United States Environmental Protection Agency | Solid Waste And Emergency Response (OS-520) | 500-B-92-003 April 1992

EPA

Burning of Hazardous Waste in Boilers and Industrial Furnaces (BIF) Rule

Satellite Training Course
April 7, 1992

Sponsored by:

RCRA Enforcement Division
Office of Waste Programs Enforcement

SATELLITE TRAINING COURSE

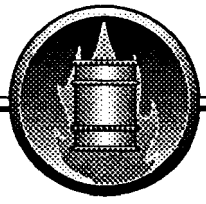


Table of Contents

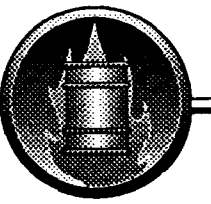
BIF Rule Enforcement Satellite Training Course

Washington, DC
April 7, 1992

Agenda

11:00–11:05	Introduction Susan Bromm, Director, RCRA Enforcement Division, Office of Waste Programs Enforcement
11:05–11:10	Course Overview
11:10–11:40	The Regulations and Permit Requirements (Bob Holloway and Sonya Sasseville)
11:40–11:55	Questions and Answers
11:55–12:10	Break
12:10–1:25	Technology Overview (Catherine Massimino and Y.J. Kim)
1:25–1:40	Questions and Answers
1:40–2:40	Lunch
2:40–4:10	Enforcement (David Nielsen, Emily Chow, Kate Anderson, John Dombrowski, and Ken Gigliello)
4:10–4:30	Questions and Answers
4:30–5:00	Panel Discussion/Wrap-up

(Times are approximate and are in EST)



Biographies of the Training Course Participants

BIF Rule Enforcement Satellite Training Course Manual Biographies List

The Regulations and Permit Requirements

Bob Holloway
(FTS/202) 308-8461
Mr. Holloway has a B.S. in Civil Engineering and a M.S. in Sanitary Engineering from Virginia Polytechnic Institute and State University. He has worked on EPA's hazardous waste combustion regulatory program since 1984. As Chief of the Combustion Section in the Office of Solid Waste for the past five years, Mr. Holloway directed the development of the Boiler and Industrial Furnace Rulemaking.

Sonya Sassesville
(FTS/202) 260-3132
Ms. Sasseville is the Chief of the Alternative Technology Section of the Permits and State Programs Division in the Office of Solid Waste. Her section provides regulation interpretations, guidance and technical support to the Regions related to hazardous waste combustion permitting. She chairs the National Hazardous Waste Combustion Permit Writers' Workgroup. This workgroup holds monthly conference calls and semi-annual meetings to discuss permitting issues related to hazardous waste combustion units (i.e., incinerators, BIFs, and Subpart X units). Sonya has been with EPA's Office of Solid Waste for six years.

Technology Overview

Y.J. Kim
(FTS/415) 744-2058
Mr. Kim is a chemical engineer who works as a permit writer for U.S. EPA Region IX. His duties include issuing permits to hazardous waste incinerators and boilers and industrial furnaces. He has been designated as a National Expert for Incineration of Hazardous Waste. Prior to working at EPA, Mr. Kim spent approximately 20 years working in the chemical and waste management industries, where he served in various capacities, including chief process engineer, technical and engineering design director, and manager of project engineering. He has invented, commercialized, and obtained patents for two chemical processes involving insitu combustion and vacuum distillation processes. Mr. Kim has an M.S. degree in Chemical Engineering from the University of Notre Dame.

BIF Rule Enforcement Satellite Training Course Manual Biographies List (continued)

Technology Overview

Catherine Massimino
(FTS/206) 553-4153
Ms. Massimino is the Senior RCRA/Superfund Technical Specialist of U.S. Environmental Protection Agency (EPA) Region 10's Hazardous Waste Division. She did her Bachelors and Graduate studies in Civil Engineering at New Jersey Institute of Technology. She serves as an EPA Region 10 Hazardous Waste Division-wide resource in the subject areas of thermal treatment and landfill covers and liners. She provides expert technical and regulatory reviews on hazardous waste thermal treatment permits, Superfund thermal treatment clean-up actions, and municipal incinerator and landfill proposals. She has had twelve years experience in development and implementation of the hazardous waste management regulatory program mandated by the Resource Conservation and Recovery Act (RCRA); development and implementation of the polychlorinated biphenyl (PCB) regulatory program mandated by the Toxic Substances Control Act (TSCA); and the provision of technical assistance involving the scientific and engineering aspects of hazardous waste management associated with the above programs.
She has lectured at the government offices' of Sao Paulo, Brazil, University of Washington, Western Washington University, and at the Air Pollution Control Association's Annual Meeting on hazardous waste and PCB incineration, and was a key lecturer and organizer for EPA Region 10's RCRA Core Hazardous Waste Program Training. She received the Seattle Federal Executive Board's Federal Employee of the Year Special Recognition Award for Scientific Achievement for 1988.

Enforcement

Kate Anderson
(FTS/202) 260-9313
Ms. Anderson is an Environmental Specialist with the U.S. Environmental Protection Agency's Office of Waste Programs Enforcement (OWPE). Her responsibilities include developing guidance and training for EPA and State personnel involved in hazardous waste enforcement activities. Prior to joining EPA, Ms. Anderson was a section manager for the RCRA/Superfund Hotline.

BIF Rule Enforcement Satellite Training Course Manual Biographies List (continued)

Enforcement

John Dombrowski
(FTS/202) 260-7834
Mr. Dombrowski is an Environmental Engineer with the U.S. Environmental Protection Agency's Office of Waste Programs Enforcement (OWPE). His responsibilities include developing guidance and training for EPA and State personnel involved in hazardous waste enforcement activities. Prior to joining EPA, John spent several years working for a consulting firm, and holds a B.S. degree in Civil Engineering from West Virginia University, and a M.S. degree in Water Resources Engineering from George Washington University.

Emily Chow
(FTS/202) 260-9329
Ms. Chow is the Chief of the Training and Guidance Section (TGS) of the RCRA Enforcement Division. She is a Chemical Engineer by training an is responsible for overseeing the projects of TGS. TGS is involved in aiding in regulation development and providing training and guidance on enforcement-related issues to the EPA Regions' and States' enforcement personnel.

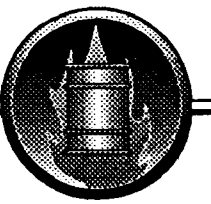
Ken Gigliello
(FTS/202) 260-8544
Mr. Gigliello began his EPA career in 1977 with the Region II Rochester Program Office performing as a laboratory analyst. In 1978 he joined the Region II Environmental Services Division Field Office where he functioned as an environmental scientist/field investigator. He has worked in the Superfund, NPDES, TSCA, and the RCRA programs performing inspections, participating in enforcement proceedings, and developing inspector training programs. He left the agency in 1986 to work for a major corporation in their corporate environmental auditing department. Since March, 1987, Ken has worked in the RCRA Enforcement Division as an environmental scientist in the Guidance and Evaluation Branch. Ken is currently the Branch Chief of the Guidance and Evaluation Branch.

BIF Rule Enforcement Satellite Training Course Manual Biographies List (continued)

Enforcement

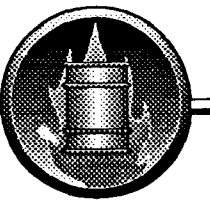
David A. Nielsen
(FTS/202) 260-1914
Mr. Nielsen is Chief of the Eastern and Southwestern Branch in the Office of Enforcement's RCRA Division. He received a law degree form the University of Virginia's School of Law and is also a graduate of the University of California, Berkley with a B.S. in Environmental and Resource Economics. David has been with EPA for 4 1/2 years.

BIF Rule Enforcement Satellite Training Course Manual



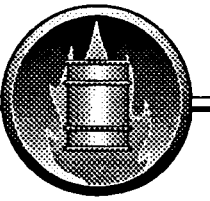
Disclaimer

The policies and procedures established in this document are intended solely for the guidance of employees of the U.S. Environmental Protection Agency. They are not intended and cannot be relied upon to create any rights, substantive or procedural, enforceable by any party in litigation with the United States. EPA reserves the right to act at variance with these policies and procedures and to change them at any time without public notice. This training manual is not a substitute for the Federal Register published rule or subsequent amendments.



PART I

The Regulations and Permit Requirements



Notes:

- Owners or operators of BIFs are now subject to the general facility standards for TSDF.

