMENTS FOR INITIAL AND DAILY CALIBRATION RESPONSE FACTORS

Compound	Relative Response Factors	
	Initial Calibration RSD	Daily Calibration % Difference
Unlabeled Analytes		
2,3,7,8-TCDD	25	25
2,3,7,8-TCDF	25	25
1,2,3,7,8-PeCDD	25	25
1,2,3,7,8-PeCDF	25	25
2,3,4,7,8-PeCDF	25	25
1,2,4,5,7,8-HxCDD	25	25
1,2,4,6,7,8-HxCDD	25	25
1,2,3,7,8,9-HxCDD	25	25
1,2,3,4,7,8-HxCDF	25	25
1,2,3,6,7,8-HxCDF	25	25
2,3,4,6,7,8-HxCDF	25	25
1,2,3,4,6,7,8-HpCDD	25	25
OCDD	30	30
Internal Standards		
¹³ C ₁₂ -2,3,7,8-TCDD	25	25
¹³ C ₁₂ -1,2,3,7,8-PeCDD	25	25
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	25	25
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	25	25

TABLE 3.4-5.—MINIMUM REQUIREMENTS FOR INITIAL AND DAILY CALIBRATION RESPONSE FACTORS—Continued

Compound	Relative Response Factors	
	Initial Calibration RSD	Daily Calibration % Difference
¹ C ₁₇ -OCDD	30	30
¹ C ₁₇ -2,3,7,8-TCDF	30	30
¹ C ₁₇ -1,2,3,7,8-PeCDF	30	30
¹ C ₁₇ -1,2,3,6,7,8-HxCDF	30	30
¹ C ₁₇ -1,2,3,4,6,7,8-HpCDF	30	30
Surrogate Standards		
¹ C ₁₇ -2,3,7,8-TCDD	25	25
¹ C ₁₇ -2,3,4,7,8-PeCDD	25	25
¹ C ₁₇ -1,2,3,4,7,8-HxCDD	25	25
¹ C ₁₇ -1,2,3,4,7,8-HxCDF	25	25
¹ C ₁₇ -1,2,3,4,7,8,9-HpCDF	25	25
Alternate Standard		
¹ C ₁₇ -1,2,3,7,8,9-HxCDF	25	25

Perform a similar resolution check on the confirmation column to document the resolution between 2,3,7,8-TCDF and other TCDF isomers.

3.4.6.2 Lock Channels. Set mass spectrometer lock channels as specified in Table 3.4-3. Monitor the quality control check channels specified in Table 3.4-3 to verify instrument stability during the analysis.

3.4.7 Quality Control

3.4.7.1 Sampling Train Collection Efficiency Check. Add 100 µl of the surrogate standards in Table 3.4-1 to the adsorbent cartridge of each train before collecting the field samples.

3.4.7.2 Internal Standard Percent Recoveries. A group of nine carbon-labeled PCDDs and PCDFs, representing the tetra- through octachlorinated homologues, is added to every sample prior to extraction. The role of the internal standards is to quantitate the native PCDDs and PCDFs present in the sample as well as to determine the overall method efficiency. Recoveries of the internal standards must be between 40 to 130 percent for the tetra- through hexachlorinated compounds while the range is 25 to 130 percent for the higher hepta- and octachlorinated homologues.

3.4.7.3 Surrogate Recoveries. The five surrogate compounds in Table 3.4-4 are added to the resin the adsorbent sampling cartridge before the sample is collected. The surrogate recoveries are measured relative to the internal standards and are a measure of collection efficiency. They are not used to measure native PCDDs and PCDFs. All recoveries shall be between 70 and 130 percent. Poor recoveries for all the surrogates may be an indication of breakthrough in the sampling train. If the recovery of all standards is below 70 percent, the sampling runs must be repeated. As an alternative, the sampling runs do not have to be repeated if the final

results are divided by the fraction of surrogate recovery. Poor recoveries of isolated surrogate compounds should not be grounds for rejecting an entire set of samples.

3.4.7.4 Toluene QA Rinse. Report the results of the toluene QA rinse separately from the total sample catch. Do not add it to the total sample.

3.4.8 Quality Assurance

3.4.8.1 Applicability. When the method is used to analyze samples to demonstrate compliance with a source emission regulation, an audit sample must be analyzed, subject to availability.

3.4.8.2 Audit Procedure. Analyze an audit sample with each set of compliance samples. The audit sample contains tetra- through octa isomers of PCDD and PCDF. Concurrently, analyze the audit sample and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall be used both for the compliance samples and the EPA audit sample.

3.4.8.3 Audit Sample Availability. Audit samples will be supplied only to enforcement agencies for compliance tests. The availability of audit samples may be obtained by writing: Source Test Audit Coordinator (MD-77B), Quality Assurance Division, Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, or by calling the Source Test Audit Coordinator (STAC) at (919) 541-7894. The request for the audit sample must be made at least 30 days prior to the scheduled compliance sample analysis.

3.4.8.4 Audit Results. Calculate the audit sample concentration according to the calculation procedure described in the audit instructions included with the audit sample. Fill in the audit sample concentration and

the analyst's name on the audit response form included with the audit instructions. Send one copy to the EPA Regional Office or the appropriate enforcement agency and a second copy to the STAC. The EPA Regional Office or the appropriate enforcement agency will report the results of the audit to the laboratory being audited. Include this response with the results of the compliance samples in relevant reports to the EPA Regional Office or the appropriate enforcement agency.

3.4.9 Calculations

Same as method 5, section 6 with the following additions.

3.4.9.1 Nomenclature.

A_i=Integrated ion current of the noise at the retention time of the analyte.

A_s=Integrated ion current of the two ions characteristic of the internal standard *i* in the calibration standard.

A_q=Integrated ion current of the two ions characteristic of compound *i* in the *i*th calibration standard.

A_{tj}=Integrated ion current of the two ions characteristic of the internal standard *i* in the *j*th calibration standard.

A_{ai}=Integrated ion current of the two ions characteristic of surrogate compound *i* in the calibration standard.

A_i=Integrated ion current of the two ions characteristic of compound *i* in the sample.

A_s=Integrated ion current of the two ions characteristic of internal standard *i* in the sample.

A_q=Integrated ion current of the two ions characteristic of the recovery standard.

A_{ai}=Integrated ion current of the two ions characteristic of surrogate compound *i* in the sample.

C_i=Concentration of PCDD or PCDF *i* in the sample, pg/M³.

C_t=Total concentration of PCDDs or PCDFs in the sample, pg/M³.

m_{ai}=Mass of compound *i* in the calibration standard injected into the analyzer, pg.

m_i=Mass of internal standard *i* added to the sample, pg.

m_q=Mass of recovery standard in the calibration standard injected into the analyzer, pg.

m_s=Mass of surrogate compound *i* in the calibration standard, pg.

RRF_i=Relative response factor.

RRF_s=Recovery standard response factor.

RRF_i=Surrogate compound response factor.

3.4.9.2 Average Relative Response Factor.

$$RRF_i = 1/n \sum [A_{qj}m_{ai}/(A_{tj}m_{ai})]$$

Eq. 23-1

$j=1$

3.4.9.3 Concentration of the PCDDs and PCDFs.

$$C_i = m_{ai}/(A_{ai} \cdot RRF_i \cdot V_{total})$$

Eq. 23-2

3.4.9.4 Recovery Standard Response Factor.

$$RRF_s = A_{tj} \cdot m_{qj}/(A_{qj} \cdot m_{s})$$

Eq. 23-3

3.4.9.5 Recovery of Internal Standards (R_i).

$$R_i = (A_{tj} \cdot m_{qj}/A_{qj} \cdot RRF_s \cdot m_{s}) \times 100\%$$

Eq. 23-4

3.4.9.6 Surrogate Compound Response Factor.

$$RRF_{ai} = A_{tj} \cdot m_{ai}/(A_{ai} \cdot m_{s})$$

Eq. 23-5

3.4.9.7 Recovery of Surrogate Compounds (R_{ai}).

$$R_{ai} = m_{s}/(A_{ai} \cdot RRF_{ai} \cdot m_{s}) \times 100\%$$

Eq. 23-6

3.4.9.8 Minimum Detectable Limit (MDL).

$$MDL = 2.6 A_{ai} m_{s}/(A_{tj} \cdot RRF_{ai})$$

Eq. 23-7

3.4.9.9 Total Concentration of PCDDs and PCDFs in the Sample.

$$C_T = \frac{n}{\sum_{i=1}^n} C_i$$

Eq. 23-8

3.4.10 Bibliography

1. American Society of Mechanical Engineers. Sampling for the Determination of Chlorinated Organic Compounds in Stack Emissions. Prepared for U.S. Department of Energy and U.S. Environmental Protection Agency. Washington, DC December 1984, 25 p.
2. American Society of Mechanical Engineers. Analytical Procedures to Assess Stack Effluent Samples and Residual Combustion Products for Polychlorinated Dibenzodioxins (PCDD) and Polychlorinated Dibenzofurans (PCDF). Prepared for the U.S. Department of Energy and U.S. Environmental Protection Agency. Washington, DC December 1984, 23 p.
3. Thompson, J.R. (ed.) Analysis of Pesticide Residues in Human and Environmental Samples. U.S. Environmental Protection Agency. Research Triangle Park, NC 1974.
4. Triangle Laboratories. Case Study: Analysis of Samples for the Presence of Tetra- through Octachloro-p-Dibenzodioxins and Dibenzofurans. Research Triangle Park, NC 1988, 26 p.
5. U.S. Environmental Protection Agency. Draft Method 8290—The Analysis of Polychlorinated Dibenzodioxin and Polychlorinated Dibenzofurans by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry. In: Test Methods for Evaluating Solid Waste. Washington, DC SW-846.

3.5 Sampling for Aldehyde and Ketone Emissions from Stationary Sources (Method 001)

3.5.1 Scope and Application

This method is applicable to the determination of Destruction and Removal Efficiency (DRE) of formaldehyde, CAS Registry number 50-00-0, and possibly other aldehydes and ketones from stationary sources as specified in the regulations. The methodology has been applied specifically to formaldehyde; however, many laboratories have extended the application to other aldehydes and ketones. Compounds derivatized with 2,4-dinitrophenyl-hydrazine can be detected as low as 6.4×10^{-5} lb/scu ft (1.8 ppbv) in stack gas over a 1 hr sampling period, sampling approximately 45 cu ft.

3.5.2 Summary of Method

3.5.2.1 Gaseous and particulate pollutants are withdrawn isokinetically from an emission source and are collected in aqueous acidic 2,4-dinitrophenyl-hydrazine. Formaldehyde present in the emissions reacts with the 2,4-dinitrophenyl-hydrazine to form the formaldehyde dinitrophenylhydrazine derivative. The dinitrophenylhydrazine derivative is extracted, solvent-exchanged, concentrated, and then analyzed by high performance liquid chromatography.

3.5.3 Interferences

3.5.3.1 A decomposition product of 2,4-dinitrophenyl-hydrazine, 2,4-dinitroaniline, can be an analytical interferent if concentrations are high. 2,4-Dinitroaniline can coelute with 2,4-dinitrophenylhydrazine of formaldehyde under high performance liquid chromatography conditions, which may be used for the analysis. High concentrations of highly-oxygenated compounds, especially acetone, that have the same retention time or nearly the same retention time as the dinitrophenylhydrazine of formaldehyde, and that also absorb at 360 nm, will interfere with the analysis.

Formaldehyde, acetone, and 2,4-dinitroaniline contamination of the aqueous

acidic 2,4-dinitrophenyl-hydrazine (DNPH) reagent is frequently encountered. The reagent must be prepared within five days of use in the field and must be stored in an uncontaminated environment both before and after sampling in order to minimize blank problems. Some concentration of acetone contamination is unavoidable, because acetone is ubiquitous in laboratory and field operations. However, the acetone contamination must be minimized.

3.5.4 Apparatus and Materials

3.5.4.1 A schematic of the sampling train is shown in Figure 3.5-1. This sampling train configuration is adapted from EPA method 4 procedures. The sampling train consists of the following components: Probe Nozzle, Pitot Tube, Differential Pressure Gauge, Metering System, Barometer, and Gas Density Determination Equipment.

3.5.4.1.1 Probe Nozzle: Quartz or glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant inner diameter. The nozzle shall be buttonhook or elbow design. A range of nozzle sizes suitable for isokinetic sampling should be available in increments of 0.15 cm (1/16 in), e.g., 0.32 to 1.27 cm (1/4 to 1/2 in), or larger if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in section 3.5.8.1.

3.5.4.1.2 Probe Liner: Borosilicate glass or quartz shall be used for the probe liner. The tester should not allow the temperature in the probe to exceed $120 \pm 14^\circ\text{C}$ ($248 \pm 25^\circ\text{F}$).

3.5.4.1.3 Pitot Tube: The Pitot tube shall be Type S, as described in section 2.1 of EPA method 2, or any other appropriate device. The pitot tube shall be attached to the probe to allow constant monitoring of the stack gas velocity. The impact (stagnation) pressure opening plane of the pitot tube shall be even with or above the nozzle entry plane (see EPA method 2, Figure 26b) during sampling. The Type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of EPA method 2.

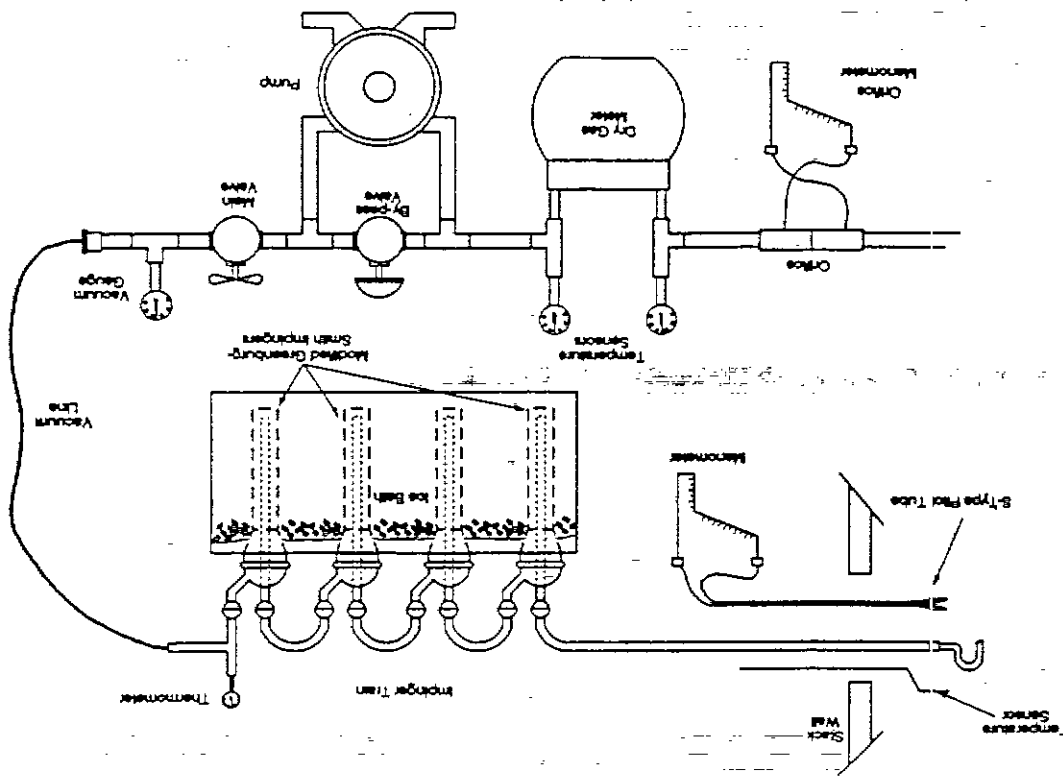


Figure 3.5-1
Formaldehyde Sampling Train

3.5.4.1.4 Differential Pressure Gauge: The differential pressure gauge shall be an inclined manometer or equivalent device as described in section 2.2 of EPA method 2. One manometer shall be used for velocity-head reading and the other for orifice differential pressure readings.

3.5.4.1.5 Impingers: The sampling train requires a minimum of four impingers, connected as shown in Figure 3.5-1, with ground glass (or equivalent) vacuum-tight fittings. For the first, third, and fourth impingers, use the Greenburg-Smith design, modified by replacing the tip with a 1.3 cm inside diameter (1/2 in) glass tube extending to 1.3 cm (1/2 in) from the bottom of the flask. For the second impinger, use a Greenburg-Smith Impinger with the standard tip. Place a thermometer capable of measuring temperature to within 1 °C (2 °F) at the outlet of the fourth impinger for monitoring purposes.

3.5.4.1.6 Metering System: The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature within 3 °C (5.4 °F), dry-gas meter capable of measuring volume to within 1%, and related equipment as shown in Figure 3.5-1. At a minimum, the pump should be capable of 4 cm free flow, and the dry gas meter should have a recording capacity of 0.9999 cu ft with a resolution of 0.005 cu ft. Other metering systems may be used which are capable of maintaining sample volumes to within 2%. The metering system may be used in conjunction with a pitot tube to enable checks of isokinetic sampling rates.

3.5.4.1.7 Barometer: The barometer may be mercury, aneroid, or other barometric capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in Hg). In many cases, the barometric reading may be obtained from a nearby National Weather Service Station, in which case the station value (which is the absolute barometric pressure) is requested and an adjustment for elevation differences between the weather station and sampling point is applied at a rate of minus 2.5 mm Hg (0.1 in Hg) per 30 m (100 ft) elevation increases (vice versa for elevation decrease).

3.5.4.1.8 Gas Density Determination Equipment: Temperature sensor and pressure gauge (as described in sections 2.3 and 2.3 of EPA method 2), and gas analyzer, if necessary (as described in EPA method 3). The temperature sensor ideally should be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor must be placed in an interference-free arrangement with respect to the Type S pitot

openings (see EPA method 2, Figure 2-7). As a second alternative, if a difference of no more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube.

3.5.4.2 Sample Recovery

3.5.4.2.1 Probe Liner: Probe nozzle and brushes: Teflon friction brushes with stainless steel wire handles are required. The probe brush shall have extensions of stainless steel, Teflon, or inert material at least as long as the probe. The brushes shall be properly sized and shaped to brush out the probe liner, the probe nozzle, and the impingers.

3.5.4.2.2 Wash Bottles: Three wash bottles are required. Teflon or glass wash bottles are recommended; polyethylene wash bottles should not be used because organic contaminants may be extracted by exposure to organic solvents used for sample recovery.

3.5.4.2.3 Graduated Cylinder and/or Balance: A graduated cylinder or balance is required to measure condensed water to the nearest 1 ml or 1 g. Graduated cylinders shall have division not >2 ml. Laboratory balances capable of weighing to ±0.5 g are required.

3.5.4.2.4 Amber Glass Storage Containers: One-liter wide-mouth amber flint glass bottles with Teflon-lined caps are required to store impinger water samples. The bottles must be sealed with Teflon tape.

3.5.4.2.5 Rubber Policeman and Funnel: A rubber policeman and funnel are required to aid in the transfer of material into and out of containers in the field.

3.5.4.3 Reagent Preparation

3.5.4.3.1 Bottles/Caps: Amber 1- or 4-L bottles with Teflon-lined caps are required for storing cleaned DNPH solution. Additional 4-L bottles are required to collect waste organic solvents.

3.5.4.3.2 Large Glass Container: At least one large glass (8 to 16 L) is required for mixing the aqueous acidic DNPH solution.

3.5.4.3.3 Stir Plate/Large Stir Bars/Stir Bar Retriever: A magnetic stir plate and large stir bar are required for the mixing of aqueous acidic DNPH solution. A stir bar retriever is needed for removing the stir bar from the large container holding the DNPH solution.

3.5.4.3.4 Buchner Filter/Filter Flask/Filter Paper: A large filter flask (2.4 L) with a Buchner filter, appropriate rubber stopper, filter paper, and connecting tubing are required for filtering the aqueous acidic DNPH solution prior to cleaning.

3.5.4.3.5 Separatory Funnel: At least one large separatory funnel (2 L) is required for cleaning the DNPH prior to use.

3.5.4.3.6 Beakers: Beakers (100 ml, 250 ml, and 400 ml) are useful for holding/measuring organic liquids when cleaning the aqueous acidic DNPH solution and for weighing DNPH crystals.

3.5.4.3.7 Funnels: At least one large funnel is needed for pouring the aqueous acidic DNPH into the separator funnel.

3.5.4.3.8 Graduated Cylinders: At least one large graduated cylinder (1 to 2 L) is required for measuring organic-free reagent water and acid when preparing the DNPH solution.

3.5.4.3.9 Top-Loading Balance: A one-place top loading balance is needed for weighing out the DNPH crystals used to prepare the aqueous acidic DNPH solution.

3.5.4.3.10 Spatulas: Spatulas are needed for weighing out DNPH when preparing the aqueous DNPH solution.

3.5.4.4 Crushed Ice: Quantities ranging from 10-60 lb may be necessary during a sampling run, depending upon ambient temperature. Samples which have been taken must be stored and shipped cold; sufficient ice for this purpose must be allowed.

3.5.5 Reagents

3.5.5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

3.5.5.2 Organic-free reagent water: All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

3.5.5.3 Silica gel: Silica gel shall be indicating type, 6-16 mesh. If the silica gel has been used previously, dry at 175°C (350 °F) for 2 hours before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

3.5.5.4 2,4-dinitrophenylhydrazine (DNPH), [2,4-(O)₂N₂C₆H₃NHNH]₂: The quantity of water may vary from 10 to 30%.

3.5.5.4.1 The 2,4-dinitrophenylhydrazine reagent must be prepared in the laboratory within five days of sampling use in the field. Preparation of DNPH can also be done in the field, with consideration of appropriate procedures required for safe handling of solvent in the field. When a container of prepared DNPH reagent is opened in the field, the contents of the opened container should be used within 48 hours. All laboratory glassware must be washed with detergent and water and rinsed with water, methanol, and methylene chloride prior to use.

NOTE: DNPH crystals or DNPH solution should be handled with plastic gloves at all times with prompt and extensive use of running water in case of skin exposure.

3.5.5.4.2 Preparation of Aqueous Acidic DNPH Derivatizing Reagent: Each batch of

DNPH reagent should be prepared and purified within five days of sampling, according to the procedures described below.

NOTE: Reagent bottles for storage of cleaned DNPH derivatizing solution must be rinsed with acetonitrile and dried before use. Baked glassware is not essential for preparation of DNPH reagent. The glassware must not be rinsed with acetone or an unacceptable concentration of acetone contamination will be introduced. If field preparation of DNPH is performed, caution must be exercised in avoiding acetone contamination.