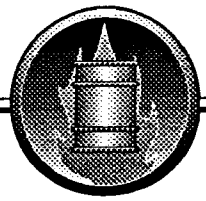
Overview of the BIF Rule

- Prior to the final rule, the burning of hazardous wastes in BIFs was exempt from regulation. The final rule has provisions to control emissions of:
  - toxic organic compounds
  - toxic metals
  - hydrogen chloride
  - chlorine gas
  - particulate matter

Notes:

Important Federal Registers Associated with the BIF Requirements

- Rule was published in the Federal Register on February 21, 1991(effective on August 21, 1991)
- Correction notice issued on July 17,1991
- Correction notice issued on August 27, 1991
- Correction notice issued on September 5, 1991



Notes:

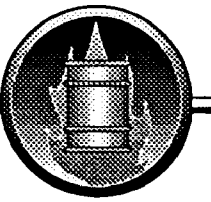
Applicability of the BIF Rule [40 CFR 266.100]

- The BIF rule applies to two basic types of units burning hazardous waste for energy recovery, destruction, or materials recovery.
  - Boilers
  - Industrial furnaces

Notes:

Exemptions and Exclusions

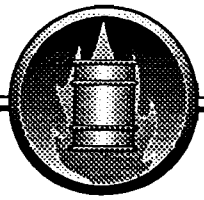
- The final rule discusses several exemptions and exclusions:
  - small quantity burner (SQB) exemption
  - potential exclusion of Bevill wastes
  - exclusion of decanter tank tar sludge
  - deferral for smelting, melting, and refining furnaces
  - low-risk waste exemption
  - destruction and removal efficiency (DRE) trial burn waiver for certain boilers



Small Quantity Burner (SQB) Exemption [40 CFR 266.108]

- SQB exemption was developed under Section 3004 (q)(2)(B) of RCRA and exempts owners or operators from emissions standards and permitting requirements of the final rule, provided:
  - The quantity of waste does not exceed the quantities specified in the final rule
  - Hazardous waste is not more than 1% of the total fuel requirements
  - Heating value of the waste is at least 5,000 Btu/lb
  - Listed dioxin wastes are not burned
  - The owner or operator must submit a one-time notification of burning activities and maintain records to document compliance with the conditions of the exemption.

Notes:



Notes:

Management of Residues [266.112]

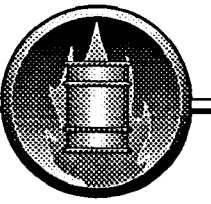
- The rule focuses on residues that are excluded from the definition of hazardous waste due to the Bevill exemption, specifically:
  - boilers burning primarily coal or other fossil fuels
  - industrial furnaces processing primarily ores or minerals
  - cement kilns processing primarily raw materials

Notes:

- BIFs must burn at least 50 percent fossil fuels, ores and minerals, or normal cement-production raw materials to be eligible for the Bevill exclusion.

Applicability of the Bevill Exclusion to Wastes from BIFs

- Section 3001 (b)(3)(A) of RCRA excluded from regulation certain residues from the processing of fossil fuels, ores and minerals, and cement kiln dust waste pending the completion of studies by EPA. This exclusion is potentially applicable to
  - Boilers burning coal or other fossil fuels
  - Industrial furnaces processing ores and minerals
  - Cement kilns



Applicability of the Bevill Exclusion to Wastes from BIFs (Continued)

- In order to be exempt under the Bevill exclusion residues from the burning of hazardous wastes must meet a two-part test to demonstrate that they have not been significantly affected by the co-combustion of hazardous waste

Notes:

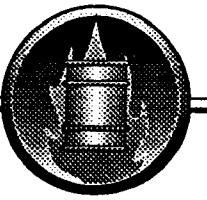
- Waste-derived residues that pass part 2 do not need to pass part 1.

Two-Part Test for Applicability of the Bevill Exclusion to Wastes from BIFs

- Part 1:
  Waste-derived residue must not have significantly higher concentrations of Part 261 Appendix VIII constituents than normal residues
- Part 2:
  Toxic constituents in the waste-derived residue must not pose a threat to human health

Notes:

- Owners or operators should use the procedures in 40 CFR 266.112 and statistical methodology for Bevill residue determinations.
- Concentrations of non-metal constituents must be compared to health-based levels in Appendix VII of Part 266.
- Concentrations of metal constituents in a TCLP extract must be compared to health-based levels in Appendix VII of Part 266.

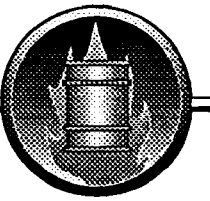


Notes:

- EPA has concluded that decanter tank tar sludge
  - does not significantly affect the chemical composition of coke
  - does not contain concentrations of hazardous constituents that are statistically different from those of coal

Exclusion of Decanter Tank Sludge from Regulation

- As a result of a petition from the American Iron and Steel Institute, K087 that is mixed with coal or coal tar in a coke oven is excluded from the definition of solid waste.

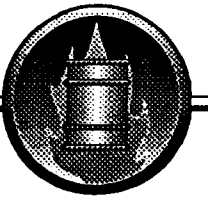


Deferral for Smelting, Melting, and Refining Furnaces

- Owners or operators of smelting, melting, and refining furnaces are eligible for a deferral from the standards of the final rule provided the facilities are burning hazardous waste for "legitimate metals recovery." The criteria for this deferral include:
  - Wastes may not contain more than 500 ppm toxic organic constituents listed in Appendix VIII of 40 CFR Part 261
  - Wastes may not have a heating value of more than 5,000 Btu/lb
  - Wastes must contain recoverable levels of metals with the same or greater levels of metals as normal feed stocks

Notes:

- Wastes with greater than 500 ppm toxic organic constituents are deemed to be burned at least partially for destruction; wastes with a heating value greater than 5,000 Btu/lb are deemed to be burned at least partially for energy recovery.
- Wastes must have "economically viable" amounts of metals to recover; the person recovering metals must be in the business of producing metals for public sale.
- For example, high-temperature metal recovery devices used to recover metals from emissions control dust (K061) are eligible for this deferral.



Notes:

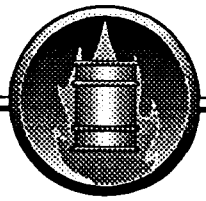
Alternate Criteria for the Deferral of Certain Industrial Furnaces

- The owner or operator of a lead or nickel-chromium recovery furnace, or a metal recovery furnace that burns baghouse bags to recover metals must
  - Provide a one-time written notice that he or she is claiming the exemption

Notes:

Alternate Criteria for the Deferral of Certain Industrial Furnaces (Continued)

- Sample and analyze the waste and feedstocks according to methods in SW-846
- Maintain records for three years documenting compliance with the exemption



Alternate Criteria for the Deferral of Certain Industrial Furnaces (Continued)

- EPA or authorized state may subject on owner or operator of a facility exempt under the alternative criteria to the requirements of the BIF rule if the waste contains more than 500 ppm of organic constituents in Appendix VIII of Part 261

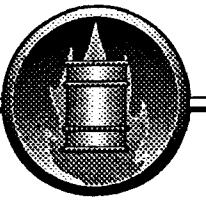
Notes:

- The Regional Administrator or State Director will make this determination based on:
  - The concentration and toxicity of organic constituents in the waste
  - The level of destruction of toxic organics provided by the furnace
  - Whether ambient air levels of organics in Appendices IV and V of Part 266 may be exceeded

Emissions Standards

- Emissions standards include:
  - toxic organic compounds
  - toxic metals
  - hydrogen chloride
  - chlorine gas
  - particulate matter

Notes:



Destruction and Removal Efficiency (DRE)

- The final rule requires a DRE of
  - 99.9999% for listed dioxin wastes
  - 99.99% for all other principal organic hazardous constituents

Notes:

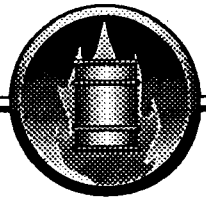
- The DRE standard does not apply to BIFs at interim status facilities.

Products of Incomplete Combustion (PICs) Controls

- The final rule indirectly controls emissions of PIC by limiting flue gas concentrations of:
  - carbon monoxide (CO)
  - hydrocarbons (HC) (where applicable)
  - dioxins and furans (where applicable)

Notes:

- These parameters are required to be monitored because they are indicators of combustion efficiency.

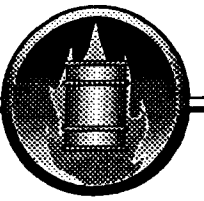


Tiered Approach for CO Emissions

- The final rule allows a two-tiered approach for demonstrating compliance.
  - Under Tier I, CO emissions must be continuously monitored to ensure they do not exceed 100 ppmv (corrected to 7% oxygen) on an hourly rolling average basis
  - Under Tier II, HC emissions must be continuously monitored to ensure that they do not exceed 20 ppmv (corrected to 7% oxygen) as measured by a FID detector and an unconditioned sample gas extraction system, and CO emissions must not exceed a maximum level established during a compliance test

Notes:

- Cement kilns will frequently require use of Tier II to demonstrate compliance with the final rule.

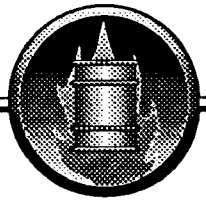


Alternate HC Limit

- The final rule allows facilities to establish an alternate (higher) HC limit through the permit process if they cannot comply with Tier I or Tier II regarding CO emissions. In order to obtain this alternate limit, an owner or operator must:
  - demonstrate the BIF is designed to operate to minimize HC emissions
  - establish a "baseline" HC level based on normal operating conditions
  - conduct emissions testing to show that emissions do not exceed the baseline when the unit burns hazardous waste
  - conduct dispersion modeling to demonstrate that ground level concentrations of organic constituents do not exceed health-based levels

Notes:

- Interim status facilities that cannot immediately comply with the HC limit should request a time extension for certification of compliance with the HC standards.



Notes:

- For cement kilns, the waste must be fed into the kiln itself

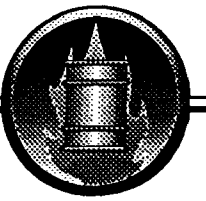
Restriction On Waste Feed Locations During Interim Status

- Owners or operators of industrial furnaces that feed wastes at locations other than the "hot" end must:
  - Comply with the Tier II CO controls (monitor HC)
  - The combustion gas temperature must be greater than 1,800°F where waste is fed
  - Adequate oxygen must be present

Notes:

Controls for Dioxins and Furans

- Owners or operators of BIFs are required to perform stack emissions testing and conduct risk assessments when there is a high potential for significant dioxin or furan emissions. These procedures are required for:
  - BIFs that operate a baghouse and that operate between 450°F and 750°F
  - Industrial furnaces operating under an alternate HC limit



Particulate Matter (PM) Controls

- Under the final rule, particulate matter emissions are limited to 0.08 gr/dscf, corrected to 7% oxygen.
  - Emissions are controlled by limiting the total ash feed rate and controls on air pollution control devices.
  - Owners or operators must comply with more stringent NSPS or state PM controls.

Notes:

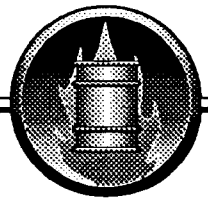
- Ash feed rate limits do not apply to cement kilns and lightweight aggregate kilns.

Tier I for Control of Emissions of Toxic Metals

- The final rule allows tiered approach to demonstrate that metals emissions do not pose a significant risk
  - Under Tier I, facilities must comply with feed rate limits in Appendix I of Part 266

Notes:

- This is the simplest, but also the most conservative approach for owners or operators to demonstrate compliance with the metal emissions requirements
- Feed rate of constituent$_i$ = [total feed rate] x [concentration of constituent$_i$ in total feed]



Notes:

Metals include:

- 5 noncarcinogenic metals
  - antimony
  - barium
  - mercury
  - silver
  - thallium
- 5 carcinogenic metals
  - arsenic
  - beryllium
  - cadmium
  - hexavalent chromium

Tier II for Control of Emissions of Toxic Metals

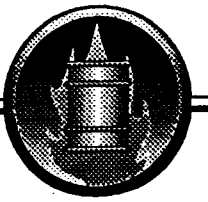
- Tier I feed rate limits are used.
- Credit is allowed for metals partitioned to air pollution control devices.
- Owners or operators must conduct emissions testing to demonstrate compliance with Tier II emission limits.

Notes:

- There are several scenarios listed in the BIF rule that do not allow use of Tier I or Tier II.

Tiered Approach for Control of Toxic Metals

- In the final rule, both the Tier I and Tier II standards are listed as a function of:
  - effective stack height
  - terrain type
  - land use classification (urban or rural)



Notes:

- Emissions testing is not required for the adjusted Tier I method.

Adjusted Tier I for Control of Emissions of Toxic Metals

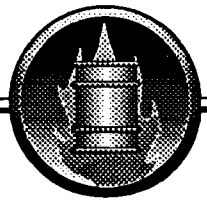
- Owners or operators of facilities that need additional flexibility in feed rates or emissions may use either adjusted Tier I or Tier III limits.
  - Under the adjusted Tier I scheme, facilities conduct site-specific dispersion modeling to determine allowable emissions levels; these levels then become the allowable feed rates

Notes:

- Under Tier III, feed rate limits are set for: total and pumpable hazardous waste; feed rates of metals in total feed streams, total hazardous waste, and pumpable hazardous waste; and feed rates of chlorine in total feed streams.

Tier III for Control of Emissions of Toxic Metals

- Owners or operators must conduct site-specific dispersion modeling to determine allowable emissions levels.
  - Facilities must conduct emissions testing to determine if actual emissions under worst-cases conditions do not exceed allowable levels.
  - Feed rate limits are established during the trial burn or compliance test.



Notes:

- Permit writers may incorporate these (or other) permit procedures into the permit.

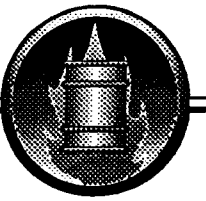
Special Requirements for Industrial Furnaces that Recycle Emission Control Dust

- Facilities operating under interim status must do one of the following:
  - Conduct semi-continuous stack monitoring
  - Pre-condition the BIF system prior to conducting the compliance test
  - Follow the kiln dust monitoring procedures in Appendix IX of Part 266

Notes:

Emissions Controls for Hydrogen Chloride and Chlorine Gas

- In the final rule, emissions controls for hydrogen chloride and chlorine gas are implemented under a similar tiered approach as for metals
  - Tier I and Tier II feed rate and emissions rate screening limits are given in Appendices II and III, respectively, of Part 266



Notes:

- Wastes may not be fed into the unit until all parameters are within their required limits.

Automatic Waste Feed Cutoffs

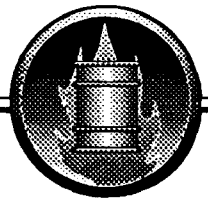
- The final rule requires systems that automatically cut off the waste feed if operating conditions exceed limits established under the compliance certification or permit. During a cutoff:
  - temperature in the combustion chamber must be maintained above a minimum level determined in the compliance test or trial burn
  - operating parameters must continue to be monitored

Notes:

- The low levels of non-metal constituents allow the waste to be exempt from the DRE standard; the low levels of hazardous metals and nonmetals allow the waste to be exempt from the particulate matter emissions standard.

Exemption of Low-Risk Wastes from the DRE Standard

- "Low-risk" wastes can be exempted from the DRE standards. Low risk wastes are defined as:
  - wastes with low concentrations of non-metal hazardous constituents
  - wastes that meet the Tier I feed rate limits for metals



Notes:

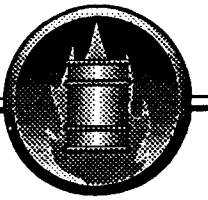
Eligibility for Low-Risk Exemption from the DRE Standard

- There are several conditions for the exemption:
  - a minimum of 50% of the fuel fired must be a "primary" fuel consisting of fossil fuels
  - primary fuels must have a heating value of 8,000 Btu/lb
  - hazardous wastes cofired with primary fuels must have a heating value of 8,000 Btu/lb
  - hazardous wastes must be fired into the flame zone of the combustion chamber

Notes:

Eligibility for Low-Risk Exemption from the DRE Standard (Continued)

- carbon monoxide in the stack gas cannot exceed 100 ppmv
- wastes cannot contain or be derived from listed dioxin wastes
- the owner or operator must demonstrate that the BIF will not pose unacceptable risks to human health



Notes:

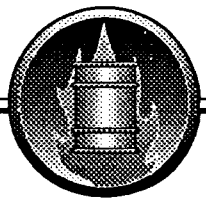
Eligibility for Waiver of Particulate Matter Standard

- the owner or operator must qualify for the DRE waiver
- the BIF must operate under Tier I or adjusted Tier I metals feed rate screening limits

Notes:

Interim Status Requirements

- These facilities must
  - certify compliance with emissions controls
  - establish limits on operating parameters
  - operate within emission controls and operating limits throughout interim status



Certification of Precompliance

- Owners or operators must certify by August 21, 1991, that emissions from BIFs at the facility are not likely to exceed metals, HCl, Cl_2, and particulate matter standards
  - facilities must comply with the requirements of the precompliance certification until a revised one is submitted or a certification of compliance is submitted

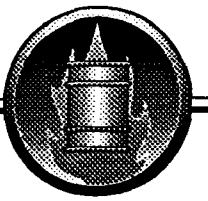
Notes:

- Facilities that were "in existence" on February 21, 1991, but not in operation, must still submit a certification of precompliance

Certification of Compliance

- by August 21,1992, owners or operators of BIFs must conduct compliance testing and submit a certification of compliance for emissions standards for HCl, Cl_2, metals, particulates, and CO, and where applicable, HC, dioxins, and furans

Notes:



Notes:

Recertification Requirements

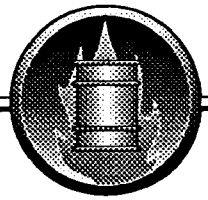
- While operating under interim status, facilities must recertify every three years
- This includes performing subsequent compliance tests

Notes:

- These extensions are not available for certifications of precompliance.