3.5.5.4.2.1 Place an 8 L container under a fume hood on a magnetic stirrer. Add a large stir bar and fill the container half full of organic-free reagent water. Save the empty bottle from the organic-free reagent water. Start the stirring bar and adjust the stir rate to be as fast as possible. Using a graduated cylinder, measure 1.4 ml of concentrated hydrochloric acid. Slowly pour the acid into the stirring water. Fumes may be generated and the water may become warm. Weigh the DNPH crystals on a one-place balance (see Table 3.5-1 for approximate amounts) and add to the stirring acid solution. Fill the 8-L container to the 8-L mark with organic-free reagent water and stir overnight. If all of the DNPH crystals have dissolved overnight, add additional DNPH and stir for two more hours. Continue the process of adding DNPH with additional stirring until a saturated solution has been formed. Filter the DNPH solution using vacuum filtration. Gravity filtration may be used, but a much longer time is required. Store the filtered solution in an amber bottle at room temperature.

3.5.5.4.2.2 Within five days of proposed use, place about 1.6 L of the DNPH reagent in a 2-L separatory funnel. Add approximately 200 ml of methylene chloride and stopper the funnel. Wrap the stopper of the funnel with paper towels to absorb any leakage. Invert and vent the funnel. Then shake vigorously for 3 minutes. Initially, the funnel should be vented frequently (every 10-15 sec). After the layers have separated, discard the lower (organic) layer.

3.5.5.4.2.3 Extract the DNPH a second time with methylene chloride and finally with cyclohexane. When the cyclohexane layer has separated from the DNPH reagent, the cyclohexane layer will be the top layer in the separatory funnel. Drain the lower layer (the cleaned extract DNPH reagent solution) into an amber bottle that has been rinsed with acetonitrile and allowed to dry.

3.5.5.4.3 Quality Control: Take two aliquots of the extracted DNPH reagent. The size of the aliquots is dependent upon the exact sampling procedure used, but 100 ml is reasonably representative. To ensure that the background in the reagent is acceptable for field use, analyze one aliquot of the re-

gent according to the procedure of method 8316. Save the other aliquot of aqueous acidic DNPH for use as a method blank when the analysis is performed.

TABLE 3.5-1.—APPROXIMATE AMOUNT OF CRYSTALLINE DNPH USED TO PREPARE A SATURATED SOLUTION

Amount of moisture in DNPH ¹	Weight required per 100 g of solution
10 weight percent	31 g
15 weight percent	33 g
20 weight percent	40 g

TABLE 3.5-2.—INSTRUMENT DETECTION LIMITS AND REAGENT CAPACITY FOR FORMALDEHYDE ANALYSIS¹

Analyte	Detection limit, ppb ²	Reagent capacity, ppm ³
Formaldehyde	1.8	66
Acetaldehyde	1.7	70
Acetone	1.5	75
Acetone/Propionaldehyde	1.5	75
Butyraldehyde	1.5	75
Methyl ethyl ketone	1.5	79
Valeraldehyde	1.5	79
Isobutyraldehyde	1.5	84
Hexanaldehyde	1.3	88
Benzaldehyde	1.4	84
o-m-to-Tolualdehyde	1.3	89
Dimethylbenzaldehyde	1.2	93

¹Organized compounds in addition to formaldehyde are included for comparison with formaldehyde; extension of methodology to other compounds is possible.

²Detection limits are determined in solvent. These values therefore represent the optimum capability of the methodology.

3.5.5.4.4 Shipment to the Field: Tightly cap the bottle containing extracted DNPH reagent using a Teflon-lined cap. Seal the bottle with Teflon tape. After the bottle is labeled, the bottle may be placed in a friction-top can (paint can or equivalent) containing a 1-2 inch layer of granulated charcoal and stored at ambient temperature until use.

3.5.5.4.1 If the DNPH reagent has passed the Quality Control criteria, the reagent may be packaged to meet necessary shipping requirements and sent to the sampling area. If the Quality Control criteria are not met, the reagent solution may be re-extracted or the solution may be re-prepared and the extraction sequence repeated.

3.5.5.4.2 If the DNPH reagent is not used in the field within five days of extraction, an aliquot may be taken and analyzed as described in method 8011A. If the reagent meets the Quality Control requirements, the reagent may be used. If the reagent does not meet the Quality Control requirements, the reagent must be discarded and new reagent must be prepared and tested.

3.5.5.4.5 Calculation of Acceptable Concentrations of Impurities in DNPH Reagent: The acceptable impurity concentration (AIC, µg/ml) is calculated from the expected analyte concentration in the sampled gas (EAC, ppbv), the volume of air that will be sampled at standard conditions (SVOL, L), the formula weight of the analyte (FW, g/mol), and the volume of DNPH reagent that will be used in the impingers (RVOL, ml): $AIC = 0.1 \times (EAC \times SVOL) \times FW / (RVOL \times 1,000)$

where:

0.1 is the acceptable contaminant concentration.

22.4 is a factor relating ppbv to g/L.

180 is a factor relating underivatized to derivatized analyte

1,000 is a unit conversion factor.

3.5.5.4.6 Disposal of Excess DNPH Reagent: Excess DNPH reagent may be returned to the laboratory and recycled or treated as aqueous waste for disposal purposes. 2,4-dinitrophenylhydrazine is a flammable solid when dry, so water should not be evaporated from the solution of the reagent.

3.5.5.5 Field Spike Standard Preparation: To prepare a formaldehyde field spiking standard at 4.01 mg/ml, use a 500 µl syringe to transfer 0.6 ml to 37% by weight of formaldehyde (401 mg/ml) to a 50 ml volumetric flask containing approximately 50 ml of methanol. Dilute to 50 ml with methanol.

3.5.5.6 Hydrochloric Acid, HCl: Reagent grade hydrochloric acid (approximately 12N) is required for acidifying the aqueous DNPH solution.

3.5.5.7 Methylene Chloride, CH₂Cl₂: Methylene chloride (suitable for residue and pesticide analysis, GC/MS, HPLC, GC, Spectrophotometry or equivalent) is required for cleaning the aqueous acidic DNPH solution, rinsing glassware, and recovery of sample trains.

3.5.5.8 Cyclohexane, C₆H₁₂: Cyclohexane (HPLC grade) is required for cleaning the aqueous acidic DNPH solution.

NOTE: Do not use spectrophotolyzed grades of cyclohexane. If this sampling methodology is extended to aldehydes and ketones with four or more carbon atoms.

3.5.5.9 Methanol, CH₃OH: Methanol (HPLC grade or equivalent) is required for rinsing glassware.

3.5.5.10 Acetonitrile, CH₃CN: Acetonitrile (HPLC grade or equivalent) is required for rinsing glassware.

3.5.5.11 Formaldehyde, HCHO: Analytical grade or equivalent formaldehyde is required for preparation of standards. If other aldehydes or ketones are used, analytical grade or equivalent is required.

3.5.6 Sample Collection, Preservation, and Handling

3.5.6.1 Because of the complexity of this method, field personnel should be trained in and experienced with the test procedures in order to obtain reliable results.

3.5.6.2 Laboratory Preparation:

3.5.6.2.1 All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified.

3.5.6.2.2 Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger or sampling holder just prior to train assembly.

3.5.6.3 Preliminary Field Determinations:

3.5.6.3.1 Select the sampling site and the minimum number of sampling point according to EPA method 1 or other relevant criteria. Determine the stack pressure, temperature, and range of velocity heads using EPA method 2. A leak-check of the pitot lines according to EPA method 2, section 3.1, must be performed. Determine the stack gas moisture content using EPA Approximation method 4 or its alternatives to establish estimates of isokinetic sampling-rate settings. Determine the stack gas dry molecular weight, as described in EPA method 2, section 3.6. If integrated in EPA method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the sample run.

3.5.6.3.2 Select a nozzle size based on the range of velocity heads so that is not necessary to change the nozzle size in order to maintain isokinetic sampling rates below 28 L/min (1.0 cfm). During the run, do not change the nozzle. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of EPA method 2).

3.5.6.3.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

3.5.6.3.4 A minimum of 45 ft³ of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of formaldehyde from incineration systems (45 ft³ is equivalent to one hour of sampling at 0.75 dscf). Additional sample volume shall be collected as necessitated by the capacity of the DNPH reagent and analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in section 10.

3.5.6.3.5 Determine the total length of sampling time needed to obtain the identified minimum volume by comparing the an-

ticipated average sampling rate with the volume requirement. Allocate the same time to all traverse points defined by EPA method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus 0.5 min.

3.5.6.3.6 In some circumstances (e.g., batch cycles) it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas-volume samples. In these cases, careful documentation must be maintained in order to allow accurate calculation of concentrations.

3.5.6.4 Preparation of Collection Train:

3.5.6.4.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered with Teflon film or aluminum foil until just prior to assembly or until sampling is about to begin.

3.5.6.4.2 Place 100 ml of cleaned DNPH solution in each of the first two impingers, and leave the third impinger empty. If additional capacity is required for high expected concentrations of formaldehyde in the stack gas, 200 ml of DNPH per impinger may be used or additional impingers may be used for sampling. Transfer approximately 200 to 300 g of pre-weighed silica gel from its container to the fourth impinger. Care should be taken to ensure that the silica gel is not entrained and carried out from the impinger during sampling. Place the silica gel container in a clean place or later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

3.5.6.4.3 With a glass or quartz liner, install the selected nozzle using a Vikon-A O-ring with stack temperatures are <200 °C (500 °F) and a woven glass-fiber gasket when temperatures are higher. See APTD-0576 (Item 1972) for details. Other connection systems utilizing either 316 stainless steel or Teflon ferrules may be used. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

3.5.6.4.4 Assemble the train as shown in Figure 3.5-1. During assembly, do not use any silicone grease on ground-glass joints upstream of the impingers. Use Teflon tape, if required. A very light coating of silicone grease may be used on ground-glass joints downstream of the impingers, but the silicone grease should be limited to the outer portion (see APTD-0576) of the ground-glass joints to minimize silicone grease contamination. If necessary, Teflon tape may be used to seal leaks. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperatures.

3.5.6.4.5 Place crushed ice all around the impingers.

3.5.6.4.6 Turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize.

3.5.6.5 Leak-Check Procedures:

3.5.6.5.1 Pre-Test Leak Check:

3.5.6.5.1.1 After the sampling train has been assembled, turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize. If a Viton-A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak check the train at the sampling site by plugging the nozzle and pulling a 381 mm Hg (15 in Hg) vacuum.

NOTE: A lower vacuum may be used, provided that the lower vacuum is not exceeded during the test.

3.5.6.5.1.2 If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first attaching a carbon-filled leak check impinger to the inlet and then plugging the inlet and pulling a 381 mm Hg (15 in Hg) vacuum. (A lower vacuum may be used if this lower vacuum is not exceeded during the test.) Next connect the probe to the train and leak-check at about 25 mm Hg (1 in Hg) vacuum. Alternatively, leak-check the probe with the rest of the sampling train in one stop at 381 mm Hg (15 in Hg) vacuum. Leakage rates in excess of (a) 4% of the average sampling rate or (b) >0.00057 m³/min (0.42 cfm), are unacceptable.

3.5.6.5.1.3 The following leak check instructions for the sampling train described in ADPT-0576 and APTD-0581 may be helpful. Start the pump with the fine-adjust valve fully open and coarse-valve completely closed. Partially open the coarse-adjust valve and slowly close the fine-adjust valve until the desired vacuum is reached. Do not reverse direction of the fine-adjust valve, as liquid will back up into the train. If the desired vacuum is exceeded, either perform the leak check at this higher vacuum or end the leak check, as shown below, and start over.

3.5.6.6.1.4 When the leak check is completed, first slowly remove the plug from the inlet to the probe. When the vacuum drops to 127 mm (5 in) Hg or less, immediately close the coarse-adjust valve. Switch off the pumping system and reopen the fine-adjust valve. Do not reopen the fine-adjust valve until the coarse-adjust valve has been closed to prevent the liquid in the impingers from being forced backward in the sampling line and silica gel from being entrained backward into the third impinger.

3.5.6.5.2 Leak Checks During Sampling Run:

3.5.6.5.2.1 If, during the sampling run, a component change (i.e., impinger) becomes necessary, a leak check shall be conducted immediately after the interruption of sampling and before the change is made. The

leak check shall be done according to the procedure described in section 3.5.6.5.1, except that it shall be done at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 m³/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester must void the sampling run.

NOTE: Any correction of the sample volume by calculation reduces the integrity of the pollutant concentration data generated and must be avoided.

3.5.6.5.2.2 Immediately after a component change and before sampling is reinitiated, a leak check similar to a pre-test leak check must also be conducted.

3.5.6.5.3 Post-Test Leak Check:

3.5.6.5.3.1 A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done with the same procedures as the pre-test leak check, except that the post-test leak check shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 m³/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If, however, a higher leakage rate is obtained, the tester shall record the leakage rate and void the sampling run.

3.5.6.6 Sampling Train Operation:

3.5.6.6.1 During the sampling run, maintain an isokinetic sampling rate to within 10% of true isokinetic, below 20 L/min (1.0 cfm). Maintain a temperature around the probe of 120 °C (248 ±25 °F).

3.5.6.6.2 For each run, record the data on a data sheet such as the one shown in Figure 3.5-2. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by Figure 2 at least once at each sample point during each time increment and additional readings when significant adjustments (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

3.5.6.6.3 Clean the stack access ports prior to the test run to eliminate the change of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pilot tube and probe are properly positioned. Position the nozzle at the first traverse

point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available. These nomographs are designed for use when the Type S pilot tube coefficient is 0.8410.02 and pensate for the deviations.

the stack gas equivalent density (dry molecular weight) is equal to 29.14. APTD-0576 details the procedure for using the nomographs. If the stack gas molecular weight and the pilot tube coefficient are outside the above ranges, do not use the nomographs unless appropriate steps are taken to compensate for the deviations.

3.5.6.6.4 When the stack is under significant negative pressure (equivalent to the height of the impinger stem), take care to close the coarse-adjust valve before inserting the probe into the stack in order to prevent liquid from backing up through the train. If necessary, the pump may be turned on with the coarse-adjust valve closed.

3.5.6.6.5 When the probe is in position, block off the openings around the probe and backstack access port to prevent unrepresentative dilution of the gas stream.

3.5.6.6.6 Traverse the stack cross section, as required by EPA Method 1, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

3.5.6.6.7 During the test run, make periodic adjustments to keep the temperature around the probe at the proper levels. Add more ice and, if necessary, salt, to maintain a temperature of $>20^{\circ}\text{C}$ (68°F) at the silica gel outlet. Also, periodically check the level and zero of the manometer.

3.5.6.6.8 A single train shall be used for the entire sampling run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. An additional train or additional trains may also be used when the capacity of a single train is exceeded.

3.5.6.8.9 When two or more trains are used, separate analyses of components from each train shall be performed. If multiple trains have been used because the capacity of a single train would be exceeded, first and second impingers from each train may be combined.

3.6.6.6.10 At the end of the sampling run, turn off the coarse-adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry gas meter reading, and conduct a post-test leak check. Also, leak check the pilot lines as described in EPA method 2. The lines must pass this leak check in order to validate the velocity-head data.

3.5.6.6.11 Calculate percent isokinetcity (see method 2) to determine whether the run was valid or another test should be made.

3.5.5.7 Sample Recovery

3.6.7.1 Preparation.

3.5.7.1.1.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be handled safely, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over the tip to prevent losing or gaining particulate matter. Do not

cap the probe tip tightly while the sampling train is cooling because a vacuum will be created, drawing liquid from the impingers back through the sampling train.

3.5.7.1.2 Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet, being careful not to lose any condensate that might be present. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used, let any condensed water or liquid drain into the impingers. Cap off any open impinger inlets and outlets. Ground glass stoppers, Teflon caps or caps of other inert materials may be used to seal all openings.

3.5.7.1.3 Transfer the probe and impinger assembly to an area that is clean and protected from wind so that the chances of contaminating or losing the sample are minimized.

3.5.7.1.4 Inspect the train before and during disassembly, and note any abnormal conditions.

3.5.7.1.5 Save a portion of all washing solution (methylene chloride, water) used for cleanup as a blank. Transfer 200 ml of each solution directly from the wash bottle being used and place each in a separate, prelabeled sample container.

3.5.7.2 Sample Containers.

3.5.7.2.1 Container 1: Probe and Impinger Zatches. Using a graduated cylinder, measure to the nearest ml, and record the volume of the solution in the first three Impingers. Alternatively, the solution may be weighed to the nearest 0.5 g. Include any condensate in the probe in this determination. Transfer the impinger solution from the graduated cylinder into the amber flint glass bottle. Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, clean all surfaces to which the sample is exposed (including the probe nozzle, probe fitting, probe liner, first Impinger, and Impinger connector) with methanol-chlorine chloride. Use less than 500 ml for the entire wash (250 ml would be better, if possible). Add the washing to the sample container.

3.5.7.2.1.1 Carefully remove the probe nozzle and rinse the inside surface with methylene chloride from a wash bottle. Brush with a Teflon bristle brush, and rinse until the inside shows no visible particles or yellow color, after which make a final rinse of the inside surface. Brush and rinse the inside parts of the Swagelok fitting with methylene chloride in a similar way.

3.5.7.2.1.2. Rinse the probe liner with methylene chloride. While squirting the methylene chloride into the upper end of the probe, tilt and rotate the probe so that all inside surfaces will be wetted with methylene chloride. Let the methylene chloride drain from the lower end into the sample container. The operator may use a funnel (glass or poly-

[illegible]

Location	_____
Operator	_____
Date	_____
Run No.	_____
Sample Box No.	_____
Master Box No.	_____
Master Hg	_____
C Factor	_____
Prior Tube Coefficient C _p	_____

Probe Temperature _____

Barometric Pressure _____

Assumed Moisture % _____

Probe Length, m(ft) _____

Moisture Identification No. _____

Average Calibrated Nozzle Diameter, cm (in) _____

Probe Hosing Setting _____

Leak Rate, m³/min. (dm) _____

Probe Line Material _____

Static Pressure, mm Hg (in Hg) _____

Filter No. _____

Schematic of Stack Cross Section



ethylene) to aid in transferring the liquid washes to the container. Follow the rinse with a Teflon brush. Hold the probe in an inclined position, and squirt methylene chloride into the upper end and as the probe brush is being pushed with a twisting action through the probe. Hold the sample container under the lower end of the probe, and catch any methylene chloride, water, and particulate matter that is brushed from the probe. Run the brush through the probe three times or more. With stainless steel or other metal probes, run the brush through in the above prescribed manner at least six times since there may be small crevices in which particulate matter can be entrapped. Rinse the brush with methylene chloride or water, and quantitatively collect these washings in the sample container. After the brushing, make a final rinse of the probe as described above.

NOTE: Two people should clean the probe in order to minimize sample losses. Between sampling runs, brushes must be kept clean and free from contamination.

3.5.7.2.1.3 Rinse the inside surface of each of the first three impingers (and connecting tubing) three separate times. Use a small portion of methylene chloride for each rinse, and brush each surface to which the sample is exposed with a Teflon bristle brush to ensure recovery of fine particulate matter. Water will be required for the recovery of the impingers in addition to the specified quantity of methylene chloride. There will be at least two phases in the impingers. This two-phase mixture does not pour well, and a significant amount of the impinger catch will be left on the walls. The use of water as a rinse makes the recovery quantitative. Make a final rinse of each surface and of the brush, using both methylene chloride and water.

3.5.7.2.1.4 After all methylene chloride and water washing and particulate matter have been collected in the sample container, tighten the lid so the solvent, water, and DNPH reagent will not leak out when the container is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Seal the container with Teflon tape. Label the container clearly to identify its contents.

3.5.7.2.1.5 If the first two impingers are to be analyzed separately to check for breakthrough, separate the contents and rinses of the two impingers into individual containers. Care must be taken to avoid physical carryover from the first impinger to the second. The formaldehyde hydrazone is a solid which floats and froths on top of the impinger solution. Any physical carryover of collected moisture into the second impinger will invalidate a breakthrough assessment.

3.5.7.2.2 Container 2: Sample Blank. Prepare a blank by using an amber flint glass container and adding a volume of DNPH reagent and methylene chloride equal to the

gent and methylene chloride equal to the total volume in Container 1. Process the blank in the same manner as Container 1.

3.5.7.2.3 Container 3: Silica Gel. Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. The impinger containing the silica gel may be used as a sample transport container with both ends sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon caps may be used. The silica gel impinger should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If the silica gel is removed from the impinger, the tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use water or other liquids to transfer the silica gel. If a balance is available in the field, the spent silica gel (or silica gel plus impinger) may be weighed to the nearest 0.5 g.

3.5.7.2.4 Sample containers should be placed in a cooler, cooled by (although not in contact with) ice. Sample containers must be placed vertically and, since they are glass, protected from breakage during shipment. Samples should be cooled during shipment so they will be received cold at the laboratory.

3.5.8 Calibration

3.5.8.1 Probe Nozzle: Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in). Make measurements at three separate places across the diameter and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in). When the nozzles become nicked or corroded, they shall be replaced and calibrated before use. Each nozzle must be permanently and uniquely identified.

3.5.8.2 Pilot Tube: The Type 5 pilot tube assembly shall be calibrated according to the procedure outlined in Section 4 of EPA Method 2 or assigned a nominal coefficient of 0.84 if it is not visibly nicked or corroded and if it meets design and intercomponent spacing specifications.

3.5.8.3 Metering System.

3.5.8.3.1 Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to correct the gas meter dial readings mathematically to the proper values. Before calibrating the metering system, it is suggested that a leak check be con-

Environmental Protection Agency

ducted. For metering systems having diaphragm pumps, the normal leak check procedure will not detect leakages with the pump. For these cases, the following leak check procedure will apply: make a ten-minute calibration run at 0.00037 m³/min (0.02 cfm). At the end of the run, take the difference of the measured wettest and dry-gas meter volumes and divide the difference by 10 to get the leak rate. The leak rate should not exceed 0.00037 m³/min (0.02 cfm).

3.5.8.3.2 After each field use, check the calibration of the metering system by performing three calibration runs at a single intermediate orifice setting (based on the previous field test). Set the vacuum at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalculate the meter over the full range of orifice settings, as outlined in APTD-0576.

3.5.8.3.3 Leak check of metering system: The portion of the sampling train from the pump to the orifice meter (see Figure 1) should be leak checked prior to initial use and after each shipment. Leakage after the pump will result in loss volume being recorded than is actually sampled. Use the following procedure: Close the main valve on the meter box. Insert a one-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13.18 cm (5.7 in) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 min. A loss of pressure on the manometer indicates a leak in the meter box. Leaks must be corrected.

NOTE: If the dry-gas-meter coefficient values obtained before and after a test series differ by >6%, either the test series must be voided or calculations for test series must be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

3.5.8.4 Probe Heater: The probe heating system must be calibrated before its initial use in the field according to the procedure outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

3.5.8.5 Temperature gauges: Each thermocouple must be permanently and uniquely marked on the casing. All mercury-in-glass reference thermometers must conform to ASTM E-1 63C or 63F specifications. Thermocouples should be calibrated in the laboratory with and without the use of extension leads. If extension leads are used in the field, the thermocouple readings at the

ambient air temperatures, with and without the extension lead, must be noted and recorded. Correction is necessary if the use of an extension lead produces a change >1.5%.

3.5.8.5.1 Impinger and dry-gas meter thermocouples: For the thermocouples used to measure the temperature of the gas leaving the impinger train, three-point calibration at ice water, room air, and boiling water temperatures is necessary. Accept the thermocouples only if the readings at all three temperatures agree to $\pm 0.3^\circ\text{C}$ ($\pm 0.5^\circ\text{F}$) with those of the absolute value of the reference thermometer.

3.5.8.5.2 Probe and stack thermocouples: For the thermocouples used to indicate the probe and stack temperatures, a three-point calibration at ice water, boiling water, and hot oil bath temperatures must be performed. Use of a point at room air temperature is recommended. The thermometer and thermocouple must agree to within 1.5% at each of the calibration points. A calibration curve (equation) may be constructed (calculated) and the data extrapolated to cover the entire temperature range suggested by the manufacturer.

3.5.8.6 Barometer: Adjust the barometer initially and before each test series to agree to within ± 2.5 mm Hg (0.1 in Hg) of the mercury barometer or the correct barometric pressure value reported by a nearby National Weather Service Station (same altitude above sea level).

3.5.8.7 Triple-beam balance: Calibrate the triple-beam balance before each test series, using Class S standard weights. The weights must be within 0.5% of the standards, or the balance must be adjusted to meet these limits.

3.5.9 Calculations

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculations.

3.5.9.1 Calculation of Total Formaldehyde: To determine the total formaldehyde in mg, use the following equation:

$$\text{Total mg formaldehyde} = C_a \times V \times DF \\ \times \frac{[\text{g/mole aldehyde}]}{[\text{g/mole DNPH derivative}]}$$

where:

C_a = measured concentration of DNPH-formaldehyde derivative, $\mu\text{g/ml}$.
 V = organic extract volume, ml.
 DF = dilution factor.

3.5.9.2 Formaldehyde concentration in stack gas.

Determine the formaldehyde concentration in the stack gas using the following equation:

$$C = K (\text{total formaldehyde, mg}) V_{\text{air}}^{-1}$$

where:

$$K = 35.31 \text{ ft}^3/\text{m}^3 \text{ if } V_{\text{air}} \text{ is expressed in English units}$$

$$= 1.00 \text{ m}^3/\text{m}^3 \text{ if } V_{\text{air}} \text{ is expressed in metric units.}$$

V_{meas} volume of gas sample as measured by dry gas meter, corrected to standard conditions, (dscf).

3.5.9.3 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop are obtained from the data sheet.

3.5.9.4 Dry Gas Volume: Calculate V_{meas} and adjust for leakage, if necessary, using the equation in section 6.3 of EPA method 5.

3.5.9.5 Volume of Water Vapor and Moisture Content: Calculate the volume of water vapor and moisture content from equations 5-2 and 5-3 of EPA method 5.

3.5.10 Determination of Volume to be Sampled
To determine the minimum sample volume to be collected, use the following sequence of equations.

3.5.10.1 From prior analysis of the waste feed, the concentration of formaldehyde (FORM) introduced into the combustion system can be calculated. The degree of destruction and removal efficiency that is required is used to determine the amount of FORM allowed to be present in the effluent. This amount may be expressed as:

$$\text{Max FORM Mass} = (\text{WF}) (\text{FORM conc}) (100 - \% \text{DRE}) / 100$$

where:

$$\text{WF} = \text{mass flow rate of waste feed per h, g/h (lb/h)}$$

FORM = concentration of FORM (wt %) introduced into the combustion process.

DRE = percent Destruction and Removal Efficiency required.

Max FORM-mass flow rate (g/h (lb/h)) of FORM emitted from the combustion sources.

3.5.10.2 The average discharge concentration of the FORM in the effluent gas is determined by comparing the Max FORM with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary EPA method 1-4 determinations:

$$\text{Max FORM conc} = (\text{Max FORM Mass}) / (\text{DV}_{\text{meas}})$$

where:

$$\text{DV}_{\text{meas}} = \text{volumetric flow rate of exhaust gas, dscf (dscf)}$$

FORM conc = anticipated concentration of the FORM in the exhaust gas stream, g/dscf (lb/dscf).

3.5.10.3 In making this calculation, it is recommended that a safety margin of at least ten be included.

$$[\text{LDL}_{\text{FORM}} \times 10 / (\text{FORM conc}) V_{\text{air}}]$$

where:

LDL_{FORM} = detectable amount of FORM in on-tire sampling train.

V_{air} = minimum dry standard volume to be collected at dry-gas meter.

3.5.10.4 The following analytical detection limits and DNPH Reagent Capacity (based on a total volume of 200 ml in two impingers) must also be considered in determining a volume to be sampled.

3.5.11 Quality Control

3.5.11.1 Sampling: See EPA Manual 600/4-77-02b for Method 5 quality control.

3.5.11.2 Analysis: The quality assurance program required for this method includes the analysis of the field and method blanks, procedure verifications, and analysis of field spikes. The assessment of combustion data and positive identification and quantification of formaldehyde are dependent on the integrity of the samples received and the precision and accuracy of the analytical methodology. Quality assurance procedures for this method are designed to monitor the performance of the analytical methodology and to provide the required information to take corrective action if problems are observed in laboratory operations or in field sampling activities.

3.5.11.2.1 Field Blanks: Field blanks must be submitted with the samples collected at each sampling site. The field blanks include the sample bottles containing aliquots of sample recovery solvents, methylene chloride and water, and unused DNPH reagent. At a minimum, one complete sampling train will be assembled in the field staging area, taken to the sampling area, and back checked at the beginning and end of the test (or for the same total number of times as the actual sampling train). The probe of the blank train must be heated during the sample test. The train will be recovered as if it were an actual test sample. No gaseous sample will be passed through the blank sampling train.

3.5.11.2.2 Method Blanks: A method blank must be prepared for each set of analytical operations, to evaluate contamination and artifacts that can be derived from glassware, reagents, and sample handling in the laboratory.

3.5.11.2.3 Field Spike: A field spike is performed by introducing 200 μL of the Field Spike Standard into an impinger containing 200 ml of DNPH solution. Standard impinger recovery procedures are followed and the spike is used as a check on field handling and recovery procedures. An aliquot of the field spike standard is retained in the laboratory for derivatization and comparative analysis.

Environmental Protection Agency

3.5.12 Method Performance

3.5.12.1 Method performance evaluation: The expected method performance parameters for precision, accuracy, and detection limits are provided in Table 3.5-3.

Addition of a Filter to the Formaldehyde Sampling Train

As a check on the survival of particulate material through the impinger system, a filter can be added to the impinger train either after the second impinger or after the third impinger. Since the impingers are in an ice bath, there is no reason to heat the filter at this point.

Any suitable medium (e.g., paper, organic membrane) may be used for the filter if the material conforms to the following specifications:

(1) the filter has at least 96% collection efficiency (<3% penetration) for 3 μm dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM standard method D2986-71. Test data from the supplier's quality control program are sufficient for this purpose.

(2) the filter has a low aldehyde blank value (<0.015 mg formaldehyde/cm² of filter area). Before the test series, determine the average formaldehyde blank value of at least three filters (from the lot to be used for sampling) using the applicable analytical procedures.

TABLE 3.5-3.—EXPECTED METHOD PERFORMANCE FOR FORMALDEHYDE

Parameter	Precision ¹	Accuracy ²	Detection limit ³
Matrix: Dual trains	$\pm 15\%$	$\pm 20\%$	1.5×10^{-4} ppb (1.8 ppbv)

¹ Relative percent difference limit for dual trains.

² Limit for field spike recoveries.

³ The lower detection limit having less than 1% probability of false positive detection.

Recover the exposed filter into a separate clean container and return the container over ice to the laboratory for analysis. If the filter is being analyzed for formaldehyde, the filter may be recovered into a container or DNPH reagent for shipment, back to the laboratory. If the filter is being examined for the presence of particulate material, the filter may be recovered into a clean dry container and returned to the laboratory.

3.5 Analysis for Aldehydes and Ketones by High Performance Liquid Chromatography (HPLC) (Method 0011A)

3.5.1 Scope and Application

3.5.1.1 Method 0011A covers the determination of free formaldehyde in the aqueous samples and leachates and derived aldehydes/ketones collected by method 0011.

Compound name	CAS No. ¹
Formaldehyde	50-00-0
Acetaldehyde	75-07-0

¹ Chemical Abstract Services Registry Number.

3.5.1.2 Method 0011A is a high performance liquid chromatographic (HPLC) method optimized for the determination of formaldehyde and acetaldehyde in aqueous environmental matrices and leachates of solid samples and stack samples collected by method 0011. When this method is used to analyze unfamiliar sample matrices, compound identification should be supported by at least one additional qualitative technique. A gas chromatograph/mass spectrometer (GC/MS) may be used for the qualitative confirmation of results from the target analytes, using the extract produced by this method.

3.5.1.3 The method detection limits (MDL) are listed in Tables 3.6-1 and 3.6-2. The MDL for a specific sample may differ from that listed, depending upon the nature of interferences in the sample matrix and the amount of sample used in the procedure.

3.5.1.4 The extraction procedure for solid samples is similar to that specified in method 1311 (1). Thus, a single sample may be extracted to measure the analytes included in the scope of other appropriate methods. The analyst is allowed the flexibility to select chromatographic conditions appropriate for the simultaneous measurement of contaminants of these analytes.

TABLE 3.6-1.—HIGH PERFORMANCE LIQUID CHROMATOGRAPHY CONDITIONS AND METHOD DETECTION LIMITS USING SOLID SORBENT EXTRACTION

Analyte	Retention time (min-utes)	MDL (ppb/L) ¹
Formaldehyde	7.1	7.2

HPLC conditions: Reverse phase C18 column, 4.6 x 250 mm; isocratic elution using methanol/water (75:25, v/v); flow rate 1.0 mL/min; detector 360 nm.

¹ After correction for laboratory blank.

TABLE 3.6-2.—HIGH PERFORMANCE LIQUID CHROMATOGRAPHY CONDITIONS AND METHOD DETECTION LIMITS USING METHYLENE CHLORIDE EXTRACTION

Analyte	Retention time (min-utes)	MDL (ppb/L) ¹
Formaldehyde	7.1	7.2
Acetaldehyde	8.6	17.1

HPLC conditions: Reverse phase C18 column, 4.6 x 250 mm; isocratic elution using methanol/water (75:25, v/v); flow rate 1.0 mL/min; detector 360 nm.

¹ These values include reagent blank concentrations of approximately 13 ppb formaldehyde and 130 ppb acetaldehyde.

3.6.1.5 This method is restricted to use by, or under the supervision of analysts experienced in the use of chromatography and in the interpretation of chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method.

3.6.1.6 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material safety data sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available.

3.6.1.7 Formaldehyde has been tentatively classified as a known or suspected, human or mammalian carcinogen.

3.6.2 Summary of Method

3.6.2.1 Environmental Liquids and Solid Leachates.

3.6.2.1.1 For wastes comprised of solids or for aqueous wastes containing significant amounts of solid material, the aqueous phase, if any, is separated from the solid phase and stored for later analysis. If necessary, the particle size of the solids in the waste is reduced. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase of the waste. A special extractor vessel is used when testing for volatiles. Following extraction, the aqueous extract is separated from the solid phase by filtration employing 0.6 to 0.8 μ m glass fiber filter.

3.6.2.1.2 If compatible (i.e., multiple phases will not form on combination), the initial aqueous phase of the waste is added to the aqueous extract, and these liquids are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume weighted average concentration.

3.6.2.1.3 A measured volume of aqueous sample or an appropriate amount of solids leachate is buffered to pH 5 and derivatized with 2,4-dinitrophenylhydrazine (DNPH), using either the solid sorbent or the methylene chloride/extractant option. If the solid sorbent option is used, the derivative is extracted using solid sorbent cartridges, followed by elution with ethanol. If the methylene chloride option is used, the derivative is extracted with methylene chloride. The methylene chloride extracts are concentrated using the Kuderna-Danish (K-D) procedure and solvent exchanged into methanol prior to HPLC analysis. Liquid chromatographic conditions are described

which permit the separation and measurement of formaldehyde in the extract by absorbance detection at 360 nm.

3.6.2.2 Stock Gas Samples Collected by Method 0011.

3.6.2.2.1 The entire sample returned to the laboratory is extracted with methylene chloride and the methylene chloride extract is brought up to a known volume. An aliquot of the methylene chloride extract is solvent exchanged and concentrated or diluted as necessary.

3.6.2.2.2 Liquid chromatographic conditions are described that permit the separation and measurement of formaldehyde in the extract by absorbance detection at 360 nm.

3.6.3 Interferences

3.6.3.1 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the chromatograms. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by analyzing laboratory reagent blanks.

3.6.3.1.1 Glassware must be scrupulously cleaned. Clean all glassware as soon as possible after use by rinsing with the last solvent used. This should be followed by detergent washing with hot water, and rinses with tap water and distilled water. It should then be drained, dried, and heated in a laboratory oven at 130°C for several hours before use. Solvent rinses with methanol may be substituted for the oven heating. After drying and cooling, glassware should be stored in a clean environment to prevent any accumulation of dust or other contaminants.

3.6.3.1.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.6.3.2 Analysis for formaldehyde is especially complicated by its ubiquitous occurrence in the environment.

3.6.3.3 Matrix interferences may be caused by contaminants that are coextracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the matrix being sampled. No interferences have been observed in the matrices studied as a result of using solid sorbent extraction as opposed to liquid extraction. If interferences occur in subsequent samples, some additional cleanup may be necessary.

3.6.3.4 The extent of interferences that may be encountered using liquid chromatographic techniques has not been fully assessed. Although the HPLC conditions described allow for a resolution of the

specific compounds covered by this method, other matrix components may interfere.

3.6.4 Apparatus and Materials

3.6.4.1 Reaction vessel—250 ml Florence flask.

3.6.4.2 Separatory funnel—205 ml, with Teflon stopcock.

3.6.4.3 Kuderna-Danish (K-D) apparatus.

3.6.4.3.1 Concentrator tube—10 ml graduated (Kontes K-570050-1025 or equivalent). A ground glass stopper is used to prevent evaporation of extracts.

3.6.4.3.2 Evaporation flask—500 ml (Kontes K-570001-500 or equivalent). Attach to concentrator tube with springs, clamps, or equivalent.

3.6.4.3.3 Snyder column—Three ball macro (Kontes K-563000-0121 or equivalent).

3.6.4.3.4 Snyder column—Two ball macro (Kontes K-563001-0219 or equivalent).

3.6.4.3.5 Springs—1/2 inch (Kontes K-662750 or equivalent).

3.6.4.4 Vials—10, 25 ml, glass with Teflon lined screw caps or clamp tops.

3.6.4.5 Boiling chips—Solvent with methylene chloride, approximately 10/40 mesh (silicon carbide or equivalent).

3.6.4.6 Balance—Analytical, capable of accurately weighing to the nearest 0.0001 g.

3.6.4.7 pH meter—Capable of measuring to the nearest 0.01 units.

3.6.4.8 High performance liquid chromatograph (modular).

3.6.4.8.1 Pumping system—Isocratic, with constant flow control capable of 1.00 ml/min.

3.6.4.8.2 High pressure injection valve with 20 μ L loop.

3.6.4.8.3 Column—250 mm $\times$ 4.6 mm ID, 5 μ m particle size, C18 (or equivalent).

3.6.4.8.4 Absorbance detector—360 nm.

3.6.4.8.5 Strip-chart recorder compatible with detector—Use of a data system for measuring peak areas and retention times is recommended.

3.6.4.9 Glass fiber filter paper.

3.6.4.10 Solid sorbent cartridges—Packed with 500 mg C18 (Baker or equivalent).

3.6.4.11 Vacuum manifold—Capable of simultaneous extraction of up to 12 samples (Supelco or equivalent).

3.6.4.12 Sample reservoirs—60 ml capacity (Supelco or equivalent).

3.6.4.13 Pipet—Capable of accurately delivering 0.10 ml solution (Pipetman or equivalent).

3.6.4.14 Water bath—Heated, with concentric ring cover, capable of temperature control ($\pm$ 2 °C). The bath should be used under a hood.

3.6.4.15 Volumetric Flasks—250 or 500 ml.

3.6.6 Reagents

3.6.5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform

to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

3.6.5.2 Organic-free water—All references to water in this method refer to organic-free reagent water, as defined in chapter 1 SW-846.

3.6.5.3 Methylene chloride, CH_2Cl_2 —HPLC grade or equivalent.

3.6.5.4 Methanol, CH_3OH —HPLC grade or equivalent.

3.6.5.5 Ethanol (absolute), $\text{CH}_3\text{CH}_2\text{OH}$ —HPLC grade or equivalent.

3.6.5.6 2,4-Dinitrophenylhydrazine (DNPH) (70% (w/w)), $(2,4\text{-}(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{NHNH}_2)$, in organic-free reagent water.

3.6.5.7 Formalin (37.6 percent (w/w)), formaldehyde in organic-free reagent water.

3.6.5.8 Acetic acid (glacial), $\text{CH}_3\text{CO}_2\text{H}$.

3.6.5.9 Sodium hydroxide solutions NaOH, 1.0 N and 5 N.

3.6.5.10 Sodium chloride, NaCl.

3.6.5.11 Sodium sulfite solution, Na_2SO_3 , 0.1 M.

3.6.5.12 Hydrochloric Acid, HCl, 0.1 N.

3.6.5.13 Extraction fluid—Dilute 64.3 ml of 1.0 N NaOH and 5.7 ml glacial acetic acid to 900 ml with organic-free reagent water. Dilute to 1 liter with organic-free reagent water. The pH should be 4.93 $\pm$ 0.02.

3.6.5.14 Stock standard solutions.

3.6.5.14.1 Stock formaldehyde (approximately 1.00 mg/ml)—Prepare by diluting 25 μ l formalin to 100 ml with organic-free reagent water.

3.6.5.14.1.1 Standardization of formaldehyde stock solution—Transfer a 25 ml aliquot of a 0.1 M Na_2SO_3 solution to a beaker and record the pH. Add a 25.0 ml aliquot of the formaldehyde stock solution (section 3.6.5.14.1) and record the pH. Titrate this mixture back to the original pH using 0.1 N HCl. The formaldehyde concentration is calculated using the following equation:

$$\text{Concentration (mg/ml)} = 30.03 \times (\text{N HCl}) \times (\text{ml HCl}) \times 25.0$$

where:

N HCl = Normality of HCl solution used.
ml HCl = ml of standardized HCl solution used.

30.03 = MW of formaldehyde.

3.6.5.14.2 Stock formaldehyde and acetaldehyde—Prepare by adding 255 μ l formalin and 0.1 g acetaldehyde to 90 ml of water and dilute to 100 ml. The concentration of acetaldehyde in this solution is 1.00 mg/ml. Calculate the concentration of formaldehyde in this solution using the results of the assay performed in section 3.6.5.14.1.1.

3.6.5.14.3 Stock standard solutions must be replaced after six months, or sooner, if

comparison with check standards indicates a problem.

3.6.5.15.1 Reaction Solutions.

3.6.5.15.1.1 DNPH (1.00 µg/L).—Dissolve 142.9 mg of 70% (w/w) reagent in 100 ml absolute ethanol. Slight heating or sonication may be necessary to effect dissolution.

3.6.5.15.2 Acetate buffer (5 N). Prepare by neutralizing glacial acetic acid to pH 5 with 5 N NaOH solution. Dilute to standard volume with water.

3.6.5.15.3 Sodium chloride solution (esterified). Prepare by mixing of the reagent grade solid with water.

3.6.6 Sample Collection, Preservation, and Handling

3.6.6.1 See the Introductory material to this Chapter, Organic Analyses, section 4.1 of SW-846.

3.6.6.2 Environmental liquid and leachate samples must be refrigerated at 4 °C, and must be derivatized within 5 days of sample collection and analyzed within 3 days of derivatization.

3.6.6.3 Stack gas samples collected by Method 001 must be refrigerated at 4 °C. It is recommended that samples be extracted within 30 days of collection and that extracts be analyzed within 30 days of extraction.

3.6.7 Procedure

3.6.7.1 Extraction of Solid Samples.

3.6.7.1.1 All solid samples should be homogeneous. When the sample is not dry, determine the dry weight of the sample, using a representative aliquot.

3.6.7.1.1.1 Determination of dry weight.—In certain cases, sample results are desired based on a dry weight basis. When such data is desired, or required, a portion of sample for dry weight determination should be weighed out at the same time as the portion used for analytical determination.

WARNING: The drying oven should be contained in a hood or vented. Significant laboratory contamination may result from drying a heavily contaminated hazardous waste sample.

TABLE 3.6-3.—SINGLE OPERATOR ACCURACY AND PRECISION USING SOLID SORBENT EXTRACTION

Analyte	Matrix type	Average percent recovery	Standard deviation percent	Spikes range (µg/L)	No. of analyses
Formaldehyde	Reagent water	88	9.4	15-1430	39
	Final effluent	90	11.0	48.8-1430	18
	Phenol formaldehyde sludge	93	12.0	457-1430	15

NOTE: For all reactions, the total volume of the aqueous layer should be adjusted to 100 ml with water.

3.6.7.3.3 Derivatization and extraction of the derivative can be accomplished using the

solid sorbent (section 3.6.7.3.4) or methylene chloride option (section 3.6.7.3.5).

3.6.7.3.4 Solid Sorbent Option.
3.6.7.3.4.1 Add 4 ml of acetate buffer and adjust the pH to 5.0±0.1 with glacial acetic

Environmental Protection Agency

acid or 5 N NaOH. Add 6 ml of DNPH reagent, seal the container, and place on a wrist-action shaker for 30 minutes.

3.6.7.3.4.2 Assemble the vacuum manifold and connect to a water aspirator or vacuum pump. Assemble solid sorbent cartridges containing a minimum of 1.5 g of C18 sorbent, using connectors supplied by the manufacturer, and attach the sorbent train to the vacuum manifold. Condition each cartridge by passing 10 ml dilute acetate buffer (10 ml 5 N acetate buffer dissolved in 250 ml water) through the sorbent cartridge train.

3.6.7.3.4.3 Remove the reaction vessel from the shaker and add 10 ml saturated NaCl solution to the vessel.

3.6.7.3.4.4 Add the reaction solution to the sorbent train and apply a vacuum so that the solution is drawn through the cartridges at a rate of 3 to 5 ml/min. Release the vacuum after the solution has passed through the sorbent.

3.6.7.3.4.5 Elute each cartridge train with approximately 9 ml of absolute ethanol, directly into a 10 ml volumetric flask. Dilute the solution to volume with absolute ethanol, mixed thoroughly, and place in a tightly sealed vial until analyzed.

3.6.7.3.5 Methylene Chloride Option.

3.6.7.3.5.1 Add 5 ml of acetate buffer and adjust the pH to 5.0±0.6 with glacial acetic acid or 5 N NaOH. Add 10 ml of DNPH reagent, seal the container, and place on a wrist-action shaker for 1 hour.