Extension of Compliance Dates for Certification of Compliance

- Interim status facilities that cannot comply with any of the requirements of the final rule must:
  - obtain an automatic 12-month extension that limits burning of hazardous wastes to 720 hours
  - obtain a case-by-case extension
  - stop burning hazardous waste and begin closure



Notes:

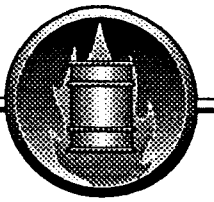
Permit Requirements

- There are four categories of facilities
  - newly regulated facilities
  - existing interim status facilities
  - existing permitted facilities
  - new facilities

Notes:

Schedule for Submittal of Permit Applications

- Differs depending on the category of the facility
  - newly regulated
  - existing interim status
  - existing permitted



Notes:

- Facility must be considered "in existence" on or before August 21, 1991 in order to obtain interim status.

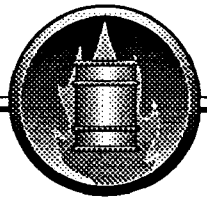
Newly Regulated Facilities

- These facilities must obtain interim status by August 21, 1991
  - submit RCRA Section 3010 notificaions by May 22, 1991
  - submit Part A permit applications by August 21, 1991

Notes:

Existing Interim Status Facilities

- These facilities must submit Part B permit applications when requested ("called") by the state or region



Permitted Facilities

- must have submitted a Class 1 permit modification by August 1, 1991
- must submit a Class 3 permit modification request within 180 days of the effective date (February 17, 1992)

Notes:

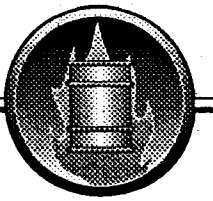
- Existing permitted facility = facility already operating under a permit for a non-BIF unit.

New Facilities

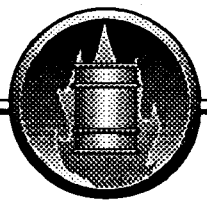
- must obtain in a permit before burning hazardous waste.

Notes:

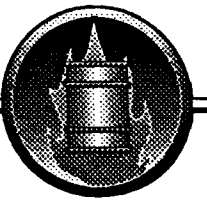
- New facilities are those that were not "in existence" on or before August 21, 1991



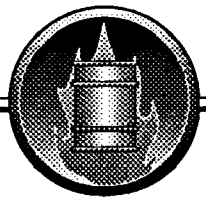
Notes:



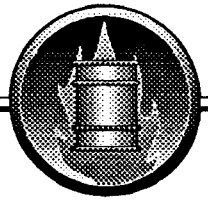
Notes:



Notes:

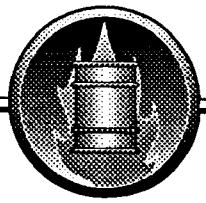


Notes:



PART II

Technology Overview



Notes:

- Hydrocarbons present in the waste react with oxygen from the air when supplied with thermal energy at temperatures in the range of 300 to 2200° F to form carbon dioxide and water.

Technology Overview

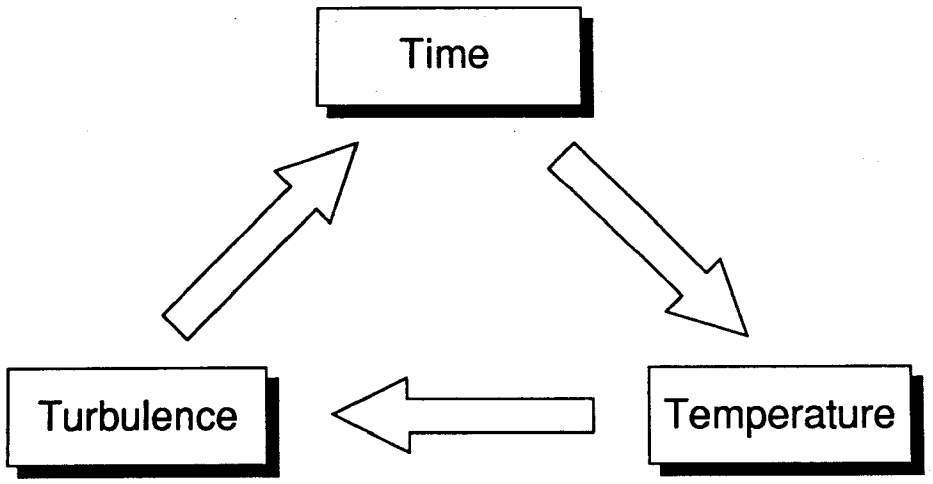
- Combustion process
  - Proper **temperature** is required for combustion to occur
  - Residence **time** of waste in the combustion chamber
  - **Turbulence** required in combustion chamber

Notes:

- Oxygen may not be available in sufficient quantities or optimum conditions may not be present for complete combustion to take place.

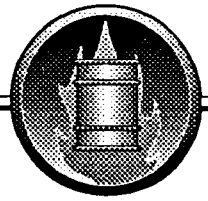
Products of Incomplete Combustion

- Carbon monoxide
- Hydrocarbons (HC)



Three "T's" of combustion

Notes:



Boilers [40 CFR 260.10]

- An enclosed device that uses controlled flame combustion to produce steam or hot water to generate electricity for on-site use

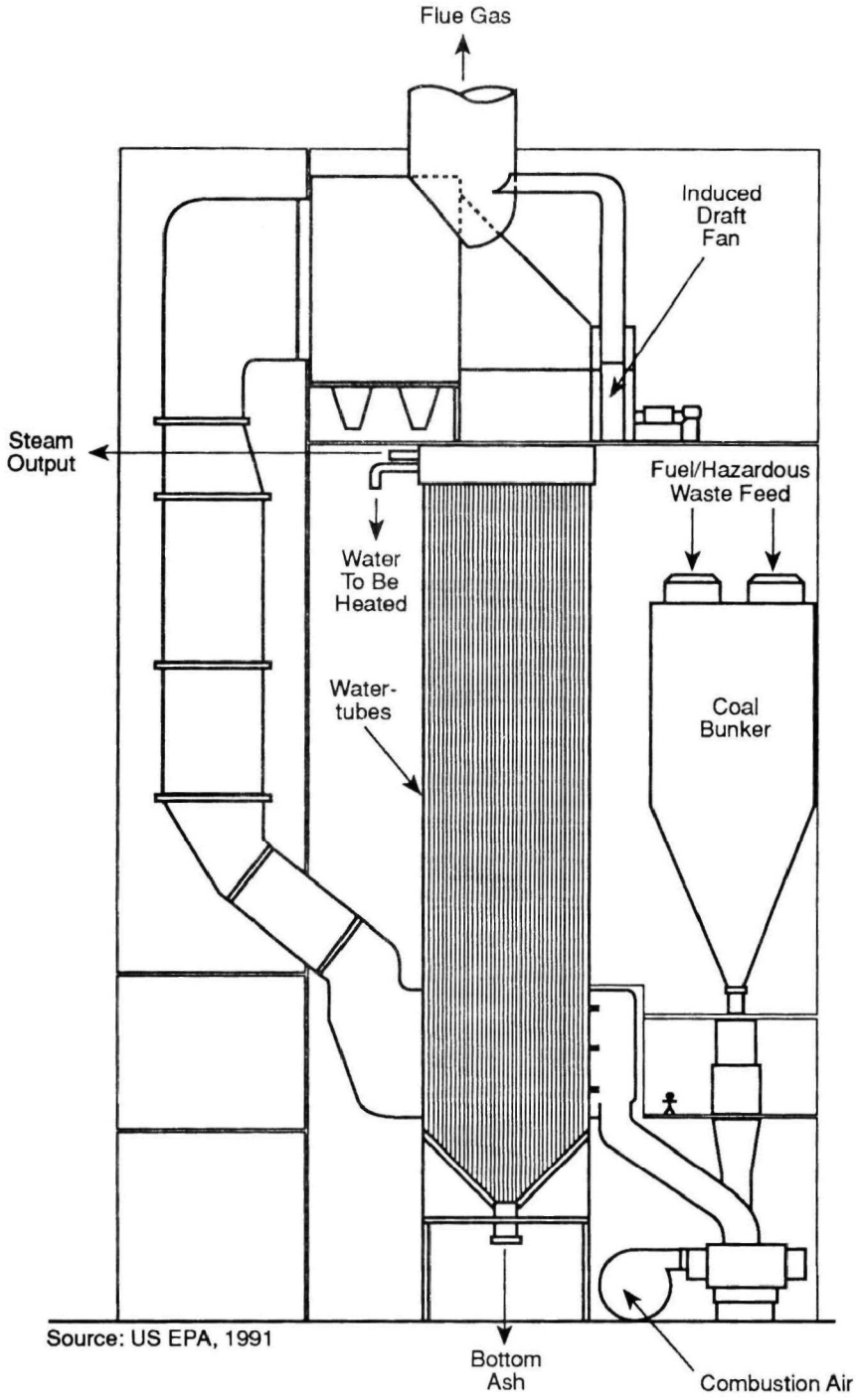
Notes:

- The unit must have equipment to recover and export thermal energy in the form of steam, heated fluids, or heated gases.
- The combustion chamber and primary energy recovery section must be of integral design.
- The unit's thermal recovery efficiency must be at least 60 percent.
- At least 75 percent of the recovered energy must be exported annually. This means that the recovered energy calculations do not include energy used internally in the device to preheat combustion air or fuel, or to drive combustion air fans or feed-water pumps.

Universe of Boilers

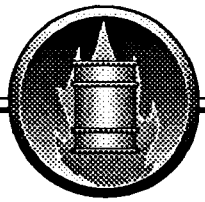
- Approximately 925 boilers were burning hazardous waste prior to the rule
- About 600 boilers are conditionally exempt as small quantity burners of hazardous wastes.
- 100-200 boilers may stop burning hazardous waste
- 100-200 boilers may be subject to interim status or permit requirements

Notes:



Section view of simplified flow diagram of a boiler

(Note: This diagram is not to scale)

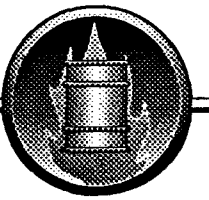


Breakdown of Boilers by EPA Region

Region	Number of Boilers*
1	9
2	10
3	34
4	26
5	20
6	49
7	4
8	2
9	1
10	3
Total	**158**

* - Those that have submitted a certification of precompliance as of November, 1991

Notes:



Notes:

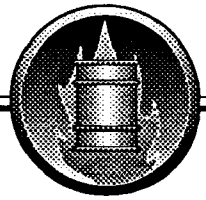
Fuels for Boilers

- Coal
- Oil
- Natural gas
- Nonconventional fuels—wood, bagasse, municipal and industrial solid wastes (including hazardous wastes)

Notes:

Fuel-Firing Mechanisms for Boilers

- Stoker-fired for burning solid fuels (e.g., coal)
- Suspension-fired for burning gas, oil, pulverized coal
  - Use burners mounted on the side or on top of the combustion chamber to burn feed materials



Notes:

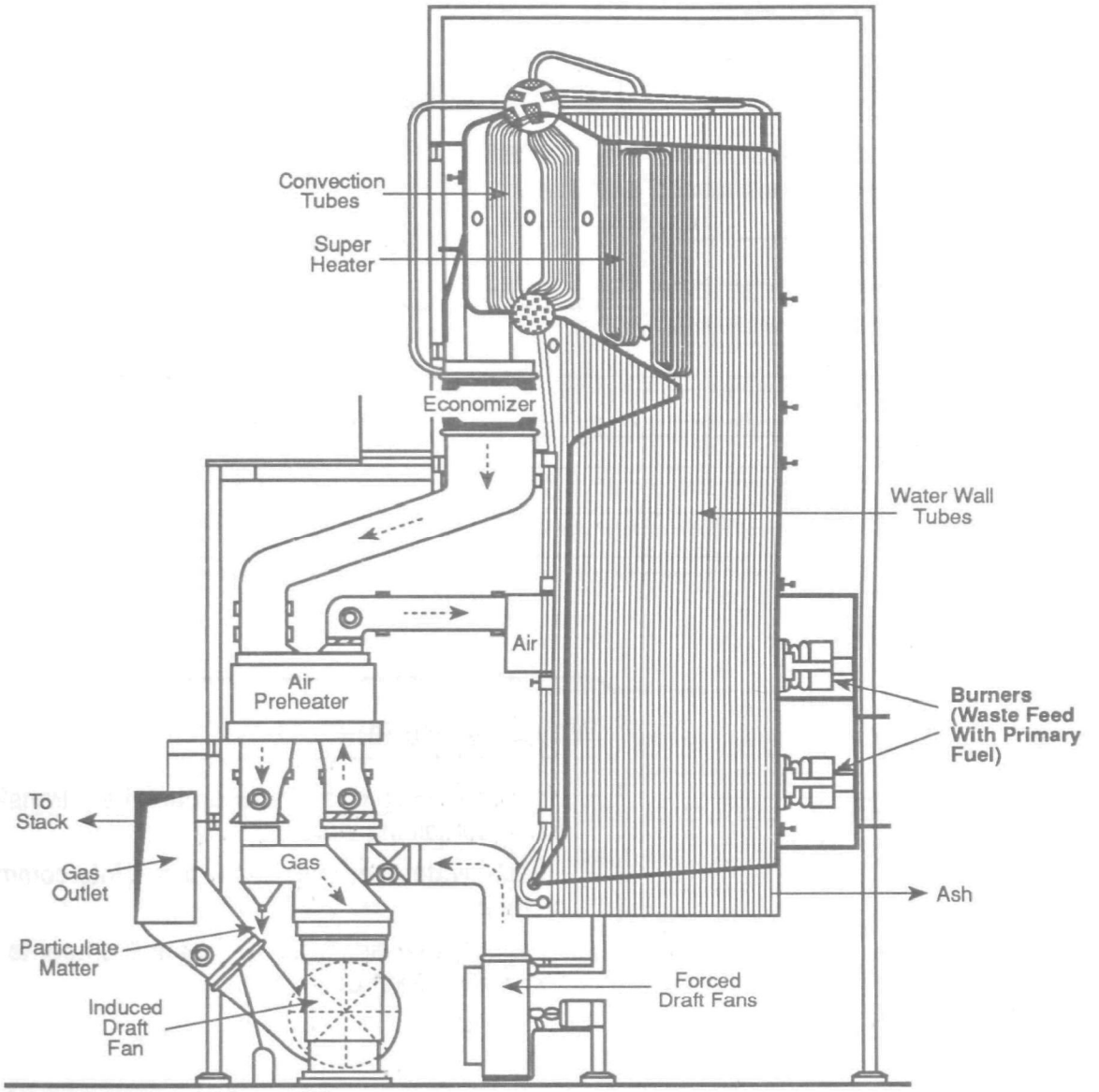
Types of Boilers

- Watertube
- Firetube
- Cast iron (sectional boilers)

Notes:

Watertube Boilers

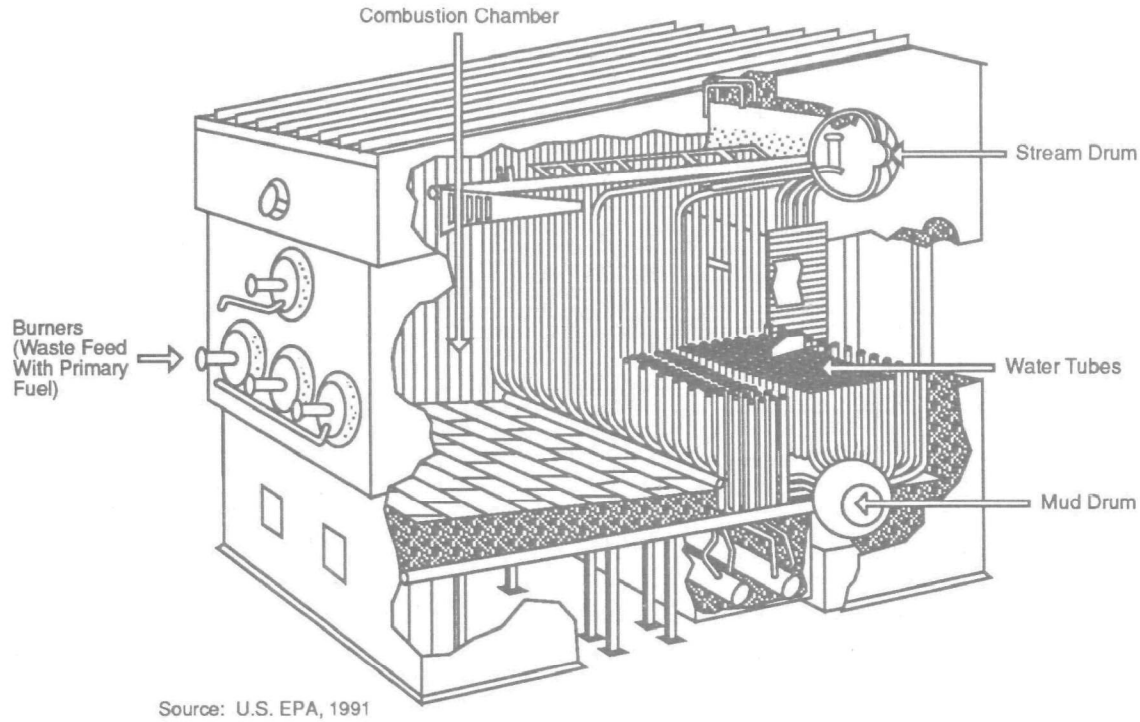
- Hot combustion gases flow around heat transfer tubes containing water
- Heated water/steam exits the tubes into common channels
- Heating capacities from 10 million Btu/hour to 250 million Btu/hour



Source: Babcock and Wilcox. 1978.