3.6.7.3.5.2 Extract the solution with three 20 ml portions of methylene chloride, using a 250 ml separatory funnel, and combine the methylene chloride layers. If an emulsion forms upon extraction, remove the entire emulsion and centrifuge at 2000 rpm for 10 minutes. Separate the layers and proceed with the next extraction.

3.6.7.3.5.3 Assemble a Kuderna-Danish (K-D) concentrator by attaching a 10 ml concentrator tube to a 500 ml evaporator flask. Wash the K-D apparatus with 25 ml of extraction solvent to complete the quantitative transfer.

3.6.7.3.5.4 Add one to two clean boiling chips to the evaporative flask and attach a three ball Snyder column. Pre-set the Snyder column by adding about 1 ml methylene chloride to the top. Place the K-D apparatus on a hot water bath (80-90 °C) so that the concentrator tube is partially immersed in the hot water and the entire lower rounded surface of the flask is bathed with hot vapor. Adjust the vertical position of the apparatus and the water temperature, as required, to complete the concentration in 10-16 min. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood with condensed solvent. When the apparent volume of liquid reaches 10 ml, remove the K-D apparatus and allow it to drain and cool for a least 10 min.

3.6.7.3.5.5 Prior to liquid chromatographic analysis, the solvent must be exchanged to methanol. The analyst must ensure quantitative transfer of the extract concentrate. The exchange is performed as follows:

3.6.7.3.5.5.1 Following K-D concentration of the methylene chloride extract to <10 ml using the macro Snyder column, allow the apparatus to cool and drain for at least 10 minutes.

3.6.7.3.5.5.2 Momentarily remove the Snyder column, add 5 ml of the methanol, a new glass bed, or boiling chip, and attach the micro Snyder column. Concentrate the extract using 1 ml of methanol to prewet the Snyder column. Place the K-D apparatus on the water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid reaches 5 ml, remove the K-D apparatus and allow it to drain and cool for at least 10 minutes.

3.6.7.3.5.5.3 Remove the Snyder column and rinse the flask and its lower joint with 1-2 ml of methanol and add to concentrator tube. A 5-ml syringe is recommended for this operation. Adjust the extract volume to 10 ml. Stopper the concentrator tube and store refrigerated at 4 °C. If further processing will not be performed immediately, the extract will be stored longer than two days, it should be transferred to a vial with a Teflon-lined screw cap or crimp top. Proceed with liquid chromatographic analysis if further cleanup is not required.

3.6.7.4 Extraction of Stack Gas Samples Collected by Method 001.

3.6.7.4.1 Measure the aqueous volume of the sample prior to extraction (for moisture determination in case the volume was not measured in the field). Pour the sample into a separatory funnel and drain the methylene chloride into a volumetric flask.

3.6.7.4.2 Extract the aqueous solution with two or three aliquots of methylene chloride. Add the methylene chloride extracts to the volumetric flask.

3.6.7.4.3 Fill the volumetric flask to the line with methylene chloride. Mix well and remove an aliquot.

3.6.7.4.4 If high levels of formaldehyde are present, the extract can be diluted with mobile phase, otherwise the extract must be solvent exchanged as described in section 3.6.7.5.3.3. If low levels of formaldehyde are present, the sample should be concentrated during the solvent exchange procedure.

3.6.7.5 Chromatographic Conditions.

Column C18, 250 mmx4.6 mm ID, 5 µm particle size

Mobile Phase methanol/water, 75:25 (v/v), isocratic
 Flow Rate 1.0 mL/min
 UV Detector 360 nm
 Injection Volume 20 µl

3.6.7.6 Calibration.

3.6.7.6.1 Establish liquid chromatographic operating parameters to produce a retention time equivalent to that indicated in Table 3.6-1 for the solid sorbent options, or in Table 3.6-2 for methylene chloride option. Suggested chromatographic conditions are provided in section 3.6.7.5. Prepare derivatized calibration standards according to the procedure in section 3.6.7.6.1.1. Calibrate the chromatographic system using the external standard technique (section 3.6.7.6.1.2).

3.6.7.6.1.1 Preparation of calibration standards.

3.6.7.6.1.1.1 Prepare calibration standard solutions of formaldehyde and acetaldehyde in water from the stock standard (section 3.6.5.14.2). Prepare these solutions at the following concentrations (in µg/ml) by serial dilution of the stock standard solution: 50, 20, 10. Prepare additional calibration standard solutions at the following concentrations, by dilution of the appropriate 50, 20, or 10 µg/ml standard: 5, 0.5, 2, 0.2, 1, 0.1.

3.6.7.6.1.1.2 Process each calibration standard solution through the derivatization option used for sample processing (section 3.6.7.3.4 or 3.6.7.3.5).

3.6.7.6.1.2 External standard calibration procedure.

3.6.7.6.1.2.1 Analyze each derivatized calibration standard using the chromatographic conditions listed in Tables 3.6-1 and 3.6-2, and tabulate peak area against concentration injected. The results may be used to prepare calibration curves for formaldehyde and acetaldehyde.

3.6.7.6.1.2.2 The working calibration curve must be verified on each working day by the measurement of one or more calibration standards. If the responses for any analyte varies from the previously established responses by more than 10%, the test must be repeated using a fresh calibration standard after it is verified that the analytical system is in control. Alternatively, a new calibration curve may be prepared for that compound. If an autosampler is available, it is convenient to prepare a calibration curve daily by analyzing standards along with test samples.

3.6.7.7 Analysis.

3.6.7.7.1 Analyze samples by HPLC, using conditions established in section 3.6.7.6.1. Tables 3.6-1 and 3.6-2 list the retention times and MDLs that were obtained under these conditions. Other HPLC columns, chromatographic conditions, or detectors may be used if the requirements for section

3.6.8.1 are met, or if the data are within the limits described in Tables 3.6-1 and 3.6-2.

3.6.7.7.2 The width of the retention time window used to make identifications should be based upon measurements of actual retention time variations of standards over the course of a day. Three times the standard deviation of a retention time for a compound can be used to calculate a suggested window size; however, the experience of the analyst should weigh heavily in the interpretation of the chromatograms.

3.6.7.7.3 If the peak area exceeds the linear range of the calibration curve, a smaller sample volume should be used. Alternatively, the final solution may be diluted with ethanol and reanalyzed.

3.6.7.7.4 If the peak area measurement is prevented by the presence of observed interferences, further cleanup is required. However, none of the 300 method series have been evaluated for this procedure.

3.6.7.8 Calculations.

3.6.7.8.1 Calculate each response factor as follows (mean value based on 5 points):

$$RF = \frac{\text{concentration of standard}}{\text{area of the signal}}$$

$$\text{mean} = \frac{RF - RF}{\frac{5}{\left(\sum RF_i\right)}} - \frac{5}{1}$$

3.6.7.8.2 Calculate the concentration of formaldehyde and acetaldehyde as follows: $\mu\text{g/ml} = (RF) (\text{area of signal}) (\text{concentration factor})$

where:

$$\text{concentration factor} = \frac{\text{Final Volume of Extract}}{\text{Initial Extract Volume}}$$

NOTE: For solid samples, a dilution factor must be included in the equation to account for the weight of the sample used.

3.6.7.8.3 Calculate the total weight of formaldehyde in the stack gas sample as follows: $\text{total } \mu\text{g/ml} = (RF) (\text{area of signal}) (\text{concentration factor})$

where:

$$\text{concentration factor} = \frac{\text{Final Volume of Extract}}{\text{Initial Extract Volume}}$$

3.6.8 Quality Control

3.6.8.1 Refer to Chapter One of SW-846 for guidance on quality control procedures.

3.6.9 Method Performance

3.6.9.1 The MDL concentrations listed in Table 3.6-1 were obtained using organic-free water and solid sorbent extraction. Similar results were achieved using a final effluent and sludge leachate. The MDL concentrations listed in Table 3.6-2 were obtained using organic-free water and methylene chloride extraction. Similar results were achieved using representative matrices.

3.6.9.2 This method has been tested for linearity of recovery from spiked organic-free water and has been demonstrated to be applicable over the range from 2-MDL to 200-MDL.

3.6.9.3 In a single laboratory evaluation using several spiked matrices, the average

TABLE 3.6-4.—SINGLE OPERATOR ACCURACY AND PRECISION USING METHYLENE CHLORIDE EXTRACTION

Analyte	Matrix type	Average percent recovery (%)	Standard deviation percent (p)	Spiked range (µg/L)	No. of analyses
Formaldehyde	Reagent Water	91	2.5	50-1000	9
	Groundwater	92.5	8.2	50	6
	Liquids	89.0	16.3	250	17
Acetaldehyde	Reagent Water	89.3	3.2	50-1000	9
	Groundwater	63.0	10.9	50	12
	Liquids (2 types)	44.0	20.2	250	12
	Solids	58.4	2.7	0.10-1.0	12

*Spiked range in units of mg/p.

x = Average recovery expected for this method.

p = Average standard deviation expected for this method.

recoveries presented in Tables 3.6-3 and 3.6-4 were obtained using solid sorbent and methylene chloride extraction, respectively. The standard deviations of the percent recovery are also included in Tables 3.6-3 and 3.6-4.

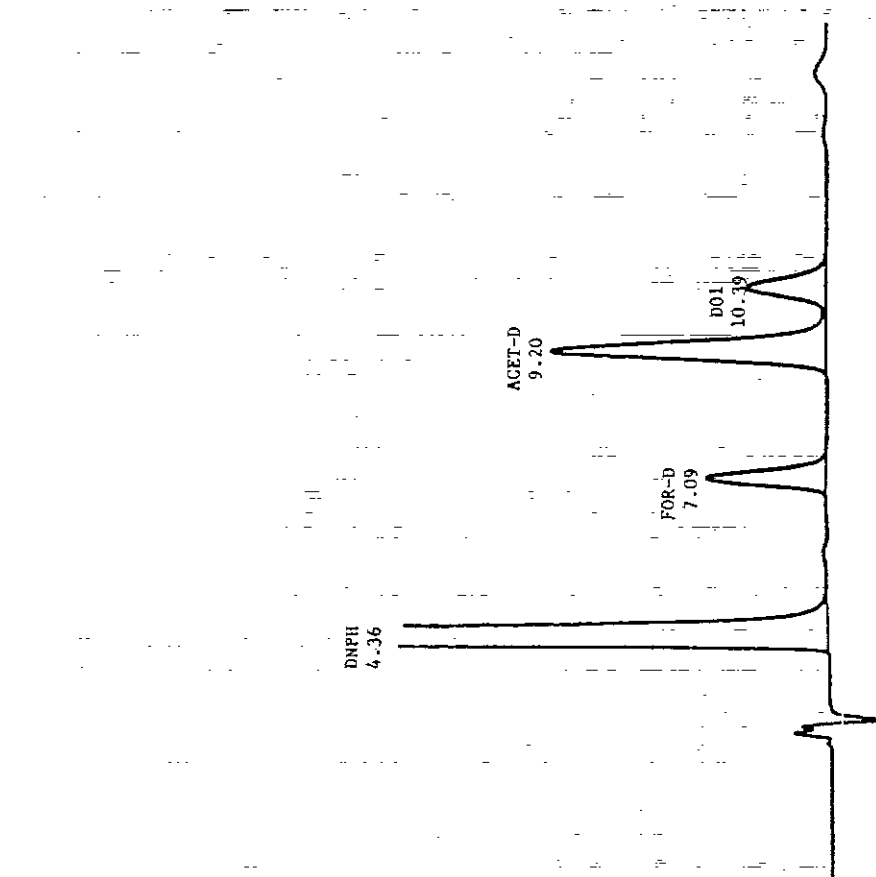
3.6.9.4 A representative chromatogram is presented in Figure 3.6-1.

3.6.10 References

1. FEDERAL REGISTER, 1986, 51, 40043-40652; November 7.
2. EPA Methods 6010, 7000, 7041, 7080, 7131, 7421, 7470, 7740, and 7841, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846, Third Edition. September 1988. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC 20460.

FIGURE 3.6-1

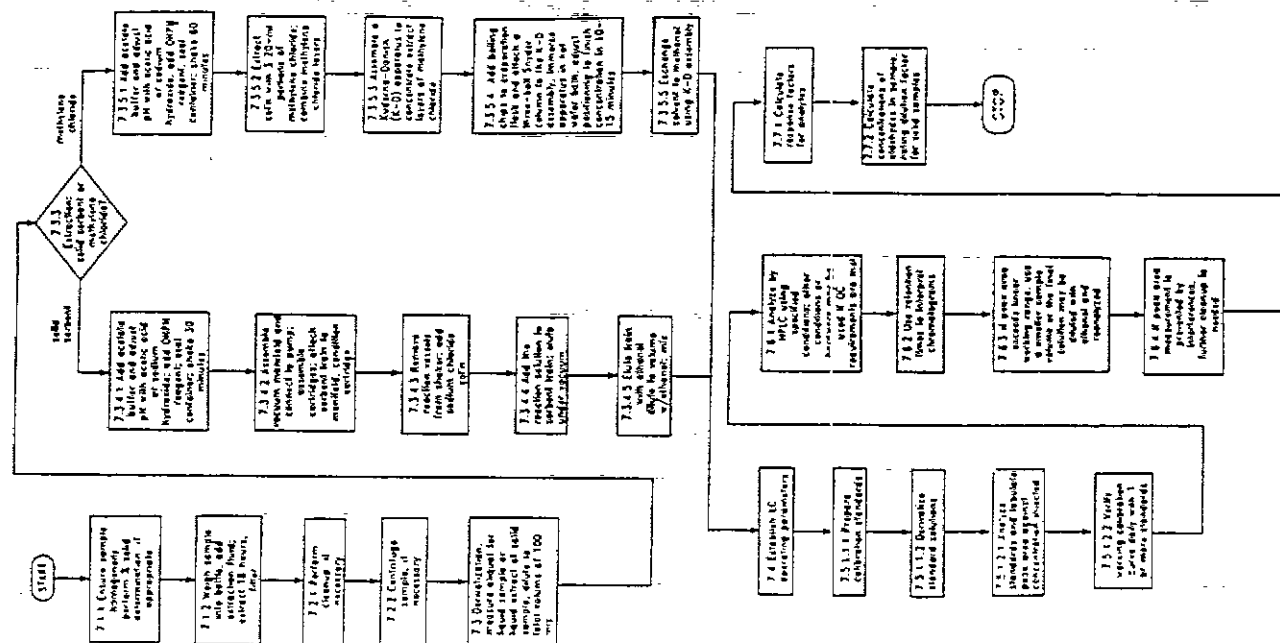
REPRESENTATIVE CHROMATOGRAM OF A 50 µg/L SOLUTION OF FORMALDEHYDE



FOR-D = Formaldehyde derivative
ACET-D = Acetaldehyde derivative

FIGURE 3.6-2

FORMALDEHYDE BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)



SECTION 4.0 PROCEDURE FOR ESTIMATING THE TOXICITY EQUIVALENCY OF CHLORINATED DIBENZO-P-DIOXIN AND DIBENZOFURAN CONGENERS

TCDDs and PCDFs must be determined using the method given in section 3.4 of this document. In this method, individual congeners or homologues¹ 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 Dibenzop-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 BIP final rule.

The procedure for calculating the 2,3,7,8-TCDD equivalent is as follows:

1. Using method 23, determine the concentrations of 2,3,8-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).

¹The 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 CDDs, monochlorinated through octachlorinated. Dibenzop-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 EQUIVALENCY FACTORS (TEFs)¹

Compound	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
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
2,3,7,8-HxCDFs	0.1
Other HxCDFs	0
2,3,7,8-HpCDFs	0.01
Other HpCDFs	0
OCDF	0.001

¹Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzop-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 HWAQSP 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 HWAQSP 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

Environmental Protection Agency

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 (HWAQSP) (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 coefficients¹ based on facility-specific information.

The screening procedure can be used to determine emissions limits at sites where the nearest meteorological (STAIR) 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

¹The term dispersion coefficient¹ refers to the change in ambient air concentration (µg/m³) resulting from a source with an emission rate of 1 g/sec.

more pollutants, a refined analysis to examine the emissions from each stack can be conducted. This multiple-stack method is presented in Step 10.

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 stacks. 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:

²Worksheet space is provided for three stacks. If the facility has additional stacks, copy the form and revise stack identification numbers for 4, 5, etc.

Is the facility in a valley < km in width?	Yes	No
Is the terrain rise within 1 km of the facility greater than the physical stack height of the tallest stack? (Only applies to stacks 520 meters in height)		
Is the distance to the nearest shoreline < 5 km? (Only applies to facilities with stacks 520 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 HWCAGSP is 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 (m³/sec)

T = Exhaust temperature (°K)

Complete the following table to compute the "K" value for each stack:

Stack No.	Stack height (m)	Flow rate (m ³ /sec)	Exh temp (°K)
1			
2			
3			

Select the stack with the lowest "JK" 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:

GEP (minimum) = $H + (1.5L)$
GEP (maximum) = greater of 65 m or $H + (1.5L)$

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,

³The 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.

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.

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(F).

(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

⁴Refer 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

Flow rate (m ³ /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	0	0	0
1.0-1.9	0	0	0	0	0	0	0	0	0	0	0
2.0-2.9	0	0	0	0	0	0	0	0	0	0	0
3.0-3.9	0	0	0	0	0	0	0	0	0	0	0
4.0-4.9	0	0	0	0	0	0	0	0	0	0	0
5.0-7.4	1	2	3	4	5	6	7	9	10	11	12
7.5-9.9	2	3	4	5	6	8	10	12	13	14	15
10.0-12.4	3	4	5	6	8	10	12	14	16	17	19
12.5-14.9	4	5	6	8	10	12	15	17	20	22	23
15.0-19.9	5	6	8	10	12	15	18	20	22	23	24
20.0-24.9	6	8	10	12	15	18	20	23	25	26	27
25.0-29.9	7	10	12	15	18	20	23	25	26	27	28
30.0-34.9	8	12	14	17	20	23	25	27	29	30	31
35.0-39.9	9	14	17	20	23	25	27	29	31	32	33
40.0-49.9	10	16	19	22	25	27	29	31	33	35	36
50.0-59.9	12	18	21	24	27	29	31	33	35	36	37
60.0-69.9	14	20	23	26	29	31	33	35	36	37	39
70.0-79.9	16	22	25	28	31	34	36	38	39	41	42
80.0-89.9	17	23	26	29	32	35	38	40	42	44	46
90.0-99.9	19	25	28	31	34	37	40	42	44	46	49
100.0-119.9	21	27	30	33	36	39	42	44	46	48	51
120.0-139.9	22	28	31	34	37	40	42	44	46	48	51
140.0-159.9	23	29	32	35	38	41	44	46	48	50	53
160.0-179.9	25	31	34	37	40	43	46	48	50	52	55
180.0-199.9	26	32	35	38	41	44	47	49	51	53	56
>199.9	28	33	36	39	42	45	48	50	52	54	57
											67
											70
											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
R1	Heavy Industrial	Urban
R2	Light/Moderate Industrial	Urban
C1	Commercial	Urban
R1	Common Residential (Normal Easements)	Rural
R2	Compact Residential (Single Family)	Urban

TABLE 5.0-3.—Classification of Land Use Types—Continued

Type ¹	Description	Urban or rural designation ²
R3	Compact Residential (Multi-Family)	Rural
R4	Estate Residential (Multi-Acre Poles)	Rural
A1	Metropolitan Natural	Rural
A2	Agricultural	Rural
A3	Undeveloped (Grasslands/Weeds)	Rural
A4	Undeveloped (Heavy Wooded)	Rural
A5	Water Surfaces	Rural

¹EPA, Guidelines on Air Quality Models (Revised), EPA-450/2-78-027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July, 1986.

²And, August 11, J., "Correlation of Land Use and Cover with meteorological Analyses," 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 Percent Urban Land Use:	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.

⁵The 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.

use Step 7(A) (1). For rolling or complex terrain (excluding generic source 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 fence line distance listed in Step 5(B). Record the maximum average hourly dispersion coefficient encountered.

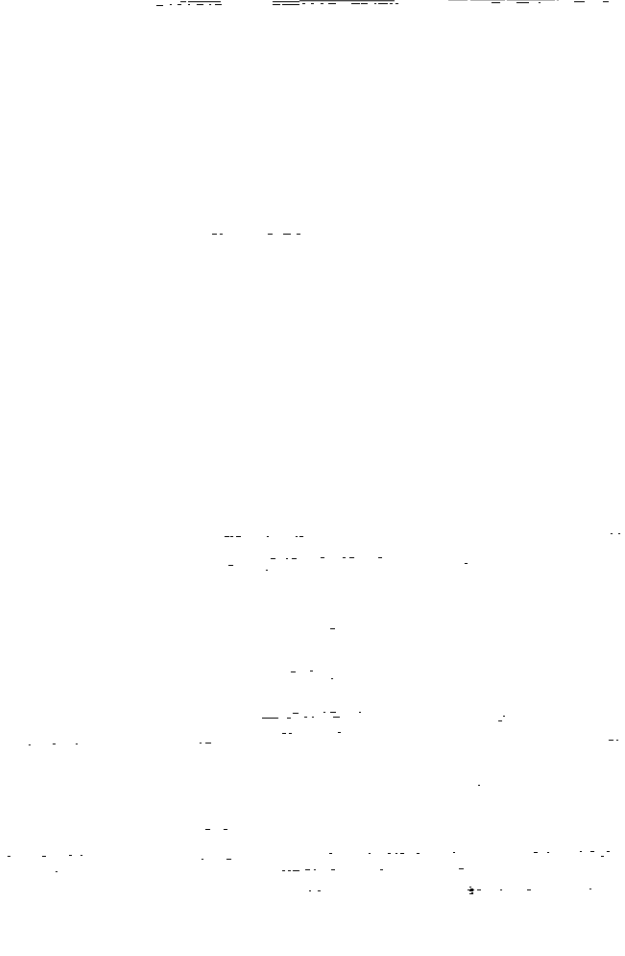
Maximum Average Hourly Dispersion Coefficient = $\frac{\text{Maximum dispersion coefficient (pgm/m}^3\text{/sec)}}{\text{Distance range (km)}}$

(2) For each of the three distance-based generic source numbers listed in Step 5(B),

⁶Exclude 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.

Distance range (km)	Generic source No. [from Step 5(B)]	Maximum dispersion coefficient (pgm/m ³ /sec)
0.0-0.5	—	—
>0.5-2.5	—	—
>2.5-5.0	—	—
>5.0-20.0	—	—

search down the appropriate generic source number columns, beginning at the minimum fence line distance listed in Step 5(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.



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 HWCASQP relative to the Tier I and II limits (see discussion of benefits from using HWCASQP 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,

⁶For the distance range 6 to 20 kilometers, generic source number 1 is used to conservatively represent the maximum dispersion coefficient.