Section view of water-tube boiler

(Note: This diagram is not to scale)

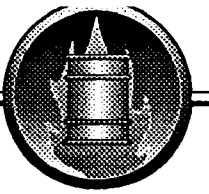


Source: U.S. EPA, 1991

Schematic of a simple water-tube boiler.

(Note: This diagram is not to scale)

Notes:



Notes:

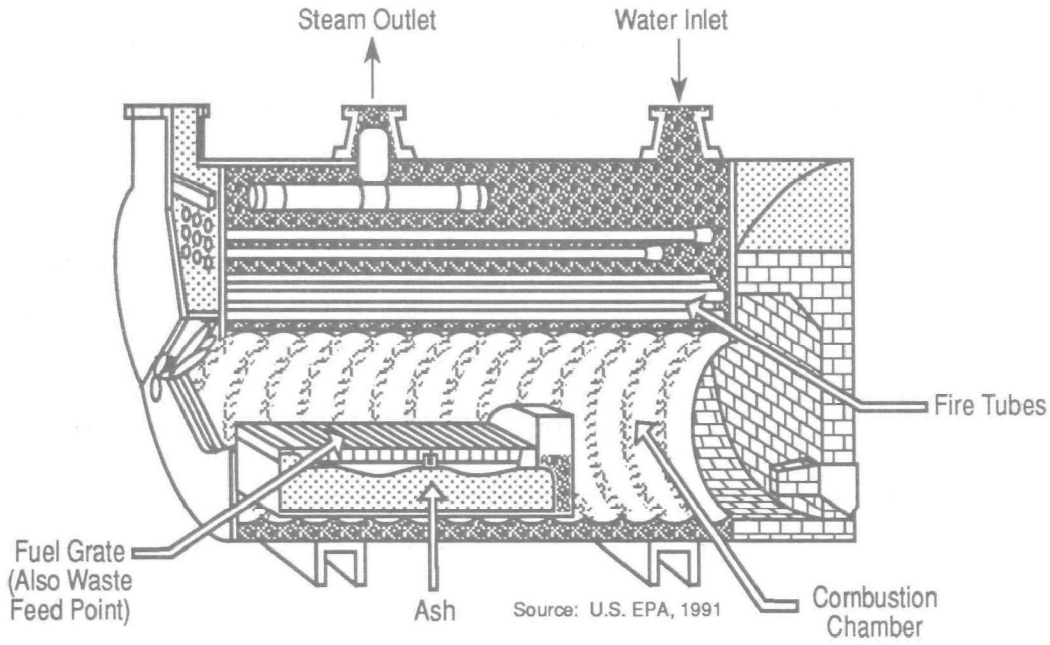
Watertube Boilers (Continued)

- Used to produce high-pressure (up to 1750 pounds per square inch) and high-temperature (up to 1,000° F) steam
- Can produce steam or hot water at rates ranging from 10,000 pounds/hour to 250,000 pounds per hour

Notes:

Firetube Boilers

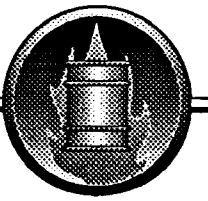
- Hot combustion gases pass through tubes surrounded by water or another fluid
- Thermal input is limited to 30 million Btu/hour
- Pressure of steam produced ranges from 165 to 265 pounds per square inch



Section View of a fire-tube boiler, Scotch Marine type

(Note: This diagram is not to scale)

Notes:



Notes:

Cast Iron Boilers

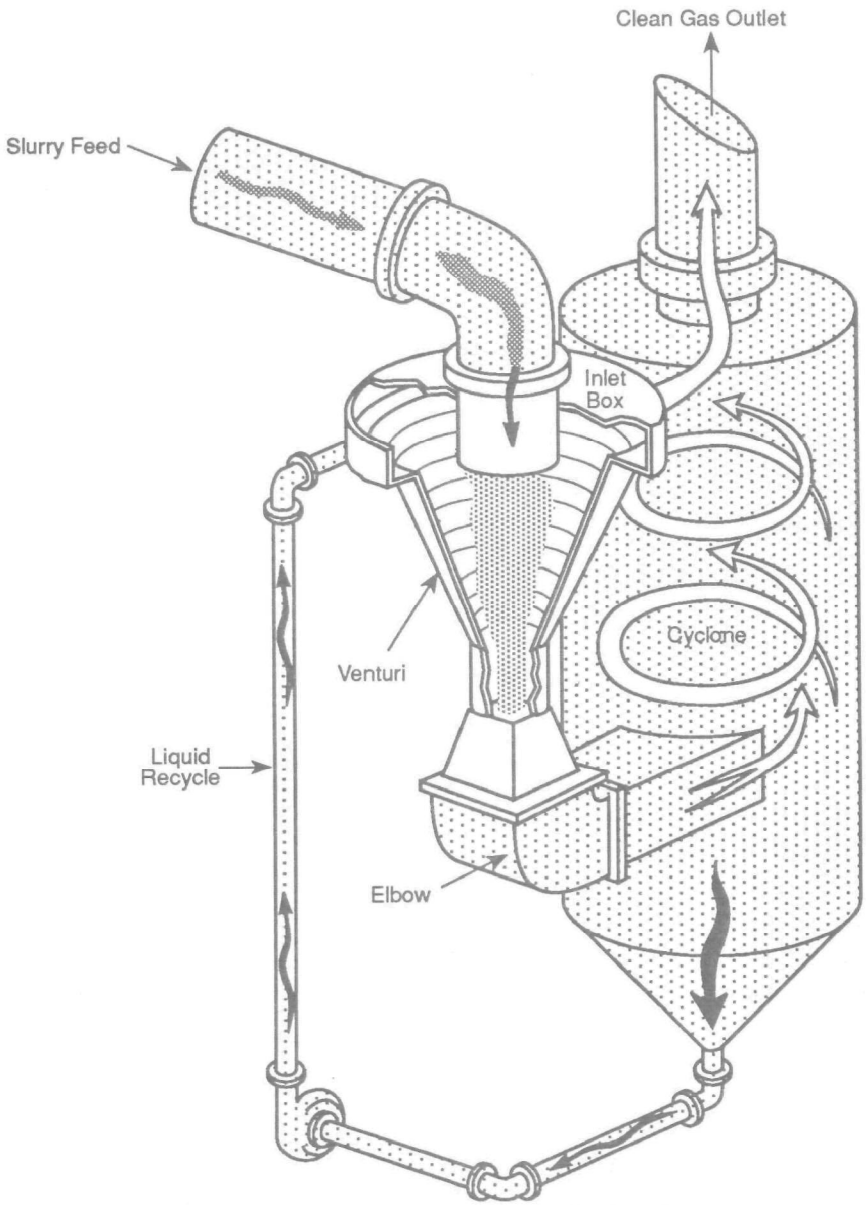
- Irregularly shaped heat exchangers in which combustion gases transfer heat through metal walls to water or other fluids in adjacent passages
- Maximum thermal input of 10 million Btu/hour.
- Used to produce low-pressure steam or hot water

Notes:

- Typical types of dry scrubbers include dry filters and viscous filters.
- Typical types of wet scrubbers include venturi scrubbers and orifice scrubbers.