TABLE 6.0-4.—ISOST PREDICTED MAXIMUM CONCENTRATIONS ($\mu\text{g}/\text{m}^3$) FOR HAZARDOUS WASTE COMBUSTORS USING URBAN CONDITIONS

Distance (KM)	Genetic Source #1 (<10M)	Genetic Source #2 (10M)	Genetic Source #3 (15M)	Genetic Source #4 (20M)	Genetic Source #5 (25M)	Genetic Source #6 (31M)	Genetic Source #7 (42M)	Genetic Source #8 (50M)	Genetic Source #9 (65M)	Genetic Source #10 (113M)	Genetic Source #11 (Downw.-N)
0.20	200.3	200.3	145.9	113.8	86.5	73.1	49.2	35.4	24.6	6.6	6.6
0.25	185.1	172.2	125.5	97.6	74.4	67.6	42.7	30.0	20.3	7.4	7.4
0.30	161.2	151.6	104.4	81.4	61.9	52.3	37.7	26.6	18.4	5.8	5.8
0.35	143.2	135.8	99.0	77.2	58.7	49.6	33.6	23.1	16.4	5.2	5.2
0.40	129.2	123.3	89.9	70.1	53.3	45.0	30.7	20.4	14.6	4.8	4.8
0.45	118.0	113.0	80.0	67.0	47.0	40.1	27.1	18.4	13.0	4.4	4.4
0.50	108.8	103.3	73.7	61.8	43.7	37.7	25.2	16.4	11.6	4.0	4.0
0.55	101.1	96.6	68.9	57.4	40.9	35.4	23.9	15.0	10.5	3.6	3.6
0.60	94.6	89.0	64.6	53.7	38.5	33.6	22.1	13.8	9.4	3.2	3.2
0.65	89.0	84.1	61.2	50.4	36.3	30.7	20.9	12.0	8.5	2.9	2.9
0.70	84.1	79.8	58.0	47.8	34.5	27.8	19.9	10.9	7.9	2.5	2.5
0.75	79.8	75.0	55.0	45.0	32.9	25.5	18.1	9.4	7.4	2.2	2.2
0.80	75.0	70.7	52.4	42.4	30.1	23.9	16.3	8.5	6.1	1.9	1.9
0.85	70.7	66.9	49.8	39.9	28.9	22.7	14.7	7.9	5.2	1.6	1.6
0.90	66.9	63.3	47.4	37.7	26.6	20.9	13.0	7.4	4.8	1.3	1.3
0.95	63.3	60.0	45.0	35.4	24.6	19.2	11.6	6.6	4.4	1.0	1.0
1.00	60.0	56.6	42.7	33.6	22.7	18.4	10.5	6.1	4.0	0.8	0.8
1.05	56.6	53.3	40.1	31.8	20.9	16.4	9.4	5.2	3.6	0.6	0.6
1.10	53.3	50.0	37.7	29.9	18.4	14.6	8.5	4.8	3.2	0.5	0.5
1.15	50.0	46.6	35.4	27.8	16.4	12.9	7.9	4.4	2.9	0.4	0.4
1.20	46.6	43.3	33.6	25.5	14.6	11.6	7.4	4.0	2.5	0.3	0.3
1.25	43.3	40.1	31.8	23.9	12.9	10.5	6.6	3.6	2.2	0.2	0.2
1.30	40.1	37.7	29.9	22.7	11.6	9.4	6.1	3.2	1.9	0.1	0.1
1.35	37.7	35.4	27.8	20.9	10.5	8.5	5.2	2.9	1.6	0.0	0.0
1.40	35.4	33.6	25.5	19.2	9.4	7.9	4.8	2.5	1.3	0.0	0.0
1.45	33.6	31.8	23.9	17.9	8.5	7.4	4.4	2.2	1.0	0.0	0.0
1.50	31.8	29.9	22.7	16.4	7.9	6.6	4.0	1.9	0.8	0.0	0.0
1.55	29.9	27.8	20.9	14.6	7.4	5.2	3.6	1.6	0.6	0.0	0.0
1.60	27.8	25.5	19.2	12.9	6.6	4.8	3.2	1.3	0.5	0.0	0.0
1.65	25.5	23.9	18.4	11.6	6.1	4.4	2.9	1.0	0.4	0.0	0.0
1.70	23.9	22.7	17.9	10.5	5.2	4.0	2.5	0.8	0.3	0.0	0.0
1.75	22.7	21.8	16.4	9.4	4.8	3.6	2.2	0.6	0.2	0.0	0.0
1.80	21.8	20.9	15.0	8.5	4.4	3.2	1.9	0.5	0.1	0.0	0.0
1.85	20.9	19.2	14.6	7.9	4.0	2.9	1.6	0.4	0.1	0.0	0.0
1.90	19.2	17.9	13.8	7.4	3.6	2.5	1.3	0.3	0.0	0.0	0.0
1.95	17.9	16.4	12.9	6.6	3.2	2.2	1.0	0.2	0.0	0.0	0.0
2.00	16.4	15.0	12.0	6.1	2.9	1.9	0.8	0.1	0.0	0.0	0.0

TABLE 6.0-5.—ISOST PREDICTED MAXIMUM CONCENTRATIONS ($\mu\text{g}/\text{m}^3$) FOR HAZARDOUS WASTE COMBUSTORS USING RURAL CONDITIONS

Distance (KM)	Genetic Source #1 (<10M)	Genetic Source #2 (10M)	Genetic Source #3 (15M)	Genetic Source #4 (20M)	Genetic Source #5 (25M)	Genetic Source #6 (31M)	Genetic Source #7 (42M)	Genetic Source #8 (50M)	Genetic Source #9 (65M)	Genetic Source #10 (113M)	Genetic Source #11 (Downw.-N)
0.20	177.1	670.3	670.3	308.6	175.8	102.8	76.5	28.0	10.1	3.5	0.0
0.25	150.6	573.2	573.2	263.4	150.6	88.2	65.8	23.5	8.5	3.0	0.0
0.30	131.6	495.7	495.7	228.9	128.2	77.6	58.7	20.9	7.9	2.7	0.0
0.35	117.1	438.5	438.5	199.1	117.1	71.1	52.3	18.1	6.6	2.2	0.0
0.40	102.3	390.7	390.7	175.8	102.3	65.8	48.4	16.4	5.8	1.9	0.0
0.45	90.7	354.4	354.4	157.7	90.7	61.2	44.4	14.6	5.2	1.6	0.0
0.50	80.0	324.4	324.4	143.1	80.0	57.4	40.1	13.0	4.8	1.3	0.0
0.55	70.7	299.1	299.1	129.2	70.7	53.3	37.7	11.6	4.4	1.0	0.0
0.60	63.3	277.8	277.8	118.0	63.3	49.6	35.4	10.5	4.0	0.8	0.0
0.65	56.6	259.9	259.9	108.8	56.6	46.6	33.6	9.4	3.6	0.6	0.0
0.70	50.0	244.4	244.4	101.1	50.0	43.3	31.8	8.5	3.2	0.5	0.0
0.75	44.4	230.7	230.7	94.6	44.4	40.1	29.9	7.9	2.9	0.4	0.0
0.80	39.9	218.4	218.4	88.2	39.9	37.7	27.8	7.4	2.5	0.3	0.0
0.85	35.4	207.7	207.7	82.7	35.4	35.4	25.5	6.6	2.2	0.2	0.0
0.90	31.8	199.1	199.1	77.6	31.8	33.6	23.9	6.1	1.9	0.1	0.0
0.95	28.9	188.2	188.2	72.7	28.9	31.8	22.7	5.8	1.6	0.0	0.0
1.00	26.6	179.8	179.8	68.9	26.6	29.9	21.8	5.2	1.3	0.0	0.0
1.05	24.6	172.2	172.2	65.8	24.6	27.8	20.9	4.8	1.0	0.0	0.0
1.10	22.7	164.6	164.6	61.2	22.7	25.5	19.2	4.4	0.8	0.0	0.0
1.15	20.9	157.7	157.7	57.4	20.9	23.9	17.9	4.0	0.6	0.0	0.0
1.20	19.2	150.6	150.6	53.3	19.2	22.7	16.4	3.6	0.5	0.0	0.0
1.25	17.9	143.1	143.1	49.6	17.9	21.8	15.0	3.2	0.4	0.0	0.0
1.30	16.4	135.8	135.8	46.6	16.4	20.9	13.8	2.9	0.3	0.0	0.0
1.35	15.0	129.2	129.2	43.3	15.0	19.2	12.9	2.5	0.2	0.0	0.0
1.40	13.8	123.3	123.3	40.1	13.8	18.4	12.0	2.2	0.1	0.0	0.0
1.45	12.9	118.0	118.0	37.7	12.9	17.9	11.6	1.9	0.1	0.0	0.0
1.50	11.6	113.0	113.0	35.4	11.6	16.4	10.9	1.6	0.0	0.0	0.0
1.55	10.5	108.8	108.8	33.6	10.5	15.0	10.5	1.3	0.0	0.0	0.0
1.60	9.4	104.4	104.4	31.8	9.4	14.6	10.0	1.0	0.0	0.0	0.0
1.65	8.5	100.0	100.0	29.9	8.5	13.8	9.4	0.8	0.0	0.0	0.0
1.70	7.9	95.7	95.7	27.8	7.9	12.9	8.5	0.6	0.0	0.0	0.0
1.75	7.4	91.8	91.8	25.5	7.4	12.0	7.9	0.5	0.0	0.0	0.0
1.80	6.6	88.2	88.2	24.6	6.6	11.6	7.4	0.4	0.0	0.0	0.0
1.85	6.1	84.1	84.1	22.7	6.1	11.0	6.6	0.3	0.0	0.0	0.0
1.90	5.8	80.0	80.0	21.8	5.8	10.5	6.1	0.2	0.0	0.0	0.0
1.95	5.2	77.6	77.6	20.9	5.2	10.0	5.8	0.1	0.0	0.0	0.0
2.00	4.8	75.0	75.0	19.2	4.8	9.4	5.2	0.0	0.0	0.0	0.0

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-

Terrain	Distance from stack (m)	Generic source No.	Maximum hourly dispersion coefficient ($> 0.1 \text{ m}^3/\text{g sec}$)	Annual hourly ratio	Maximum annual dispersion coefficient ($> 0.1 \text{ m}^3/\text{g sec}$)
Flat	0-20.0 0-0.5 20.5-2.5				
Rolling or Complex	2.5-5.0 5.0-20.0				

* 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 fall the

Stack No.	GEP stack height (m)	Flow rate (m^3/sec)	Exit temp ($^{\circ}\text{K}$)	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:

$$\frac{\text{Maximum Effective Stack Height}}{\text{Minimum Effective Stack Height}} =$$

If the above ratio is greater than 1.25, proceed with the remaining steps. Otherwise, this option is less likely to significantly re-

* 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

Environmental Protection Agency

dence 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 = _____

$$\frac{\text{Terrain Rise (m)}}{\text{Shortest Stack Height (m)}} \times 100 = \text{ \% }$$

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

USE THE TABLE BELOW TO CALCULATE THE TAESH FOR EACH STACK*

Stack No.	Distance Range (km)					
	HE	TR	TAESH	HE	TR	TAESH
1						
2						
3						

* Refer to Step 1 for terrain adjustment data. Note that the distance from the source to the center 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.

GENERIC SOURCE NUMBER AFTER TERRAIN ADJUSTED (IF NEEDED)

Stack No.	0-0.5 km	>0.5-2.5 km	>2.5-6.0 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 fence-line 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 stack for all distance ranges. For other situations up to three generic source numbers

* This applies to all stacks less than or equal to 10 meters regardless of the terrain classification.

may be needed per stack (i.e., a unique generic source number per distance range). In Tables 5.0-4 and 5.0-6, 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 6 km (past the limits of the terrain analysis).

Worksheet 5.0-1 Dispersion Coefficient by Downwind Distance¹

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			
13.00			
20.00			

¹Note: 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.

¹²Refer to Step 8 of the basic screening procedure. At this point in the screening procedure, annual emissions are used to rep-

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Total Distance (km)	Stack 1 EX X DC = C	Stack 2 EX X DC = C	Stack 3 EX 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 Coefficient (from Worksheet 5.0-1)
C= Estimated Maximum Hourly Ambient Air Concentration

Worksheet 5.0-2 Maximum Hourly Ambient Air Concentration

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
1.00				
1.50				
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				

Pollutant

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

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
1.00				
1.50				
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				

Pollutant

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

Stack No.	Stack height (m)	Maximum terrain rise (m)	Complex	Noncomplex
1				
2				
3				

(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(G) or 10(F)), urban/rural designation (from Step 6), and complex or

Stack No.	Generic source No. steps 10 (C or D)		Annual/hourly ratio (from table 5.0-6)	
	Distance range (km)	Distance (km)	Distance range (km)	Distance (km)
1	0-0.5		0-0.5	
2	0-0.5		0-0.5	
3	0-0.5		0-0.5	

(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 ($\mu\text{g}/\text{m}^3$) for pollutant "N" from Step 10(F),
 C_a =Maximum annual average air concentration for pollutant "N" ($\mu\text{g}/\text{m}^3$),
 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	0.020	0.024

¹⁴If 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.

¹⁵As an option, the user can identify the stack with the highest ratio for each distance range (rather than the absolute high-

TABLE 5.0-6.—95TH PERCENTILE OF ANNUAL/HOURLY RATIOS—Continued

Noncomplex Terrain			Complex Terrain		
Source	Urban	Rural	Source	Urban	Rural
10	0.029	0.008	10	0.017	0.013
11	0.018	0.015	11	0.020	0.053

gush 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?
I1	Heavy Industrial	Urban
I2	Light/Moderate Industrial	Urban
C1	Commercial	Urban
R1	Common Residential (Normal Estates)	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)	Rural
A4	Undeveloped (Heavily Wooded)	Rural
A5	Water Surfaces	Rural

¹EPA, 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.
²Auer, 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 applica-

(J) Use the maximum annual average concentration from Step 10(I) to determine compliance with regulatory requirements.

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 distin-

tions will have clear-out 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 1988 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". The weight .003", length .04", spaced .20" center to center.	
118	Single track abandoned Same as existing track with space .02", dash .18". Label: ABANDONED	
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". The length .032", spaced .20" center to center. If more than two tracks label with double cross bar at point of change. Double cross bar .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 dots, spaced .20" center to center. Minimum space between tracks .011". Line weight for single tracks .005", multiple tracks .003".	
124	Railroad in street The spaced .20" center to center. Label if narrow gauge. The weight .003".	
125	Yards Line weight .003". Space between tracks .011". The spaced .20" center to center, minimum length to touch 8 tracks.	
126	Sidings Line weight .003". Scribe to scale with minimum space between tracks .011". The spaced .20" center to center, length .04" for single track.	
176	Large buildings Outline weight .003". When width exceeds .08", hatch at 45° angle to building in NE direction. Area .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 .02" minimum, 10" maximum. Label as to content.	
197	Tanks: oil, gas, water, etc. Exceeding 10' diameter. Outline weight .003". Hatch SH-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 281, 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 re-established 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. Multiple samples of the waste-derived residue may be analyzed or subsamples may be compositated 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 com-

pared 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:

$$UTL = \bar{X} + (K)(S)$$

where $\bar{X}$ = mean of the normal residue concentrations, $X = \bar{X}/n$,

K = coefficient for sample size n , 95% confidence and 95% proportion,

S = standard deviation of the normal residue concentrations,

$$S = (\sum (X_i - \bar{X})^2 / (n - 1))^{1/2}, \text{ and}$$

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	16
4	10
5	7
6	12
7	10
8	16
9	16
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:

$$UTL = 11.5 + (2.91)(2.9) = 19.9 \text{ ppm}$$

Thus, 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 limit. 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	2.816
12	2.736
13	2.670
14	2.614
15	2.566
16	2.523
17	2.486
18	2.459
19	2.423
20	2.396
21	2.371
22	2.350
23	2.329
24	2.303
25	2.282

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, Cl₂, 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 chlorine, metals, or PM and the air pollution control system removal efficiency (APCS RE) for these pollutants. The SRE is defined as:

$$SRE = (\text{species input} - \text{species emitted}) / \text{species input}$$

The SRE can be calculated from the partitioning factor (PF) and APCS RE by the following formula:

$$SRE = 1 - [(PF/100) \times (1 - APCS RE/100)]$$

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, Cl₂, 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 HFs, 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 8.1-2.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF NONCHLORINATED WASTES

Metal	Name	Thermal Input (MMBtu/hr)					
		1	10	100	1000	10000	
Arsenic	As	320	280	240	200	160	
Cadmium	Cd	1040	940	860	780	720	
Chromium	Cr	2000	1760	1590	1420	1360	
Beryllium	Be	1680	1440	1240	1080	980	
Antimony	Sb	680	600	540	480	420	
Barium	Ba	2240	1820	1540	1360	1240	
Lead	Pb	1280	1160	1080	1000	920	
Mercury	Hg	340	300	260	220	180	
Silver	Ag	1620	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	Name	Thermal Input (MMBtu/hr)					
		1	10	100	1000	10000	
Arsenic	As	320	280	240	200	160	
Cadmium	Cd	1040	940	860	780	720	
Chromium	Cr	>1400	>1400	>1400	>1400	>1400	
Beryllium	Be	1680	1440	1240	1080	980	
Antimony	Sb	680	600	540	480	420	
Barium	Ba	2060	1840	1680	1540	1420	
Lead	Pb	>1400	>1400	>1400	>1400	>1400	
Mercury	Hg	340	300	260	220	180	
Silver	Ag	1090	940	840	740	660	

TABLE 8.1-1.—AIR POLLUTION CONTROL SYSTEMS (APCS) AND THEIR CONSERVATIVELY ESTIMATED EFFICIENCIES FOR CONTROLLING TOXIC METALS (%)

APCS	Metal Volatility		Very Volatile
	Nonvolatile	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	90	0
WESP	90	85	40
FF	97	90	0
DSFF	97	90	0
DSFF	95	90	0
IWS	90	87	75

WS=Wet Scrubber including: Sleeve Tray Tower, Packed Tower, Bubble Cap Tower
VS-20=Venturi Scrubber, ca. 20-30 in W.G. Δp
VS-60=Venturi Scrubber, ca. >60 in W.G. Δp
ESP-1=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 8.1-3.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF CHLORINATED WASTES—Continued

Metal	Name	Thermal Input (MMBtu/hr)					
		Symbol	1	10	100	1000	10000
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 8.2-1.—AIR POLLUTION CONTROL SYSTEMS (APCS) AND THEIR CONSERVATIVELY ESTIMATED EFFICIENCIES FOR REMOVING HYDROGEN CHLORIDE (HCL) AND PARTICULATE MATTER (PM) (%)

APCS	HCl		PM
	Cement Kilns	Other BIFs	
WS	97	97	40
VS-20	97	97	80
VS-60	98	98	87
ESP-1	93	0	90
ESP-2	93	0	92
ESP-4	93	0	95
WESP	93	70	90
FF	93	0	90
DSFF	98	98	97
DSFF	98	98	95
DSFF	99	99	95
IWS	99	99	90

WS=Wet Scrubber including: Sleeve Tray Tower, Packed Tower, Bubble Cap Tower
VS=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. Δp
VS-60=Venturi Scrubber, ca. >60 in W.G. Δp
ESP-1=Electrostatic Precipitator; 1 stage
ESP-2=Electrostatic Precipitator; 2 stage
IWS=Ionizing Wet Scrubber
DS=Dry Scrubber
FF=Fabric Filter (Baghouse)
SD=Spray Dryer (Wet/Dry Scrubber)

8.2 APCS RE Default Values for HCl and Cl₂

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 Cl₂ for most types of APCS is generally minimal. Therefore, the default assumption for APCS RE for Cl₂ 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.

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. Maunighan, 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 in Hazardous Waste Management, NTIS Document No. EPA/600/9-89/072, p. 535 (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, Cl₂, 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 Cl₂

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 to the combustor. Therefore, the owner/operator must estimate the controlled emission rate of both HCl and Cl₂ 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 Cl₂, 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/hy-

drogen ratio ≤ 0.95 , the default partitioning factor is 20 percent Cl₂, 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 Cl₂.

3. To determine the uncontrolled (i.e., prior to acid gas APCS) emission rate of HCl and Cl₂, 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 Cl₂.

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 g/dscf, corrected to 7% O₂, PM emission limit to a PM emission rate.

Water 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 lanceed 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 g/dscf, corrected to 7% O₂, unless a more stringent standard applies (e.g., a New Source Performance Standard (NSPS) or a State standard implemented under the State Implement-

Environmental Protection Agency

tation Plan (SIP)). To convert the 0.08 g/dscf standard to a PM mass emission rate:

1. Determine the flue gas O₂ 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 $[(21 - O_2) \text{ concentration from step 1}]/(21 - 7\%)$.

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. 321

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 rep-

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:

$$ME \left(\frac{\text{lb Emitted Metal}}{\text{hr}} \right) = \frac{PME \left(\frac{\text{lb PM}}{\text{hr}} \right) DMC \left(\frac{\text{lb Dust Metal}}{\text{lb Dust}} \right) EF \left(\frac{\text{lb Emitted Metal/lb PM}}{\text{lb Dust Metal/lb Dust}} \right)}{Tier III Limit \left(\frac{\text{lb Emitted Metal}}{\text{hr}} \right)} \quad (1)$$

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):

$$DMCL \left(\frac{\text{lb Dust Metal}}{\text{lb Dust}} \right) = \frac{Tier III Limit \left(\frac{\text{lb Emitted Metal}}{\text{hr}} \right)}{PML \left(\frac{\text{lb PM}}{\text{hr}} \right) EF \left(\frac{\text{lb Emitted Metal/lb PM}}{\text{lb Dust Metal/lb Dust}} \right)} \quad (2)$$

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

$$DMCL_c \left(\frac{\text{lb Dust Metal}}{\text{lb Dust}} \right) = \frac{Tier III Limit \left(\frac{\text{lb Emitted Metal}}{\text{hr}} \right)}{PML \left(\frac{\text{lb PM}}{\text{hr}} \right) EF_{95} \left(\frac{\text{lb Emitted Metal/lb PM}}{\text{lb Dust Metal/lb Dust}} \right)} \quad (3)$$

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 EF₉₅ is greater than two times the value of EF₉₅, the "safe" en-

richment factor can be calculated using Equation 4a:

$$SEF \geq 2 EF_{95} \quad (4a)$$

If EF₉₅ is not greater than two times the value of EF₉₅, the "safe" enrichment factor can be calculated using Equation 4b:

$$SEF \geq EF_{95} \quad (4b)$$

In cases where the enrichment factor cannot be determined because the kiln dust metal concentration is nondetectable, the "safe" enrichment factor is as follows:

$$SEF = 100 \quad (4c)$$

For all cases, the "conservative" dust metal concentration limit is calculated using the following equation:

$$DMCL_c \left(\frac{\text{lb Dust Metal}}{\text{lb Dust}} \right) = \frac{Tier III Limit \left(\frac{\text{lb Emitted Metal}}{\text{hr}} \right)}{PML \left(\frac{\text{lb PM}}{\text{hr}} \right) SEF \left(\frac{\text{lb Emitted Metal/lb PM}}{\text{lb Dust Metal/lb Dust}} \right)} \quad (5)$$

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 EF₉₅ exists, the "violation" dust metal concentration limit is set at ten times the "conservative" limit:

$$DMCL_v = 10 \times DMCL_c \quad (6)$$

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).

Environmental Protection Agency

Pl. 266, App. IX

- 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 leachates 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 analysts 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 pumpable 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 k/n 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 those tests such that the feedrate of each metal for pumpable and total hazardous waste 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 those 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_{hex} , EF_{total} , and SEF. Calculate EF_{hex} and EF_{total} according to the t-distribution as described in Appendix A. Calculate SEF by

—Equation 4a if EF_{hex} is determinable and if EF_{total} is greater than two times EF_{hex} .

—Equation 4b if EF_{hex} is determinable and if EF_{total} is not greater than two times EF_{hex} .

—Equation 4c if EF_{hex} 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 II (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_{hex} is determinable, or using Equation 6 if EF_{hex} 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 II (or Tier II) metal limit for hexavalent chromium.

—If the stack samples taken in Step 2 were analyzed for hexavalent chromium, the EF_{hex} 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_{total} 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 6) 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_{hex} 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_{hex} 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_{hex} .

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 Cl₂ 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 judgment.

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.

dust metal concentration limit, no corrective measures are necessary; continue with the daily and/or weekly monitoring as described in Step 6.

- 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 6).

• 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 judgment must be used to ensure that the "con-

servative" kiln dust metal concentration goal might 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 6).

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, $EF_{95\%}$, 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 $EF_{95\%}$. Similarly, at the 99% confidence level, the enrichment factor, $EF_{99\%}$, is statistically determined so there is only a 1% chance that the enrichment factor at any given time will be larger than $EF_{99\%}$.

For a large number of samples ($n > 30$), $EF_{95\%}$ is based on a normal distribution, and is equal to:

$$EF_{95\%} = EF_{95\%} z_c \sigma \quad (1)$$

where:

$$EF = \frac{\sum_{i=1}^n EF_i}{n} \quad (2)$$

$$\sigma = \left[\frac{\sum_{i=1}^n (EF_i - EF)^2}{n} \right]^{1/2} \quad (3)$$

For a 95% confidence level, z_c is equal to 1.96.

For a small number of samples ($n < 30$), $EF_{95\%}$ is based on the t-distribution and is equal to:

$$EF_{95\%} = EF_{95\%} t_c S \quad (4)$$

where the standard deviation, S , is defined as:

$$S = \left[\frac{\sum_{i=1}^n (EF_i - EF)^2}{n-1} \right]^{1/2} \quad (5)$$

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_{actual} :

$$t_{\text{actual}} = \frac{EF_1 - EF_2}{\sigma_t \left(\frac{1}{n_1} + \frac{1}{n_2} \right)^{1/2}} \quad (6)$$

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

$$Q_c = \left(\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2} \right)^{1/2} \quad (7)$$

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_{actual} is greater than 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_{actual} , is then compared with rejection values that are critical for a particular degree of confidence, where Q_{actual} :

$$Q_{\text{actual}} = \frac{DMC_{\text{questionable}} - DMC_{\text{next}}}{DMC_{\text{questionable}} - DMC_{\text{lowest}}} \quad (8)$$

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_{actual} 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
9	0.44
10	0.41

[56 FR 32822, July 17, 1991 as amended 56 FR 42512, 42516, Aug. 27, 1991; 57 FR 39566, Aug. 25, 1992; 57 FR 44909, Sept. 30, 1992]

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 Industries¹

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 pellets
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)

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).

40 CFR Ch. I (7-1-94 Edition)

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 (P006)
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 industry¹
Filter cake from nickel-chromium alloy pickling operations¹

(56 FR 42517, Aug. 27, 1991)

PART 267—INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS WASTE LAND DISPOSAL FACILITIES

Subpart A—General

Sec.
267.1 Purpose, scope and applicability.
267.2 Applicability of part 264 standards.
267.3 Duration of part 267 standards and their relationship to permits.
267.4 Imminent hazard action.
267.5 Additional permit procedures applicable to part 267.
267.6 Definitions.

¹ If a hazardous waste under an authorized State program.

Environmental Protection Agency

Subpart B—Environmental Performance Standard

267.10 Environmental performance standard.

Subpart C—Landfills

267.20 Applicability.
267.21 General design requirements.
267.22 General operating requirements.
267.23 Closure and post-closure.
267.24 Treatment of waste.
267.25 Additional requirements.

Subpart D—Surface Impoundments

267.30 Applicability.
267.31 General design requirements.
267.32 General operating requirements.
267.33 Closure and post-closure.
267.34 Treatment of waste.
267.35 Additional requirements.

Subpart E—Land Treatment

267.40 Applicability.
267.41 General design requirements.
267.42 General operating requirements.
267.43 Unsaturated zone monitoring.
267.44 Closure and post-closure.
267.45 Treatment of waste.
267.46 Additional requirements.

Subpart F—Ground-Water Monitoring

267.50 Applicability.
267.51 Ground-water monitoring system.
267.52 Ground-water monitoring procedures.
267.53 Additional requirements.

Subpart G—Underground Injection

267.60 Applicability.
267.61 General design requirements.
267.62 General operating requirements.
267.63 Closure.
267.64 Additional requirements.

Authority: Secs. 1005, 2202(a), 3004 and 3005 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. 6905, 6912(a), 6924 and 6925.

Source: 46 FR 12429, Feb. 13, 1981, unless otherwise noted.

Subpart A—General

§267.1 Purpose, scope and applicability.

(a) The purpose of this part is to establish minimum national standards that define the acceptable management of hazardous waste for new land disposal facilities.

§ 267.2

(b) The regulations in this part apply to owners and operators of new hazardous waste landfills, surface impoundments, land treatment facilities and Class I underground injection wells (as defined in §122.32(g) of this chapter) that require individual RCRA permits under 40 CFR part 122.

(c) The requirements of this part do not apply to:

(1) A person disposing of hazardous waste by means of ocean disposal subject to a RCRA permit by rule issued under §122.26(a) of this chapter.

(2) A person disposing of hazardous waste by means of underground injection subject to a RCRA permit by rule under §122.26(b) of this chapter.

(3) An owner or operator of a POTW subject to a RCRA permit by rule under §122.26(c) of this chapter.

(4) The owner or operator of a facility permitted, licensed, or registered by a State to manage municipal or industrial solid waste, if the only hazardous waste the facility treats, stores, or disposes of is excluded from regulation under parts 262 through 265 and parts 122 and 124 of this chapter by §261.5 of this chapter.

(5) The owner or operator of a facility which treats or stores hazardous waste, which treatment or storage meets the criteria in §261.6(A) of this chapter, except to the extent that §261.6(b) of this chapter provides otherwise;

(6) A generator accumulating waste on-site in compliance with §262.34 of this chapter;

(7) A farmer disposing of waste pesticides from his own use in compliance with §262.51 of this chapter;

(8) The owner or operator of a totally enclosed treatment facility, as defined in §260.10;

(9) The owner or operator of an elementary neutralization unit or a wastewater treatment unit as defined in §260.10 of this chapter.

(10) Persons with respect to those activities that are carried out to immediately contain or treat a spill of hazardous waste or material which, when spilled, becomes a hazardous waste.

§267.2 Applicability of part 264 standards.

In addition to the standards contained in this part, owners and operators

(4) The effectiveness of additional treatment, design, or monitoring techniques.

[48 FR 14228, Apr. 1, 1983, as amended at 50 FR 22065, Jan. 14, 1985; 50 FR 28752, July 15, 1985; 57 FR 3496, Jan. 29, 1992]

\$270.19 Specific part B information requirements for incinerators.

Except as §264.340 of this chapter provides otherwise, owners and operators of facilities that incinerate hazardous waste must fulfill the requirements of (a), (b), or (c) of this section.

(a) When seeking an exemption under §264.340 (b) or (c) of this chapter (ignitable, corrosive, or reactive wastes only):

(1) Documentation that the waste is listed as a hazardous waste in part 261, subpart D of this chapter, solely because it is ignitable (Hazard Code I) or corrosive (Hazard Code C) or both; or

(2) Documentation that the waste is listed as a hazardous waste in part 261, subpart D of this chapter, solely because it is reactive (Hazard Code R) for characteristics other than those listed in §261.23(a) (4) and (5) of this chapter, and will not be burned when other hazardous wastes are present in the combustion zone; or

(3) Documentation that the waste is a hazardous waste solely because it possesses the characteristic of ignitability, corrosivity, or both, as determined by the tests for characteristics of hazardous waste under part 261, subpart C of this chapter; or

(4) Documentation that the waste is a hazardous waste solely because it possesses the reactivity characteristics listed in §261.23(a) (1), (2), (3), (6), (7), or (8) of this chapter, and that it will not be burned when other hazardous wastes are present in the combustion zone; or

(b) Submit a trial burn plan or the results of a trial burn, including all required determinations, in accordance with §270.62; or

(c) In lieu of a trial burn, the applicant may submit the following information:

(1) An analysis of each waste or mixture of wastes to be burned including:

(i) Heat value of the waste in the form and composition in which it will be burned.

(ii) Viscosity (if applicable), or description of physical form of the waste.

(iii) An identification of any hazardous organic constituents listed in part 261, appendix VIII, of this chapter, which are present in the waste to be burned, except that the applicant need not analyze for constituents listed in part 261, appendix VIII, of this chapter which would reasonably not be expected to be found in the waste. The constituents excluded from analysis must be identified and the basis for their exclusion stated. The waste analysis must rely on analytical techniques specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter and §270.6, or their equivalent.

(iv) An approximate quantification of the hazardous constituents identified in the waste, within the precision produced by the analytical methods specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter and §270.6.

(v) A quantification of those hazardous constituents in the waste which may be designated as POHC's based on data submitted from other trial or operational burns which demonstrate compliance with the performance standards in §264.343 of this chapter.

(2) A detailed engineering description of the incinerator, including:

(i) Manufacturer's name and model number of incinerator.

(ii) Type of incinerator.

(iii) Linear dimension of incinerator unit including cross sectional area of combustion chamber.

(iv) Description of auxiliary fuel system (type/feed).

(v) Capacity of prime mover.

(vi) Description of automatic waste feed cutoff system(s).

(vii) Stack gas monitoring and pollution control monitoring system.

(viii) Nozzle and burner design.

(ix) Construction materials.

(x) Location and description of temperature, pressure, and flow indicating devices and control devices.

(3) A description and analysis of the waste to be burned compared with the

waste for which data from operational or trial burns are provided to support the contention that a trial burn is not needed. The data should include those items listed in paragraph (c)(1) of this section. This analysis should specify the POHC's which the applicant has identified in the waste for which a permit is sought, and any differences from the POHC's in the waste for which burn data are provided.

(4) The design and operating conditions of the incinerator unit to be used, compared with that for which comparative burn data are available.

(5) A description of the results submitted from any previously conducted trial burn(s) including:

(i) Sampling and analysis techniques used to calculate performance standards in §264.343 of this chapter.

(ii) Methods and results of monitoring temperatures, waste feed rates, carbon monoxide, and an appropriate indicator of combustion gas velocity (including a statement concerning the precision and accuracy of this measurement).

(6) The expected incinerator operation information to demonstrate compliance with §§264.343 and 264.345 of this chapter including:

(i) Expected carbon monoxide (CO) level in the stack exhaust gas.

(ii) Waste feed rate.

(iii) Combustion zone temperature.

(iv) Indication of combustion gas velocity.

(v) Expected stack gas volume, flow rate, and temperature.

(vi) Computed residence time for waste in the combustion zone.

(vii) Expected hydrochloric acid removal efficiency.

(viii) Expected fugitive emissions and their control procedures.

(ix) Proposed waste feed out-off limits based on the identified significant operating parameters.

(7) Such supplemental information as the Director finds necessary to achieve the purposes of this paragraph.

(8) Waste analysis data, including that submitted in paragraph (c)(1) of this section, sufficient to allow the Director to specify as permit Principal Organic Hazardous Constituents (permitted POHC's) those constituents for

which destruction and removal efficiencies will be required.

(d) The Director shall approve a permit application without a trial burn if he finds that:

(1) The wastes are sufficiently similar; and

(2) The incinerator units are sufficiently similar, and the data from other trial burns are adequate to specify (under §264.345 of this chapter) operating conditions that will ensure that the performance standards in §264.343 of this chapter will be met by the incinerator.

[48 FR 14228, Apr. 1, 1983, as amended at 50 FR 46051, Aug. 31, 1985]

\$270.20 Specific part B information requirements for land treatment/facilities.

Except as otherwise provided in §264.1, owners and operators of facilities that use land treatment to dispose of hazardous waste must provide the following additional information:

(a) A description of plans to conduct a treatment demonstration as required under §264.272. The description must include the following information:

(1) The wastes for which the demonstration will be made and the potential hazardous constituents in the waste;

(2) The data sources to be used to make the demonstration (e.g., literature, laboratory data, field data, or operating data);

(3) Any specific laboratory or field test that will be conducted, including:

(i) The type of test (e.g., column leaching, degradation);

(ii) Materials and methods, including analytical procedures;

(iii) Expected time for completion;

(iv) Characteristics of the unit that will be simulated in the demonstration, including treatment zone characteristics, climatic conditions, and operating practices.

(b) A description of a land treatment program, as required under §264.271. This information must be submitted with the plans for the treatment demonstration, and updated following the treatment demonstration. The land treatment program must address the following items:

(1) The wastes to be land treated;

§ 264.316, as applicable, will be complied with.

(1) A waste management plan for EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027 describing how a landfill is or will be designed, constructed, operated, and maintained to meet the requirements of § 264.317. This submission must address the following items as specified in § 264.317:

(1) The volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) The attenuative properties of underlying and surrounding soils or other materials;

(3) The mobilizing properties of other materials co-disposed with these wastes; and

(4) The effectiveness of additional treatment, design, or monitoring techniques.

[48 FR 14228, Apr. 1, 1983; 48 FR 30114, June 30, 1983, as amended at 50 FR 2006, Jan. 14, 1985; 50 FR 28732, July 15, 1985; 57 FR 3496, Jan. 29, 1992]

§ 270.22 Specific part B information requirements for boilers and industrial furnaces burning hazardous waste.

(a) *Trial burns*—(1) *General*. Except as provided below, owners and operators that are subject to the standards to control organic emissions provided by § 266.104 of this chapter, standards to control particulate matter provided by § 266.105 of this chapter, standards to control metals emissions provided by § 266.106 of this chapter, or standards to control hydrogen chloride or chlorine gas emissions provided by § 266.107 of this chapter must conduct a trial burn to demonstrate conformance with those standards and must submit a trial burn plan or the results of a trial burn, including all required determinations, in accordance with § 270.66.

(1) A trial burn to demonstrate conformance with a particular emission standard may be waived under provisions of § 266.104 through 266.107 of this chapter and paragraphs (a)(2) through (a)(5) of this section; and

(ii) The owner or operator may submit data in lieu of a trial burn, as pre-

scribed in paragraph (a)(6) of this section.

(2) *Waiver of trial burn for DRE—(i) Boilers operated under special operating requirements*. When seeking to be permitted under §§ 266.104(a)(4) and 266.110 of this chapter that automatically waive the DRE trial burn, the owner or operator of a boiler must submit documentation that the boiler operates under the special operating requirements provided by § 266.110 of this chapter.

(ii) *Boilers and industrial furnaces burning low risk waste*. When seeking to be permitted under the provisions for low risk waste provided by §§ 266.104(a)(5) and 266.109(a) of this chapter that waive the DRE trial burn, the owner or operator must submit:

(A) Documentation that the device is operated in conformance with the requirements of § 266.109(a)(1) of this chapter.

(B) Results of analyses of each waste to be burned, documenting the concentrations of nonmetal compounds listed in appendix VIII of part 261 of this chapter, except for those constituents that would reasonably not be expected to be in the waste. The constituents excluded from analysis must be identified, and the basis for their exclusion explained. The analysis must rely on analytical techniques specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (incorporated by reference, see § 260.11).

(C) Documentation of hazardous waste firing rates and calculations of reasonable, worst-case emission rates of each constituent identified in paragraph (a)(2)(i)(B) of this section using procedures provided by § 266.109(a)(2)(ii) of this chapter.

(D) Results of emissions dispersion modeling for emissions identified in paragraphs (a)(2)(i)(C) of this section using modeling procedures prescribed by § 266.106(h) of this chapter. The Director will review the emission modeling conducted by the applicant to determine conformance with these procedures. The Director will either approve the modeling or determine that alternate or supplementary modeling is appropriate.

(E) Documentation that the maximum annual average ground level con-

Environmental Protection Agency

centration of each constituent identified in paragraph (a)(2)(i)(B) of this section quantified in conformance with paragraph (a)(2)(i)(D) of this section does not exceed the allowable ambient level established in appendices IV or V of part 266. The acceptable ambient concentration for emitted constituents for which a specific Reference Air Concentration has not been established in appendix IV or Risk-Specific Dose has not been established in appendix V is 0.1 micrograms per cubic meter, as noted in the footnote to appendix IV.

(3) *Waiver of trial burn for metals*. When seeking to be permitted under the Tier I (or adjusted Tier I) metals feed rate screening limits provided by § 266.106 (b) and (e) of this chapter that control metals emissions without requiring a trial burn, the owner or operator must submit:

(i) Documentation of the feed rate of hazardous waste, other fuels, and industrial furnace feed stocks;

(ii) Documentation of the concentration of each metal controlled by § 266.106 (b) or (e) of this chapter in the hazardous waste, other fuels, and industrial furnace feedstocks, and calculations of the total feed rate of each metal;

(iii) Documentation of how the applicant will ensure that the Tier I feed rate screening limits provided by § 266.106 (b) or (e) of this chapter will not be exceeded during the averaging period provided by that paragraph;

(iv) Documentation to support the determination of the terrain-adjusted effective stack height, good engineering practice stack height, terrain type, and land use as provided by § 266.106 (b)(3) through (b)(5) of this chapter;

(v) Documentation of compliance with the provisions of § 266.106(b)(6), if applicable, for facilities with multiple stacks;

(vi) Documentation that the facility does not fall the criteria provided by § 266.106(b)(7) for eligibility to comply with the screening limits; and

(vii) Proposed sampling and metals analysis plan for the hazardous waste, other fuels, and industrial furnace feed stocks.

(4) *Waiver of trial burn for particulate matter*. When seeking to be permitted under the low risk waste provisions of

§ 266.109(b) which waives the particulate standard (and trial burn to demonstrate conformance with the particulate standard), applicants must submit documentation supporting conformance with paragraphs (a)(2)(i) and (a)(3) of this section.

(5) *Waiver of trial burn for HCl and Cl₂*. When seeking to be permitted under the Tier I (or adjusted Tier I) feed rate screening limits for total chloride and chlorine provided by § 266.107 (b)(1) and (e) of this chapter that control emissions of hydrogen chloride (HCl) and chlorine gas (Cl₂) without requiring a trial burn, the owner or operator must submit:

(i) Documentation of the feed rate of hazardous waste, other fuels, and industrial furnace feed stocks;

(ii) Documentation of the levels of total chloride and chlorine in the hazardous waste, other fuels, and industrial furnace feedstocks, and calculations of the total feed rate of total chloride and chlorine;

(iii) Documentation of how the applicant will ensure that the Tier I (or adjusted Tier I) feed rate screening limits provided by § 266.107 (b)(1) or (e) of this chapter will not be exceeded during the averaging period provided by that paragraph;

(iv) Documentation to support the determination of the terrain-adjusted effective stack height, good engineering practice stack height, terrain type, and land use as provided by § 266.107(b)(3) of this chapter;

(v) Documentation of compliance with the provisions of § 266.107(b)(4), if applicable, for facilities with multiple stacks;

(vi) Documentation that the facility does not fall the criteria provided by § 266.107(b)(3) for eligibility to comply with the screening limits; and

(vii) Proposed sampling and analysis plan for total chloride and chlorine for the hazardous waste, other fuels, and industrial furnace feedstocks.

(6) *Data in lieu of trial burn*. The owner or operator may seek an exemption from the trial burn requirements to demonstrate conformance with §§ 266.104 through 266.107 of this chapter and § 270.66 by providing the information required by § 270.66 from previous compliance testing of the device in

conformance with §266.103 of this chapter, or from compliance testing or trial or operational burns of similar boilers or industrial furnaces burning similar hazardous wastes under similar conditions. If data from a similar device is used to support a trial burn waiver, the design and operating information required by §270.66 must be provided for both the similar device and the device to which the data is to be applied, and a comparison of the design and operating information must be provided. The Director shall approve a permit application without a trial burn if he finds that the hazardous wastes are sufficiently similar, the devices are sufficiently similar, the operating conditions are sufficiently similar, and the data from other compliance tests, trial burns, or operational burns are adequate to specify (under §266.102 of this chapter) operating conditions that will ensure conformance with §266.102(c) of this chapter. In addition, the following information shall be submitted:

- (f) For a waiver from any trial burn:
 - (A) A description and analysis of the hazardous waste to be burned compared with the hazardous waste for which data from compliance testing, or operational or trial burns are provided to support the contention that a trial burn is not needed;
 - (B) The design and operating conditions of the boiler or industrial furnace to be used, compared with that for which comparative burn data are available; and
 - (C) Such supplemental information as the Director finds necessary to achieve the purposes of this paragraph.
- (1) For a waiver of the DRE trial burn, the basis for selection of POHCs used in the other trial or operational burns which demonstrate compliance with the DRE performance standard in §266.104(a) of this chapter. This analysis should specify the constituents in appendix VIII, part 261 of this chapter, that the applicant has identified in the hazardous waste for which a permit is sought, and any differences from the POHCs in the hazardous waste for which burn data are provided.

- (b) *Alternative HC limit for industrial furnaces with organic matter in raw materials.* Owners and operators of industrial furnaces requesting an alternative

HC limit under §266.104(f) of this chapter shall submit the following information at a minimum:

- (1) Documentation that the furnace is designed and operated to minimize HC emissions from fuels and raw materials;
- (2) Documentation of the proposed baseline flue gas HC (and CO) concentration, including data on HC (and CO) levels during tests when the facility produced normal products under normal operating conditions from normal raw materials while burning hazardous waste;
- (3) Test burn protocol to confirm the baseline HC (and CO) level including information on the type and flow rate of all feedstreams, point of introduction of all feedstreams, total organic carbon content (or other appropriate measure of organic content) of all nonfuel feedstreams, and operating conditions that affect combustion of fuels and destruction of hydrocarbon emissions from nonfuel sources;
- (4) Trial burn plan to:
 - (i) Demonstrate that flue gas HC (and CO) concentrations when burning hazardous waste do not exceed the baseline HC (and CO) level; and
 - (ii) Identify the types and concentrations of organic compounds listed in appendix VIII, part 261 of this chapter, that are emitted when burning hazardous waste in conformance with procedures prescribed by the Director;
- (5) Implementation plan to monitor over time changes in the operation of the facility that could reduce the baseline HC level and procedures to periodically confirm the baseline HC level; and
- (6) Such other information as the Director finds necessary to achieve the purposes of this paragraph.