Air Pollution Control Equipment on Boilers

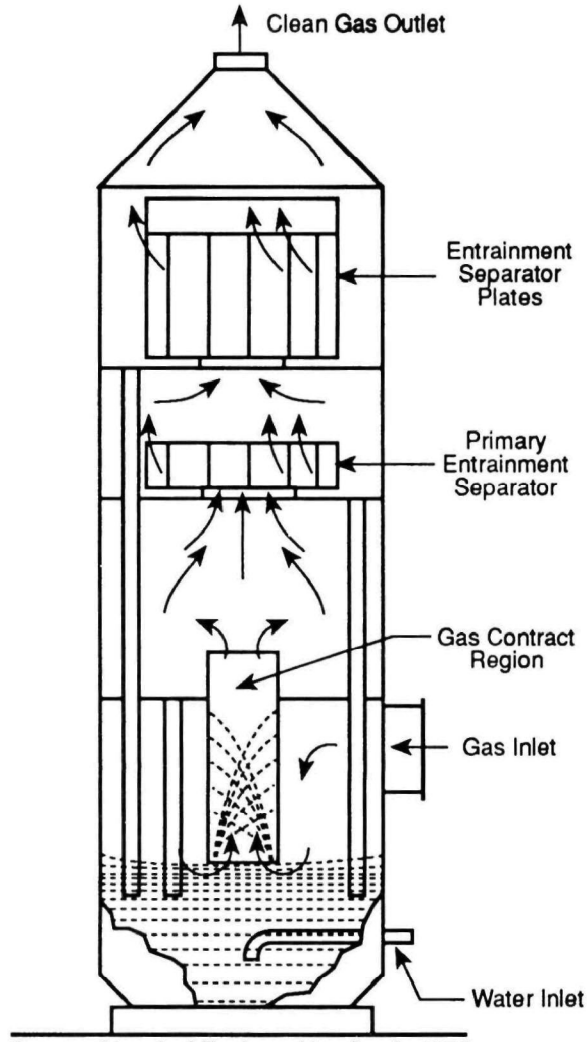
- Scrubbers often are used by boilers, including
  - Wet scrubbers – contaminants are removed by counter-current washing with a liquid, and the solids are removed as a slurry
  - Dry scrubbers – use dust-free air to force contaminants through filters



Source: Chemical Engineers Handbook, 1973

Venturi scrubber, wet-approach type

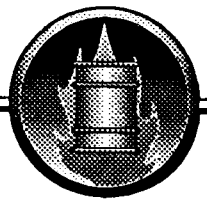
(Note: This diagram is not to scale)



Source: Chemical Engineer Handbook, 1973

Schematic of an orifice scrubber

(Note: This diagram is not to scale)



Notes:

- Particulates are removed mechanically, either by washing or vibrating the plates.

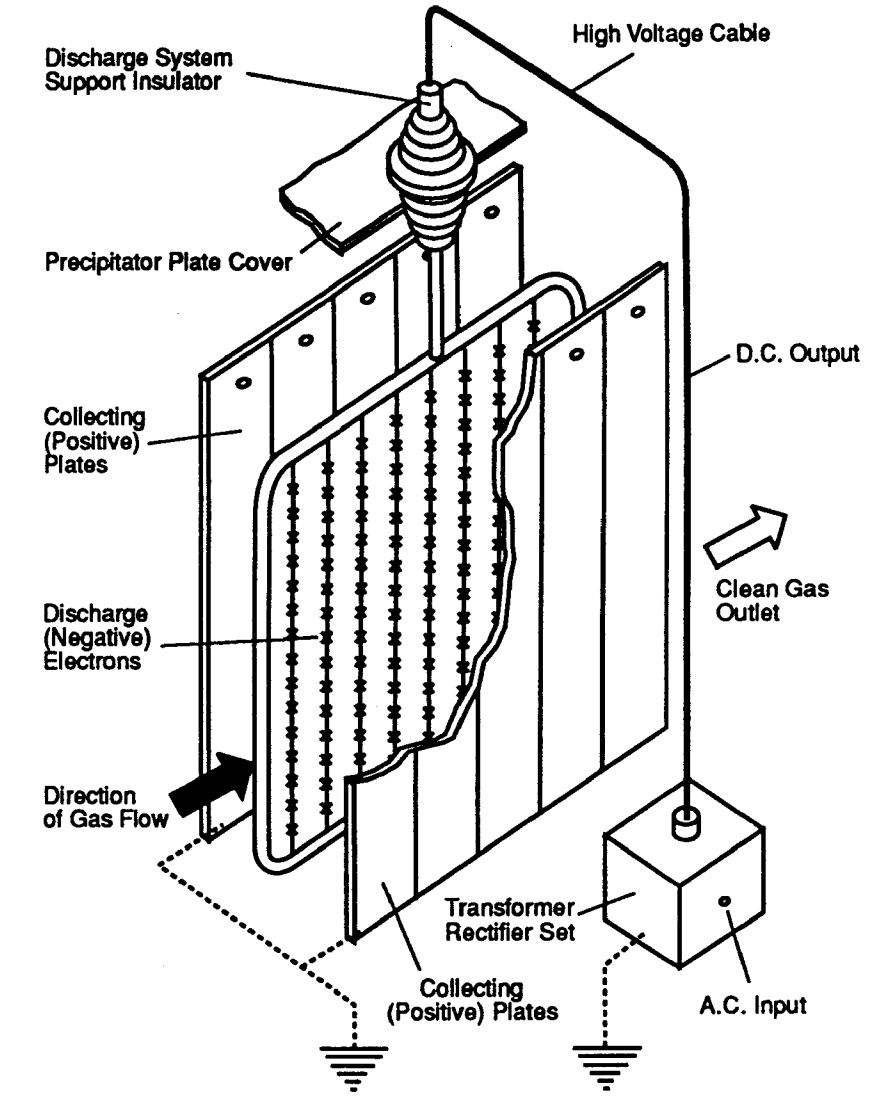
Air Pollution Control Equipment on Boilers (Continued)

- Precipitators use differences in physical properties to remove particulate matter from exhaust gases
- The most common type is the electrostatic precipitator
- Exhaust gases are passed through two oppositely-charged plates, are ionized, and migrate to a grounded plate

Notes:

Monitoring of Boilers

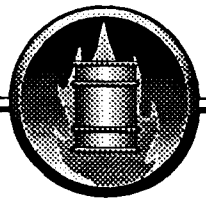
- Owners or operators of boilers must demonstrate compliance with emission standards for carbon monoxide, metals, chlorine gas, hydrogen chloride, particulate matter, and, in some cases, hydrocarbons
- They must do this by monitoring process feed rates, combustion temperature, and stack emissions



Source: Coulson, Richardson, Sinnot, 1983

Electrostatic precipitator

(Note: This diagram is not to scale)



Notes:

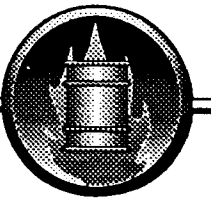
Monitoring of Feed Rate

- Solid and sludge feeds are measured using
  - Volumetric methods
  - Level indicators
  - Stationary weight indicators
  - Conveyer weighing systems
  - Momentum flowmeters

Notes:

Monitoring of Feed Rate (Continued)

- Liquid feeds are measured using
  - Rotameters
  - Orifice meters
  - Vortex shedding meters
  - Positive displacement meters
  - Mass flowmeters



Notes:

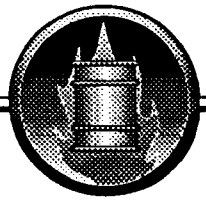
Monitoring of Feed Rate (Continued)

- Gaseous feeds are measured using
  - Orifice meters
  - Vortex shedding meters

Notes:

Carbon Monoxide, Oxygen, and Hydrocarbon Monitoring

- Owners or operators must use continuous emissions monitoring
  - continuously sample regulated parameter without interruption
  - evaluate detector response at least once every 15 seconds



Notes:

Temperature Monitoring

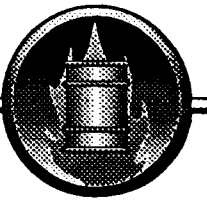
- The temperature in the combustion chamber is measured using
  - Thermocouples
  - Optical pyrometers

Notes:

- Ash and solid residuals may be land disposed either onsite or offsite (hazardous wastes must meet applicable requirements under the land disposal restrictions).
- Scrubber water is either treated onsite and discharged to a POTW or sent offsite for treatment or disposal.