- (c) *Alternative metals implementation approach.* When seeking to be permitted under an alternative metals implementation approach under §266.106(f) of this chapter, the owner or operator must submit documentation specifying how the approach ensures compliance with the metals emissions standards of §266.106(c) or (d) and how the approach can be effectively implemented and monitored. Further, the owner or operator shall provide such

other information that the Director finds necessary to achieve the purposes of this paragraph.

(d) *Automatic waste feed cutoff system.* Owners and operators shall submit information describing the automatic waste feed cutoff system, including any pre-alarm systems that may be used.

(e) *Direct transfer.* Owners and operators that use direct transfer operations to feed hazardous waste from transport vehicles (containers, as defined in §266.111 of this chapter) directly to the boiler or industrial furnace shall submit information supporting conformance with the standards for direct transfer provided by §266.111 of this chapter.

(f) *Residues.* Owners and operators that claim that their residues are excluded from regulation under the provisions of §266.112 of this chapter must submit information adequate to demonstrate conformance with those provisions.

(56 FR 7235, Feb. 21, 1991; 56 FR 32631, July 17, 1991)

§270.23 Specific part B information requirements for miscellaneous units.

Except as otherwise provided in §264.600, owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units must provide the following additional information:

(a) A detailed description of the unit being used or proposed for use, including the following:

- (1) Physical characteristics, materials of construction, and dimensions of the unit;
- (2) Detailed plans and engineering reports describing how the unit will be located, designed, constructed, operated, maintained, monitored, inspected, and closed to comply with the requirements of §§264.601 and 264.602; and

- (3) For disposal units, a detailed description of the plans to comply with the post-closure requirements of §264.603.
- (b) Detailed hydrologic, geologic, and meteorologic assessments and land-use maps for the region surrounding the site that address and ensure compliance of the unit with each factor in the environmental performance standards

of §264.601. If the applicant can demonstrate that he does not violate the environmental performance standards of §264.601 and the Director agrees with such demonstration, preliminary hydrologic, geologic, and meteorologic assessments will suffice.

(c) Information on the potential pathways of exposure of humans or environmental receptors to hazardous waste or hazardous constituents and on the potential magnitude and nature of such exposures.

(d) For any treatment unit, a report on a demonstration of the effectiveness of the treatment based on laboratory or field data.

(e) Any additional information determined by the Director to be necessary for evaluation of compliance of the unit with the environmental performance standards of §264.601.

§270.24 Specific part B information requirements for process vents.

Except as otherwise provided in §264.1, owners and operators of facilities that have process vents to which subpart AA of part 264 applies must provide the following additional information:

(a) For facilities that cannot install a closed-vent system and control device to comply with the provisions of 40 CFR 264 subpart AA on the effective date that the facility becomes subject to the provisions of 40 CFR 264 or 265 subpart AA, an implementation schedule as specified in §264.1033(a)(2).

(b) Documentation of compliance with the process vent standards in §264.1032, including:

- (1) Information and data identifying all affected process vents, annual throughput and operating hours of each affected unit, estimated emission rates for each affected vent and for the overall facility (i.e., the total emissions for all affected vents at the facility), and the approximate location within the facility of each affected unit (e.g., identify the hazardous waste management units on a facility plot plan).
- (2) Information and data supporting estimates of vent emissions and emission reduction achieved by add-on control devices based on engineering calculations or source tests. For the pur-

pose of determining compliance, estimates of vent emissions and emission reductions must be made using operating parameter values (e.g., temperatures, flow rates, or concentrations) that represent the conditions that exist when the waste management unit is operating at the highest load or capacity level reasonably expected to occur.

(3) Information and data used to determine whether or not a process vent is subject to the requirements of § 264.1032.

(c) Where an owner or operator applies for permission to use a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system to comply with the requirements of § 264.1032, and chooses to use test data to determine the organic removal efficiency or the total organic compound concentration achieved by the control device, a performance test plan as specified in § 264.1035(b)(3).

(d) Documentation of compliance with § 264.1033, including:

(1) A list of all information references and sources used in preparing the documentation.

(2) Records, including the dates, of each compliance test required by § 264.1033(k).

(3) A design analysis, specifications, drawings, schematics, and piping and instrumentation diagrams based on the appropriate sections of "ATPI Course 415: Control of Gaseous Emissions" (incorporated by reference as specified in § 260.11) or other engineering texts acceptable to the Regional Administrator that present basic control device design information. The design analysis shall address the vent stream characteristics and control device operation parameters as specified in § 264.1035 (b)(4)(iii).

(4) A statement signed and dated by the owner or operator certifying that the operating parameters used in the design analysis reasonably represent the conditions that exist when the hazardous waste management unit is or would be operating at the highest load or capacity level reasonably expected to occur.

(5) A statement signed and dated by the owner or operator certifying that the control device is designed to operate at an efficiency of 95 weight percent or greater unless the total organic emission limits of § 264.1032(a) for affected process vents at the facility can be attained by a control device involving vapor recovery at an efficiency less than 95 weight percent.

[55 FR 25518, June 21, 1990, as amended at 55 FR 19290, Apr. 26, 1991]

§ 270.25 Specific part B information requirements for equipment.

Except as otherwise provided in § 264.1, owners and operators of facilities that have equipment to which subpart BB of part 264 applies must provide the following additional information:

(a) For each piece of equipment to which subpart BB of part 264 applies:

(1) Equipment identification number and hazardous waste management unit identification.

(2) Approximate locations within the facility (e.g., identify the hazardous waste management unit on a facility plot plan).

(3) Type of equipment (e.g., a pump or pipeline valve).

(4) Percent by weight total organics in the hazardous waste stream at the equipment.

(5) Hazardous waste state at the equipment (e.g., gas/vapor or liquid).

(6) Method of compliance with the standard (e.g., "monthly leak detection and repair" or "equipped with dual mechanical seals").

(b) For facilities that cannot install a closed-vent system and control device to comply with the provisions of 40 CFR 264 subpart BB on the effective date that the facility becomes subject to the provisions of 40 CFR 264 or 265 subpart BB, an implementation schedule as specified in § 264.1033(a)(2).

(c) Where an owner or operator applies for permission to use a control device other than a thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system and chooses to use test data to determine the organic removal efficiency or the total organic compound concentration achieved by the control device, a per-

Environmental Protection Agency

formance test plan as specified in § 264.1035(b)(3).

(d) Documentation that demonstrates compliance with the equipment standards in §§ 264.1032 to 264.1059. This documentation shall contain the records required under § 264.1064. The Regional Administrator may request further documentation before deciding if compliance has been demonstrated.

(e) Documentation to demonstrate compliance with § 264.1060 shall include the following information:

(1) A list of all information references and sources used in preparing the documentation.

(2) Records, including the dates, of each compliance test required by § 264.1033(j).

(3) A design analysis, specifications, drawings, schematics, and piping and instrumentation diagrams based on the appropriate sections of "ATPI Course 415: Control of Gaseous Emissions" (incorporated by reference as specified in § 260.11) or other engineering texts acceptable to the Regional Administrator that present basic control device design information. The design analysis shall address the vent stream characteristics and control device operation parameters as specified in § 264.1035(b)(4)(iii).

(4) A statement signed and dated by the owner or operator certifying that the operating parameters used in the design analysis reasonably represent the conditions that exist when the hazardous waste management unit is operating at the highest load or capacity level reasonably expected to occur.

(5) A statement signed and dated by the owner or operator certifying that the control device is designed to operate at an efficiency of 95 weight percent or greater.

[55 FR 25518, June 21, 1990, as amended at 55 FR 19290, Apr. 26, 1991]

§ 270.26 Special part B information requirements for drip pads.

Except as otherwise provided by § 264.1 of this chapter, owners and operators of hazardous waste treatment, storage, or disposal facilities that collect, store, or treat hazardous waste on drip pads must provide the following additional information:

(a) A list of hazardous wastes placed or to be placed on each drip pad.

(b) If an exemption is sought to subpart F of part 264 of this chapter, as provided by § 264.90 of this chapter, detailed plans and an engineering report describing how the requirements of § 264.90(b)(2) of this chapter will be met.

(c) Detailed plans and an engineering report describing how the drip pad is or will be designed, constructed, operated and maintained to meet the requirements of § 264.573 of this chapter, including the as-built drawings and specifications. This submission must address the following items as specified in § 264.571 of this chapter:

(1) The design characteristics of the drip pad;

(2) The liner system;

(3) The leakage detection system, including the leak detection system and how it is designed to detect the failure of the drip pad or the presence of any releases of hazardous waste or accumulated liquid at the earliest/practicable time;

(4) Practices designed to maintain drip pads;

(5) The associated collection system;

(6) Control of run-on to the drip pad;

(7) Control of run-off from the drip pad;

(8) The interval at which dripage and other materials will be removed from the associated collection system and a statement demonstrating that the interval will be sufficient to prevent overflow onto the drip pad;

(9) Procedures for cleaning the drip pad at least once every seven days to ensure the removal of any accumulated residues of waste or other materials, including but not limited to rinsing, washing with detergents or other appropriate solvents, or steam cleaning and provisions for documenting the date, time, and cleaning procedure used each time the pad is cleaned.

(10) Operating practices and procedures that will be followed to ensure that tracking of hazardous waste or waste constituents off the drip pad due to activities by personnel or equipment is minimized;

(11) Procedures for ensuring that, after removal from the treatment vessel, treated wood from pressure and non-pressure processes is held on the

(see § 144.6) injecting hazardous wastes within a State in which no UIC program has been approved or promulgated. Any such permit shall apply and insure compliance with all applicable requirements of 40 CFR part 264, subpart R (RCRA standards for wells), and shall be for a term not to exceed two years. No such permit shall be issued after approval or promulgation of a UIC program in the State. Any permit under this section shall contain a condition providing that it will terminate upon final action by the Director under a UIC program to issue or deny a UIC permit for the facility.

(48 FR 14223, Apr. 1, 1983; 48 FR 30114, June 30, 1983)

§ 270.65 Research, development, and demonstration permits.

(a) The Administrator may issue a research, development, and demonstration permit for any hazardous waste treatment facility which proposes to utilize an innovative and experimental hazardous waste treatment technology or process for which permit standards for such experimental activity have not been promulgated under part 264 or 266. Any such permit shall include such terms and conditions as will assure protection of human health and the environment. Such permits:

(1) Shall provide for the construction of such facilities as necessary, and for operation of the facility for not longer than one year unless renewed as provided in paragraph (d) of this section, and

(2) Shall provide for the receipt and treatment by the facility of only those types and quantities of hazardous waste which the Administrator deems necessary for purposes of determining the efficacy and performance capabilities of the technology or process and the effects of such technology or process on human health and the environment, and

(3) Shall include such requirements as the Administrator deems necessary to protect human health and the environment (including, but not limited to, requirements regarding monitoring, operation, financial responsibility, closure, and remedial action), and such requirements as the Administrator deems necessary regarding testing and

providing of information to the Administrator with respect to the operation of the facility.

(b) For the purpose of expediting review and issuance of permits under this section, the Administrator may, consistent with the protection of human health and the environment, modify or waive permit application and permit issuance requirements in parts 124 and 270 except that there may be no modification or waiver of regulations regarding financial responsibility (including insurance) or of procedures regarding public participation.

(c) The Administrator may order an immediate termination of all operations at the facility at any time he determines that termination is necessary to protect human health and the environment.

(d) Any permit issued under this section may be renewed not more than three times. Each such renewal shall be for a period of not more than 1 year.

(50 FR 28752, July 15, 1985)

§ 270.66 Permits for boilers and industrial furnaces burning hazardous waste.

(a) General. Owners and operators of new boilers and industrial furnaces (those not operating under the interim status standards of § 266.103 of this chapter) are subject to paragraphs (b) through (f) of this section. Boilers and industrial furnaces operating under the interim status standards of § 266.103 of this chapter are subject to paragraph (g) of this section.

(b) Permit operating periods for new boilers and industrial furnaces. A permit for a new boiler or industrial furnace shall specify appropriate conditions for the following operating periods:

(1) *Pretrial burn period.* 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 boiler or industrial furnace to a point of operational readiness to conduct a trial burn, not to exceed 720 hours operating time when burning hazardous waste, the Director must establish in the Pretrial Burn Period of the permit conditions, including but not limited to, allowable hazardous waste feed rates and operating conditions. The Di-

a minimum, restrictions on the operating requirements provided by § 266.102(e) of this chapter.

(iii) The Director will review this statement and any other relevant information submitted with part B of the permit application and specify requirements for this period sufficient to meet the performance standards of § 266.104 through 266.107 of this chapter based on his/her engineering judgment.

(4) *Final permit period.* For the final period of operation, the Director will develop operating requirements in conformance with § 266.102(e) of this chapter that reflect conditions in the trial burn plan and are likely to ensure compliance with the performance standards of § 266.104 through 266.107 of this chapter. Based on the trial burn results, the Director shall make any necessary modifications to the operating requirements to ensure compliance with the performance standards. The permit modification shall proceed according to § 270.42.

(c) *Requirements for trial burn plans.* The trial burn plan must include the following information. The Director, in reviewing the trial burn plan, shall evaluate the sufficiency of the information provided and may require the applicant to supplement this information, if necessary, to achieve the purposes of this paragraph:

(1) An analysis of each feed stream, including hazardous waste, other fuels, and industrial furnace feed stocks, as fired, that includes:

(i) Heating value, levels of antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver, thallium, total chlorine/chloride, and ash;

(ii) Viscosity or description of the physical form of the feed stream;

(2) An analysis of each hazardous waste, as fired, including:

(i) An identification of any hazardous organic constituents listed in appendix VIII, part 261, of this chapter that are present in the feed stream, except that the applicant need not analyze for constituents listed in appendix VIII that would reasonably not be expected to be found in the hazardous waste. The constituents excluded from analysis must be identified and the basis for this exclusion explained. The waste analysis must be conducted in accordance with

the waste analysis method specified in appendix VIII, part 261, of this chapter, except that the applicant need not analyze for constituents listed in appendix VIII that would reasonably not be expected to be found in the hazardous waste. The constituents excluded from analysis must be identified and the basis for this exclusion explained. The waste analysis must be conducted in accordance with

the Director may extend the duration of this operational period once, for up to 720 additional hours, at the request of the applicant when good cause is shown. The permit may be modified to reflect the extension according to § 270.42.

(i) Applicants must submit a statement, with part B of the permit application, that suggests the conditions necessary to operate in compliance with the standards of § 266.104 through 266.107 of this chapter during this period. This statement should include, at a minimum, restrictions on the applicable operating requirements identified in § 266.102(e) of this chapter.

(ii) The Director will review this statement and any other relevant information submitted with part B of the permit application and specify requirements for this period sufficient to meet the performance standards of § 266.104 through 266.107 of this chapter based on his/her engineering judgment.

(2) *Trial burn period.* For the duration of the trial burn, the Director must establish conditions in the permit for the purposes of determining feasibility of compliance with the performance standards of § 266.104 through 266.107 of this chapter and determining adequate operating conditions under § 266.102(e) of this chapter. Applicants must propose a trial burn plan, prepared under paragraph (c) of this section, to be submitted with part B of the permit application.

(3) *Post-trial burn period.* (i) For the period immediately following completion of the trial burn, and only for the minimum period sufficient to allow sample analysis, data computation, and submission of the trial burn results by the applicant, and review of the trial burn results and modification of the facility permit by the Director to reflect the trial burn results, the Director will establish the operating requirements most likely to ensure compliance with the performance standards of § 266.104 through 266.107 of this chapter based on his engineering judgment.

(ii) Applicants must submit a statement, with part B of the application, that identifies the conditions necessary to operate during this period in compliance with the performance standards of § 266.104 through 266.107 of this chapter. This statement should include, at

analytical techniques specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter and §270.6, or their equivalent.

(ii) An approximate quantification of the hazardous constituents identified in the hazardous waste, within the precision produced by the analytical methods specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter and §270.6, or other equivalent.

(iii) A description of blending procedures, if applicable, prior to firing the hazardous waste, including a detailed analysis of the hazardous waste prior to blending, an analysis of the material with which the hazardous waste is blended, and blending ratios.

(3) A detailed engineering description of the boiler or industrial furnace, including:

(i) Manufacturer's name and model number of the boiler or industrial furnace;

(ii) Type of boiler or industrial furnace;

(iii) Maximum design capacity in appropriate units;

(iv) Description of the feed system for the hazardous waste, and, as appropriate, other fuels and industrial furnace feedstocks;

(v) Capacity of hazardous waste feed system;

(vi) Description of automatic hazardous waste feed cutoff system(s);

(vii) Description of any air pollution control system; and

(viii) Description of stack gas monitoring and any pollution control monitoring systems.

(4) A detailed description of sampling and monitoring procedures including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis.

(5) A detailed test schedule for each hazardous waste for which the trial burn is planned, including date(s), duration, quantity of hazardous waste to be burned, and other factors relevant

to the Director's decision under paragraph (b)(2) of this section.

(6) A detailed test protocol, including, for each hazardous waste identified, the ranges of hazardous waste feed rate, and, as appropriate, the feed rates of other fuels and industrial furnace feedstocks, and any other relevant parameters that may affect the ability of the boiler or industrial furnace to meet the performance standards in §266.104 through 266.107 of this chapter.

(7) A description of, and planned operating conditions for, any emission control equipment that will be used.

(8) Procedures for rapidly stopping the hazardous waste feed and controlling emissions in the event of an equipment malfunction.

(9) Such other information as the Director reasonably finds necessary to determine whether to approve the trial burn plan in light of the purposes of this paragraph and the criteria in paragraph (b)(2) of this section.

(d) *Trial burn procedures.* (1) A trial burn must be conducted to demonstrate conformance with the standards of §§266.104 through 266.107 of this chapter under an approved trial burn plan.

(2) The Director shall approve a trial burn plan if he/she finds that:

(i) The trial burn is likely to determine whether the boiler or industrial furnace can meet the performance standards of §§266.104 through 266.107 of this chapter;

(ii) The trial burn itself will not present an imminent hazard to human health and the environment;

(iii) The trial burn will help the Director to determine operating requirements to be specified under §266.102(e) of this chapter; and

(iv) The information sought in the trial burn cannot reasonably be developed through other means.

(3) The applicant must submit to the Director a certification that the trial burn has been carried out in accordance with the approved trial burn plan, and must submit the results of all the determinations required in paragraph (c) of this section. This submission shall be made within 90 days of completion of the trial burn, or later if approved by the Director.

(4) All data collected during any trial burn must be submitted to the Director following completion of the trial burn.

(5) All submissions required by this paragraph must be certified on behalf of the applicant by the signature of a person authorized to sign a permit application or a report under §270.11.

(e) *Special procedures for DRE trial burns.* When a DRE trial burn is required under §266.104(a) of this chapter, the Director will specify (based on the hazardous waste analysis data and other information in the trial burn plan) as trial Principal Organic Hazardous Constituents (POHCs) those compounds for which destruction and removal efficiencies must be calculated during the trial burn. These trial POHCs will be specified by the Director based on information including his/her estimate of the difficulty of destroying the constituents identified in the hazardous waste analysis, their concentrations or mass in the hazardous waste feed, and, for hazardous waste containing or derived from wastes listed in part 261, subpart D of this chapter, the hazardous waste organic constituent(s) identified in Appendix VII of that part as the basis for listing.

(f) *Determinations based on trial burn.* During each approved trial burn (or as soon after the burn as is practicable), the applicant must make the following determinations:

(1) A quantitative analysis of the levels of antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, thallium, silver, and chlorine/chloride, in the feed streams (hazardous waste, other fuels, and industrial furnace feedstocks);

(2) When a DRE trial burn is required under §266.104(a) of this chapter:

(i) A quantitative analysis of the trial POHCs in the hazardous waste feed;

(ii) A quantitative analysis of the stack gas for the concentration and mass emissions of the trial POHCs; and

(iii) A computation of destruction and removal efficiency (DRE), in accordance with the DRE formula specified in §266.104(a) of this chapter;

(3) When a trial burn for chlorinated dioxins and furans is required under §266.104(e) of this chapter, a quantitative analysis of the stack gas for

the concentration and mass emission rate of the 2,3,7,8-chlorinated tetraocta congeners of chlorinated dibenzop-dioxins and furans, and a computation showing conformance with the emission standard;

(4) When a trial burn for particulate matter, metals, or HCl/Cl₂ is required under §§266.105, 266.106 (c) or (d), or 266.107 (b)(2) or (c) of this chapter, a quantitative analysis of the stack gas for the concentrations and mass emissions of particulate matter, metals, or hydrogen chloride (HCl) and chlorine (Cl₂), and computations showing conformance with the applicable emission performance standards;

(5) When a trial burn for DRE, metals, or HCl/Cl₂ is required under §§266.104(a), 266.106 (c) or (d), or 266.107 (b)(2) or (c) of this chapter, a quantitative analysis of the scrubber water (if any), ash residues, other residues, and products for the purpose of estimating the fate of the trial POHCs, metals, and chlorine/chloride;

(6) An identification of sources of fugitive emissions and their means of control;

(7) A continuous measurement of carbon monoxide (CO), oxygen, and where required, hydrocarbons (HC), in the stack gas; and

(8) Such other information as the Director may specify as necessary to ensure that the trial burn will determine compliance with the performance standards in §§266.104 through 266.107 of this chapter and to establish the operating conditions required by §266.102(c) of this chapter as necessary to meet those performance standards.

(g) *Interim status boilers and industrial furnaces.* For the purpose of determining feasibility of compliance with the performance standards of §§266.104 through 266.107 of this chapter and of determining adequate operating conditions under §266.103 of this chapter, applicants owning or operating existing boilers or industrial furnaces operated under the interim status standards of §266.103 must either prepare and submit a trial burn plan and perform a trial burn in accordance with the requirements of this section or submit other information as specified in §270.22(a)(6). Applicants who submit a trial burn plan and receive approval be-

fore submission of the part B permit application must complete the trial burn and submit the results specified in paragraph (f) of this section with the part B permit application. If completion of this process conflicts with the date set for submission of the part B application, the applicant must contact the Director to establish a later date for submission of the part B application or the trial burn results. If the applicant submits a trial burn plan with part B of the permit application, the trial burn must be conducted and the results submitted within a time period prior to permit issuance to be specified by the Director.

(56 FR 7239, Feb. 21, 1991; 56 FR 32392, July 17, 1991, as amended at 59 FR 46051, Aug. 31, 1993)

Subpart G—Interim Status

§ 270.70 Qualifying for interim status.

(a) Any person who owns or operates an "existing HWM facility" or a facility in existence on the effective date of statutory or regulatory amendments under the Act that render the facility subject to the requirement to have an RCRA permit shall have interim status and shall be treated as having been issued a permit to the extent he or she has:

(1) Complied with the requirements of section 3010(a) of RCRA pertaining to notification of hazardous waste activity.

(Comment: Some existing facilities may not be required to file a notification under section 3010(a) of RCRA. These facilities may qualify for interim status by meeting paragraph (a)(2) of this section.)

(2) Complied with the requirements of § 270.10 governing submission of part A applications;

(b) Failure to qualify for interim status. If EPA has reason to believe upon examination of a part A application that it fails to meet the requirements of § 270.13, it shall notify the owner or operator in writing of the apparent deficiency. Such notice shall specify the grounds for EPA's belief that the application is deficient. The owner or operator shall have 30 days from receipt to respond to such a notification and to explain or cure the alleged deficiency in his part A application. If, after such

notification and opportunity for response, EPA determines that the application is deficient it may take appropriate enforcement action.

(c) Paragraph (a) of this section shall not apply to any facility which has been previously denied a RCRA permit or if authority to operate the facility under RCRA has been previously terminated.

(48 FR 14223, Apr. 1, 1983, as amended at 49 FR 17718, Apr. 24, 1984; 50 FR 28753, July 15, 1985)

§ 270.71 Operation during interim status.

(a) During the interim status period the facility shall not:

(1) Treat, store, or dispose of hazardous waste not specified in part A of the permit application;

(2) Employ processes not specified in part A of the permit application; or

(3) Exceed the design capacities specified in part A of the permit application.

(b) Interim status standards. During interim status, owners or operators shall comply with the interim status standards at 40 CFR part 265.

§ 270.72 Changes during interim status.

(a) Except as provided in paragraph (b), the owner or operator of an interim status facility may make the following changes at the facility:

(1) Treatment, storage, or disposal of new hazardous wastes not previously identified in part A of the permit application (and, in the case of newly listed or identified wastes, addition of the units being used to treat, store, or dispose of the hazardous wastes on the effective date of the listing or identification) if the owner or operator submits a revised part A permit application prior to such treatment, storage, or disposal;

(2) Increases in the design capacity of processes used at the facility if the owner or operator submits a revised part A permit application prior to such a change (along with a justification explaining the need for the change) and the Director approves the changes because:

(1) There is a lack of available treatment, storage, or disposal capacity at

other hazardous waste management facilities, or

(1) The change is necessary to comply with a Federal, State, or local requirement.

(3) Changes in the processes for the treatment, storage, or disposal of hazardous waste or addition of processes if the owner or operator submits a revised part A permit application prior to such change (along with a justification explaining the need for the change) and the Director approves the change because:

(i) The change is necessary to prevent a threat to human health and the environment because of an emergency situation, or

(ii) The change is necessary to comply with a Federal, State, or local requirement.

(4) Changes in the ownership or operational control of a facility if the new owner or operator submits a revised part A permit/application no later than 90 days prior to the scheduled change. When a transfer of operational control of a facility occurs, the old owner or operator shall comply with the requirements of 40 CFR part 265, subpart II (Financial Requirements), until the new owner or operator has demonstrated to the Director that he is complying with the requirements of that subpart. The new owner or operator must demonstrate compliance with subpart II requirements within six months of the date of the change in ownership or operational control of the facility. Upon demonstration to the Director by the new owner or operator of compliance with subpart II, the Director shall notify the old owner or operator in writing that he no longer needs to comply with subpart II as of the date of demonstration. All other interim status duties are transferred effective immediately upon the date of the change in ownership or operational control of the facility.

(5) Changes made in accordance with an interim status corrective action order issued by EPA under section 3008(h) or other Federal authority, by an authorized State under comparable State authority, or by a court in a judicial proceeding brought by EPA or an authorized State, provided that such changes are limited to the treatment, storage, or disposal of solid waste from releases that originate within the boundary of the facility.

ment, storage, or disposal of solid waste from releases that originate within the boundary of the facility.

(6) Addition of newly regulated units for the treatment, storage, or disposal of hazardous waste if the owner or operator submits a revised part A permit application on or before the date on which the unit becomes subject to the new requirements.

(b) Except as specifically allowed under paragraph (a) of this section may not be made if they amount to reconstruction of the hazardous waste management facility. Reconstruction occurs when the capital investment in the changes to the facility exceeds 50 percent of the capital cost of a comparable entirely new hazardous waste management facility. If all other requirements are met, the following changes may be made even if they amount to a reconstruction:

(1) Changes made solely for the purposes of complying with the requirements of 40 CFR 265.193 for tanks and ancillary equipment.

(2) If necessary to comply with Federal, State, or local requirements, changes to an existing unit, changes solely involving tanks or containers, or addition of replacement surface impoundments that satisfy the standards of section 3004(o).

(3) Changes that are necessary to allow owners or operators to continue handling newly listed or identified hazardous wastes that have been treated, stored, or disposed of at the facility prior to the effective date of the rule establishing the new listing or identification.

(4) Changes during closure of a facility or of a unit within a facility made in accordance with an approved closure plan.

(5) Changes necessary to comply with an interim status corrective action order issued by EPA under section 3008(h) or other Federal authority, by an authorized State under comparable State authority, or by a court in a judicial proceeding brought by EPA or an authorized State, provided that such changes are limited to the treatment, storage, or disposal of solid waste from releases that originate within the boundary of the facility.

(i) Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

(ii) Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids for sale; or

(iii) Used oil-fired space heaters provided that the burner meets the provisions of § 279.23.

(3) Hazardous waste incinerators subject to regulation under subpart O of parts 264 or 265 of this chapter.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 26425, May 3, 1993]

Subpart C—Standards for Used Oil Generators

§ 279.20 Applicability.

(a) *General.* Except as provided in paragraphs (a)(1) through (a)(4) of this section, this subpart applies to all used oil generators. A used oil generator is any person, by site, whose act or process produces used oil or whose act first causes used oil to become subject to regulation.

(1) *Household "do-it-yourselfer" used oil generators.* Household "do-it-yourselfer" used oil generators are not subject to regulation under this part.

(2) *Vessels.* Vessels at sea or at port are not subject to this subpart. For purposes of this subpart, used oil produced on vessels from normal shipboard operations is considered to be "generated at the time it is transported ashore." The owner or operator of the vessel and the person(s) removing or accepting used oil from the vessel are co-generators of the used oil and are both responsible for managing the waste in compliance with this subpart once the used oil is transported ashore. The co-generators may decide among them which party will fulfill the requirements of this subpart.

(3) *Diesel fuel.* Mixtures of used oil and diesel fuel mixed by the generator of the used oil for use in the generator's own vehicles are not subject to this part once the used oil and diesel fuel have been mixed. Prior to mixing, the used oil fuel is subject to the requirements of this subpart.

(4) *Farmers.* Farmers who generate an average of 25 gallons per month or less of used oil from vehicles or machinery used on the farm in a calendar year are not subject to the requirements of this part.

(b) *Other applicable provisions.* Used oil generators who conduct the following activities are subject to the requirements of other applicable provisions of this part as indicated in paragraphs (b)(1) through (5) of this section:

(1) Generators who transport used oil, except under the self-transport provisions of § 279.24 (a) and (b), must also comply with subpart E of this part.

(2) (i) Except as provided in paragraph (b)(2)(ii) of this section, generators who process or re-refine used oil must also comply with subpart F of this part.

(ii) Generators who perform the following activities are not processors provided that the used oil is generated on-site and is not being sent off-site to a burner of on- or off-specification used oil fuel.

(A) Filtering, cleaning, or otherwise reconditioning used oil before returning it for reuse by the generator;

(B) Separating used oil from wastewater generated on-site to make the wastewater acceptable for discharge or reuse pursuant to section 402 or section 307(b) of the Clean Water Act or other applicable Federal or state regulations governing the management or discharge of wastewaters;

(C) Using oil mist collectors to remove small droplets of used oil from in-plant air to make plant air suitable for continued recirculation;

(D) Draining or otherwise removing used oil from materials containing or otherwise contaminated with used oil in order to remove excessive oil to the extent possible pursuant to § 279.10(c); or

(E) Filtering, separating or otherwise reconditioning used oil before burning it in a space heater pursuant to § 279.23.

(3) Generators who burn off-specification used oil for energy recovery, except under the on-site space heater provisions of § 279.23, must also comply with subpart G of this part.

(4) Generators who direct shipments of off-specification used oil from their facility to a used oil burner or first

claim that used oil that is to be burned for energy recovery meets the used oil fuel specifications set forth in § 279.11 must also comply with subpart H of this part.

(b) Generators who dispose of used oil, including the use of used oil as a dust suppressant, must also comply with subpart I of this part.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 10560, Mar. 4, 1994]

§ 279.21 Hazardous waste mixing.

(a) Mixtures of used oil and hazardous waste must be managed in accordance with § 279.10(b).

(b) The rebuttable presumption for used oil of § 279.10(b)(1)(ii) applies to the oil managed by generators. Under the rebuttable presumption for used oil of § 279.10(b)(1)(ii), used oil containing greater than 1,000 ppm total halogens is presumed to be a hazardous waste and thus must be managed as hazardous waste and not as used oil unless the rebuttable presumption does not apply to certain metalworking oils/ fluids and certain used oils removed from refrigeration units.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 26425, May 3, 1993]

§ 279.22 Used oil storage.

Used oil generators are subject to all applicable Spill Prevention, Control and Countermeasures (40 CFR part 112) in addition to the requirements of this Subpart. Used oil generators are also subject to the Underground Storage Tank (40 CFR part 280) standards for used oil stored in underground tanks whether or not the used oil exhibits any characteristics of hazardous waste, in addition to the requirements of this subpart.

(a) *Storage units.* Used oil generators shall not store used oil in units other than tanks, containers, or units subject to regulation under parts 264 or 265 of this chapter.

(b) *Condition of units.* Containers and aboveground tanks used to store used oil at generator facilities must be:

- (1) In good condition (no severe rusting, apparent structural defects or deterioration); and
- (2) Not leaking (no visible leaks).

(c) *Labels.* (1) Containers and aboveground tanks used to store used oil at generator facilities must be labeled or marked clearly with the words "Used Oil."

(2) Fill pipes used to transfer used oil into underground storage tanks at generator facilities must be labeled or marked clearly with the words "Used Oil."

(d) *Response to releases.* Upon detection of a release of used oil to the environment not subject to the requirements of part 280, subpart F of this chapter which has occurred after the effective date of the authorized used oil program for the State in which the release is located, a generator must perform the following cleanup steps:

- (1) Stop the release;
- (2) Contain the released used oil;
- (3) Clean up and manage properly the released used oil and other materials; and
- (4) If necessary to prevent future releases, repair or replace any leaking used oil storage containers or tanks prior to returning them to service.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 26425, May 3, 1993]

§ 279.23 On-site burning in space heaters.

Generators may burn used oil in used oil-fired space heaters provided that:

- (a) The heater burns only used oil that the owner or operator generates or used oil received from household do-it-yourself used oil generators;
- (b) The heater is designed to have a maximum capacity of not more than 0.5 million Btu per hour; and
- (c) The combustion gases from the heater are vented to the ambient air.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 26425, May 3, 1993]

§ 279.24 Off-site shipments.

Except as provided in paragraphs (a) through (c) of this section, generators must ensure that their used oil is transported only by transporters who have obtained EPA identification numbers.

(a) *Self-transportation of small amounts to approved collection centers.* Generators may transport, without an EPA identification number, used oil that is generated at the generator's site and

used oil collected from household do-it-yourselfers to a used oil collection center provided that:

- (1) The generator transports the used oil in a vehicle owned by the generator or owned by an employee of the generator;
 - (2) The generator transports no more than 55 gallons of used oil at any time; and
 - (3) The generator transports the used oil to a used oil collection center that is registered, licensed, permitted, or recognized by a state/county/municipal government to manage used oil.
- (b) *Self-transportation of small amounts to aggregation points owned by the generator.* Generators may transport, without an EPA identification number, used oil that is generated at the generator's site to an aggregation point provided that:

- (1) The generator transports the used oil in a vehicle owned by the generator or owned by an employee of the generator;
- (2) The generator transports no more than 55 gallons of used oil at any time; and
- (3) The generator transports the used oil to an aggregation point that is owned and/or operated by the same generator.

(c) *Tolling arrangements.* Used oil generators may arrange for used oil to be transported by a transporter without an EPA identification number if the used oil is reclaimed under a contractual agreement pursuant to which reclaimed oil is returned by the processor/refiner to the generator for use as a lubricant, cutting oil, or coolant. The contract (known as a "tolling arrangement") must indicate:

- (1) The type of used oil and the frequency of shipments;
- (2) That the vehicle used to transport the used oil to the processing/re-refining facility and to deliver recycled used oil back to the generator is owned and operated by the used oil processor/refiner; and
- (3) That reclaimed oil will be returned to the generator.

Subpart D—Standards for Used Oil Collection Centers and Aggregation Points

§ 279.30 Do-it-yourselfer used oil collection centers.

(a) *Applicability.* This section applies to owners or operators of all do-it-yourselfer (DIY) used oil collection centers. A DIY used oil collection center is any site or facility that accepts aggregates and stores used oil collected only from household do-it-yourselfers.

(b) *DIY used oil collection center requirements.* Owners or operators of DIY used oil collection centers must comply with the generator standards in subpart C of this part.

§ 279.31 Used oil collection centers.

(a) *Applicability.* This section applies to owners or operators of used oil collection centers. A used oil collection center is any site or facility that accepts/aggregates and stores used oil collected from used oil generators regulated under subpart C of this part who bring used oil to the collection center in shipments of no more than 55 gallons under the provisions of § 279.24(a). Used oil collection centers may also accept used oil from household do-it-yourselfers.

(b) *Used oil collection center requirements.* Owners or operators of all used oil collection centers must:

- (1) Comply with the generator standards in subpart C of this part; and
- (2) Be registered/licensed/permitted/recognized by a state/county/municipal government to manage used oil.

§ 279.32 Used oil aggregation points owned by the generator.

(a) *Applicability.* This section applies to owners or operators of all used oil aggregation points. A used oil aggregation point is any site or facility that accepts, aggregates, and/or stores used oil collected only from other used oil generation sites owned or operated by the owner or operator of the aggregation point, from which used oil is transported to the aggregation point in shipments of no more than 55 gallons under the provisions of § 279.24(b). Used

Environmental Protection Agency

oil aggregation points may also accept used oil from household do-it-yourselfers.

(b) *Used oil aggregation point requirements.* Owners or operators of all used oil aggregation points must comply with the generator standards in subpart C of this part.

Subpart E—Standards for Used Oil Transporter and Transfer Facilities

§ 279.40 Applicability.

(a) *General.* Except as provided in paragraphs (a)(1) through (a)(4) of this section, this subpart applies to all used oil transporters. Used oil transporters are persons who transport used oil, persons who collect used oil from more than one generator and transport the collected oil, and owners and operators of used oil transfer facilities.

(1) This subpart does not apply to on-site transportation.

(2) This subpart does not apply to generators who transport shipments of used oil totalling 55 gallons or less from the generator to a used oil collection center as specified in § 279.24(a).

(3) This subpart does not apply to generators who transport shipments of used oil totalling 55 gallons or less from the generator to a used oil aggregation point owned or operated by the same generator as specified in § 279.24(b).

(4) This subpart does not apply to transportation of used oil from household do-it-yourselfers to a regulated used oil generator, collection center, aggregation point, processor/refiner, or burner subject to the requirements of this part. Except as provided in paragraphs (a)(1) through (a)(3) of this section, this subpart does, however, apply to transportation of collected household do-it-yourselfer used oil from regulated used oil generators, collection centers, aggregation points, or other facilities where household do-it-yourselfer used oil is collected.

(b) *Imports and exports.* Transporters who import used oil from abroad or export used oil outside of the United States are subject to the requirements of this subpart from the time the used oil enters and until the time it exits the United States.

(c) *Trucks used to transport hazardous waste.* Unless trucks previously used to transport hazardous waste are emptied as described in § 261.7 of this chapter prior to transporting used oil, the used oil is considered to have been mixed with the hazardous waste and must be managed as hazardous waste unless, under the provisions of § 279.10(b), the hazardous waste/used oil mixture is determined not to be hazardous waste.

(d) *Other applicable provisions.* Used oil transporters who conduct the following activities are also subject to other applicable provisions of this part as indicated in paragraphs (d)(1) through (5) of this section:

(1) Transporters who generate used oil must also comply with subpart C of this part;

(2) Transporters who process or re-refine used oil, except as provided in § 279.41, must also comply with subpart F of this part;

(3) Transporters who burn off-specification used oil for energy recovery must also comply with subpart G of this part;

(4) Transporters who direct shipments of off-specification used oil from their facility to a used oil burner or first claim that used oil that is to be burned for energy recovery meets the used oil fuel specifications set forth in § 279.11 must also comply with subpart H of this part; and

(5) Transporters who dispose of used oil, including the use of used oil as a dust suppressant, must also comply with subpart I of this part.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 26425, May 3, 1993]

§ 279.41 Restrictions on transporters who are not also processors or refiners.

(a) Used oil transporters may consolidate or aggregate loads of used oil for purposes of transportation. However, except as provided in paragraph (b) of this section, used oil transporters may not process used oil unless they also comply with the requirements for processors/re-refiners in subpart F of this part.

(b) Transporters may conduct incidental processing operations that occur in the normal course of used oil transportation (e.g., settling and water separation

§ 279.56

(1) The sampling method used to obtain representative samples to be analyzed. A representative sample may be obtained using either:

(A) One of the sampling methods in appendix I of part 261 of this chapter; or

(B) A method shown to be equivalent under § 260.20 and 260.21 of this chapter;

(4) Whether used oil will be sampled and analyzed prior to or after any processing/re-refining;

(iii) The frequency of sampling to be performed, and whether the analysis will be performed on-site or off-site; and

(iv) The methods used to analyze used oil for the parameters specified in § 279.72; and

(3) The type of information that will be used to make the on-specification used oil fuel determination.

§ 279.56 Tracking.

(a) *Acceptance.* Used oil processors/re-refiners must keep a record of each used oil shipment accepted for processing/re-refining. These records may take the form of a log, invoice, manifest, bill of lading or other shipping documents. Records for each shipment must include the following information:

(1) The name and address of the transporter who delivered the used oil to the processor/re-refiner;

(2) The name and address of the generator or processor/re-refining from whom the used oil was sent for processing/re-refining;

(3) The EPA identification number of the transporter who delivered the used oil to the processor/re-refiner;

(4) The EPA identification number (if applicable) of the generator or processor/re-refiner from whom the used oil was sent for processing/re-refining;

(5) The quantity of used oil accepted; and

(6) The date of acceptance.

(b) *Delivery.* Used oil processor/re-refiners must keep a record of each shipment of used oil that is shipped to a disposal facility. These records may take the form of a log, invoice, manifest, bill of lading or other shipping documents. Records for each shipment must include the following information:

40 CFR Ch. I (7-1-94 Edition)

(1) The name and address of the transporter who delivers the used oil to the burner, processor/re-refiner or disposal facility;

(2) The name and address of the burner, processor/re-refiner or disposal facility who will receive the used oil;

(3) The EPA identification number of the transporter who delivers the used oil to the burner, processor/re-refiner or disposal facility;

(4) The EPA identification number of the burner, processor/re-refiner, or disposal facility who will receive the used oil;

(5) The quantity of used oil shipped; and

(6) The date of shipment.

(c) *Record retention.* The records described in paragraphs (a) and (b) of this section must be maintained for at least three years.

§ 279.57 Operating record and reporting.

(a) *Operating record.* (1) The owner or operator must keep a written operating record at the facility.

(2) The following information must be recorded, as it becomes available, and maintained in the operating record until closure of the facility:

(i) Records and results of used oil analyses performed as described in the analysts plan required under § 279.55; and

(ii) Summary reports and details of all incidents that require implementation of the contingency plan as specified in § 279.52(b).

(b) *Reporting.* A used oil processor/re-refiner must report to the Regional Administrator, in the form of a letter, on a biennial basis (by March 1 of each even numbered year), the following information concerning used oil activities during the previous calendar year:

(1) The EPA identification number, name, and address of the processor/re-refiner;

(2) The calendar year covered by the report; and

(3) The quantities of used oil accepted for processing/re-refining and the manner in which the used oil is processed/re-refined, including the specific processes employed.

Environmental Protection Agency

§ 279.58 Off-site shipments of used oil.

Used oil processors/re-refiners who initiate shipments of used oil off-site must ship the used oil using a used oil transporter who has obtained an EPA identification number.

§ 279.59 Management of residues.

Owners and operators who generate residues from the storage, processing, or re-refining of used oil must manage the residues as specified in § 279.10(c).

Subpart G—Standards for Used Oil Burners Who Burn Off-Specification Used Oil for Energy Recovery

§ 279.60 Applicability.

(a) *General.* The requirements of this subpart apply to used oil burners except as specified in paragraphs (a)(1) and (a)(2) of this section. A used oil burner is a facility where used oil not meeting the specification requirements in § 279.11 is burned for energy recovery in devices identified in § 279.61(a). Facilities burning used oil for energy recovery under the following conditions are not subject to this Subpart:

(1) The used oil is burned by the generator in an on-site space heater under the provisions of § 279.23; or

(2) The used oil is burned by a processor/re-refiner for purposes of processing used oil, which is considered burning incidentally to used oil processing.

(b) *Other applicable provisions.* Used oil burners who conduct the following activities are also subject to the requirements of other applicable provisions of this part as indicated below.

(1) Burners who generate used oil must also comply with subpart C of this part;

(2) Burners who transport used oil must also comply with subpart E of this part;

(3) Except as provided in § 279.61(b), burners who process or re-refine used oil must also comply with subpart F of this part;

(4) Burners who direct shipments of off-specification used oil from their facility to a used oil burner or first claim that used oil that is to be burned for energy recovery meets the used oil fuel specifications set forth in § 279.11 must

§ 279.62

also comply with subpart H of this part; and

(5) Burners who dispose of used oil, including the use of used oil as a dust suppressant, must comply with subpart I of this part.

(c) *Specification fuel.* This subpart does not apply to persons burning used oil that meets the used oil fuel specification of § 279.11, provided that the burner complies with the requirements of subpart H of this part.

[57 FR 41612, Sept. 10, 1992, as amended at 58 FR 26426, May 3, 1993]

§ 279.61 Restrictions on burning.

(a) Off-specification used oil fuel may be burned for energy recovery in only the following devices:

(1) Industrial furnaces identified in § 260.10 of this chapter;

(2) Boilers, as defined in § 260.10 of this chapter, that are identified as follows:

(i) Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

(ii) Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids for sale; or

(iii) Used oil-fired space heaters provided that the burner meets the provisions of § 279.23; or

(3) Hazardous waste incinerators subject to regulation under subpart O of parts 264 or 265 of this chapter.

(b)(1) With the following exception, used oil burners may not process used oil unless they also comply with the requirements of subpart F of this part.

(2) Used oil burners may aggregate off-specification used oil with virgin oil or on-specification used oil for purposes of burning, but may not aggregate for purposes of producing on-specification used oil.

§ 279.62 Notification

(a) *Identification numbers.* Used oil burners which have not previously complied with the notification requirements of RCRA section 3010 must comply with these requirements and obtain an EPA identification number.

(b) *Mechanics of notification.* A used oil burner who has not received an EPA