Residuals Generated from Operating Boilers

- Residuals from air pollution control devices can be solids, sludges, or liquids
  - Particulate matter removed from stack gases
  - Scrubber water or sludges from wet scrubbers that remove halogens in exhaust gases
  - Bottom ash similar to incinerator ash



Notes:

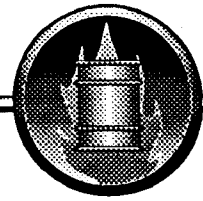
Industrial Furnaces [40 CFR 260.10]

- Enclosed devices that are an integral component of a manufacturing process, and use thermal treatment to recover materials and/or energy
- Units that burn materials that function solely as an ingredient for a manufacturing process are not regulated because the material being burned is not a solid waste [40 CFR 261.2(e)]

Notes:

Industrial Furnaces Include 12 Types of Devices:

1. Cement kilns
2. Lime kilns
3. Aggregate kilns, including light-weight aggregate kilns
4. Phosphate kilns
5. Coke ovens



Notes:

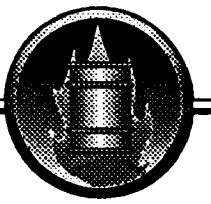
Industrial Furnaces (Types of Devices) Continued:

6. Blast furnaces
7. Smelting, melting, and refining furnaces
8. Titanium dioxide chloride process oxidation reactors
9. Methane reforming furnaces
10. Pulping liquor recovery furnaces

Notes:

Industrial Furnaces (Types of Devices) Continued:

11. Combustion devices used in the recovery of sulfur values from spent sulfuric acid
12. Halogen acid furnaces
13. Other furnaces designated by the Administrator based on the criteria outlined in the final rule

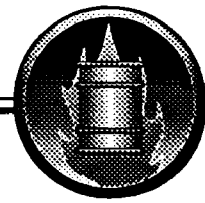


Universe of Industrial Furnaces That Submitted a Part A and Certification of Precompliance*

Region	Industrial Furnaces
1	1
2	4
3	15
4	13
5	9
6	22
7	9
8	4
9	6
10	1
Total	**84**

* - As of November, 1991

Notes:



Notes:

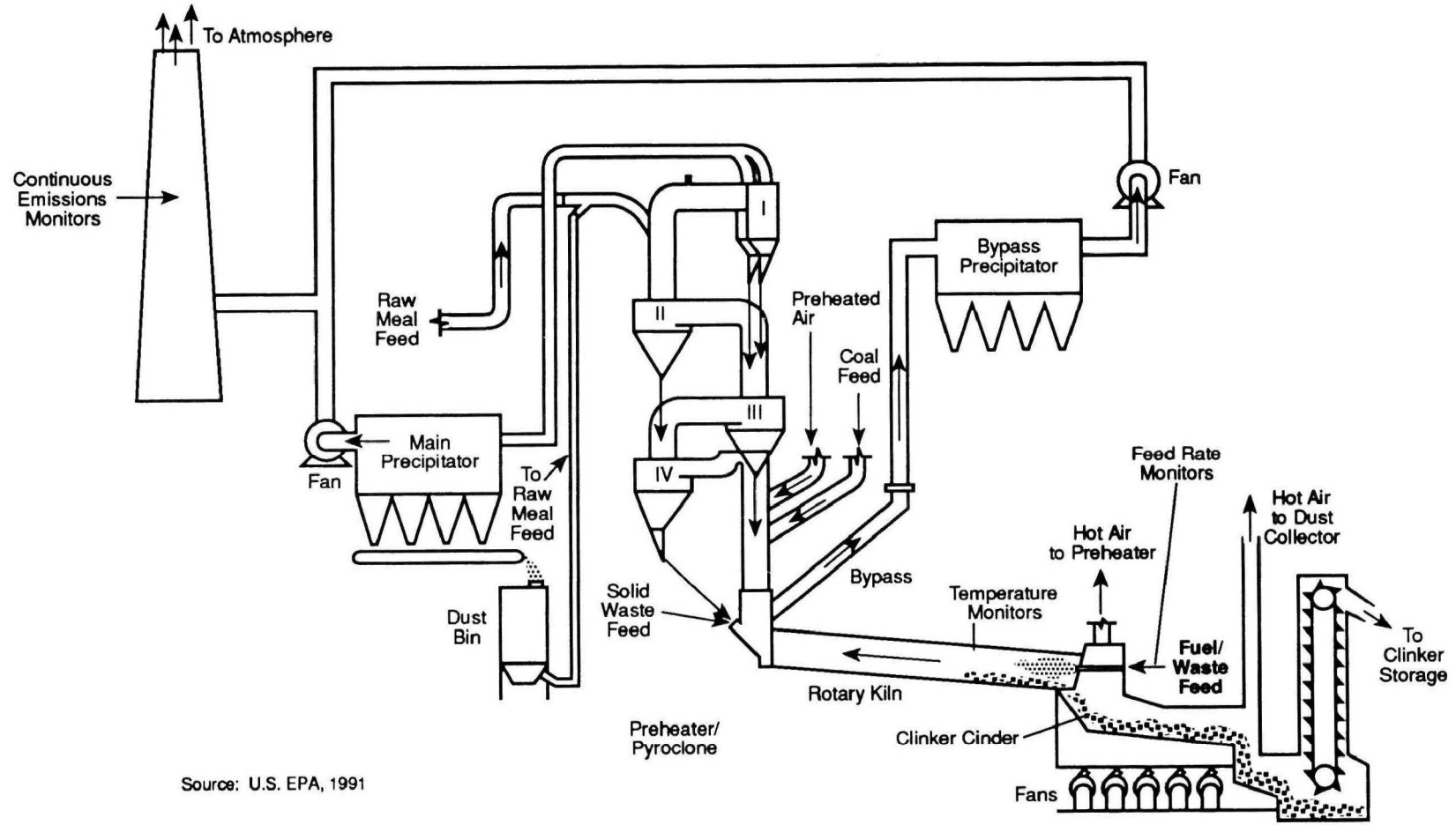
Cement Kilns

- Cement kilns are internally fired, rotating cylinders lined with refractory material.
- Cement kilns are usually positioned horizontally with a slight inclination to aid the flow of feed material through the combustion zone.

Notes:

Types of Cement Production Processes

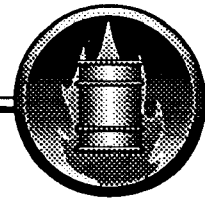
- Wet Process
- Dry Process



Source: U.S. EPA, 1991

Process flow diagram of cement kiln with a precalciner

(Note: This diagram is not to scale)



Notes:

Wet Process for Cement Manufacture

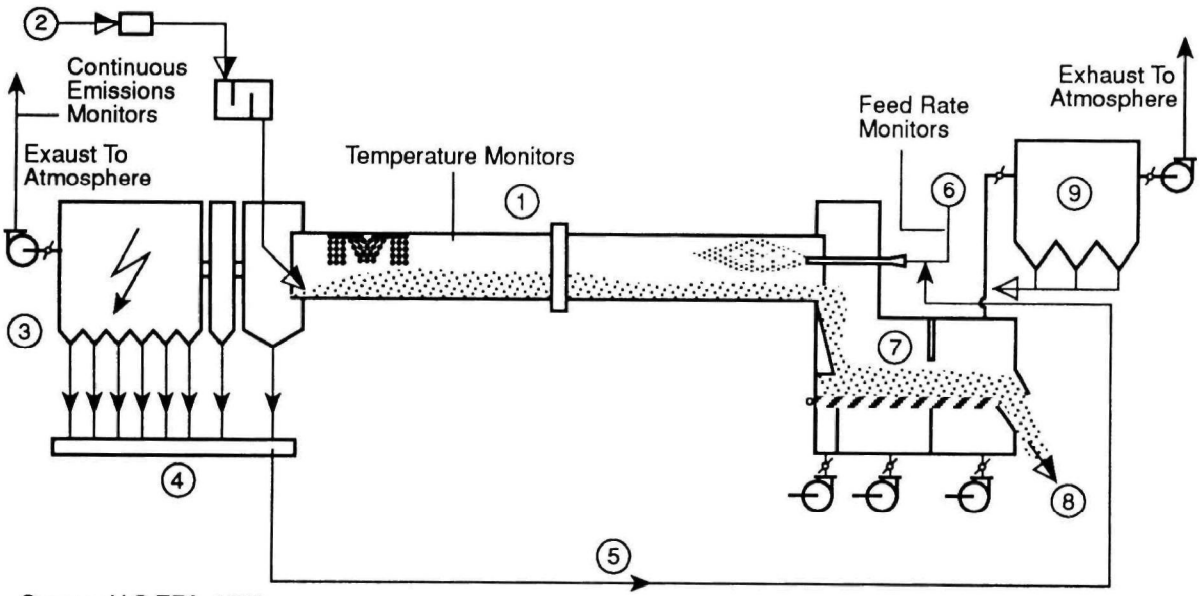
- Limestone and shale are ground, mixed with water, and fed into the kiln in a slurry form.
- Wet process kilns are longer than dry process kilns to facilitate the evaporation of water. Their length can range to 450 feet.

Notes:

- Calcination involves heating the limestone to 1,650° F to drive of carbon dioxide.

Dry Process for Cement Manufacture

- Raw materials, including limestone and shale, are ground (without the addition of water) and then precalcined in a preheater or precalciner before being fed into the kiln.
- Dry kilns are typically more thermally efficient than wet kilns.

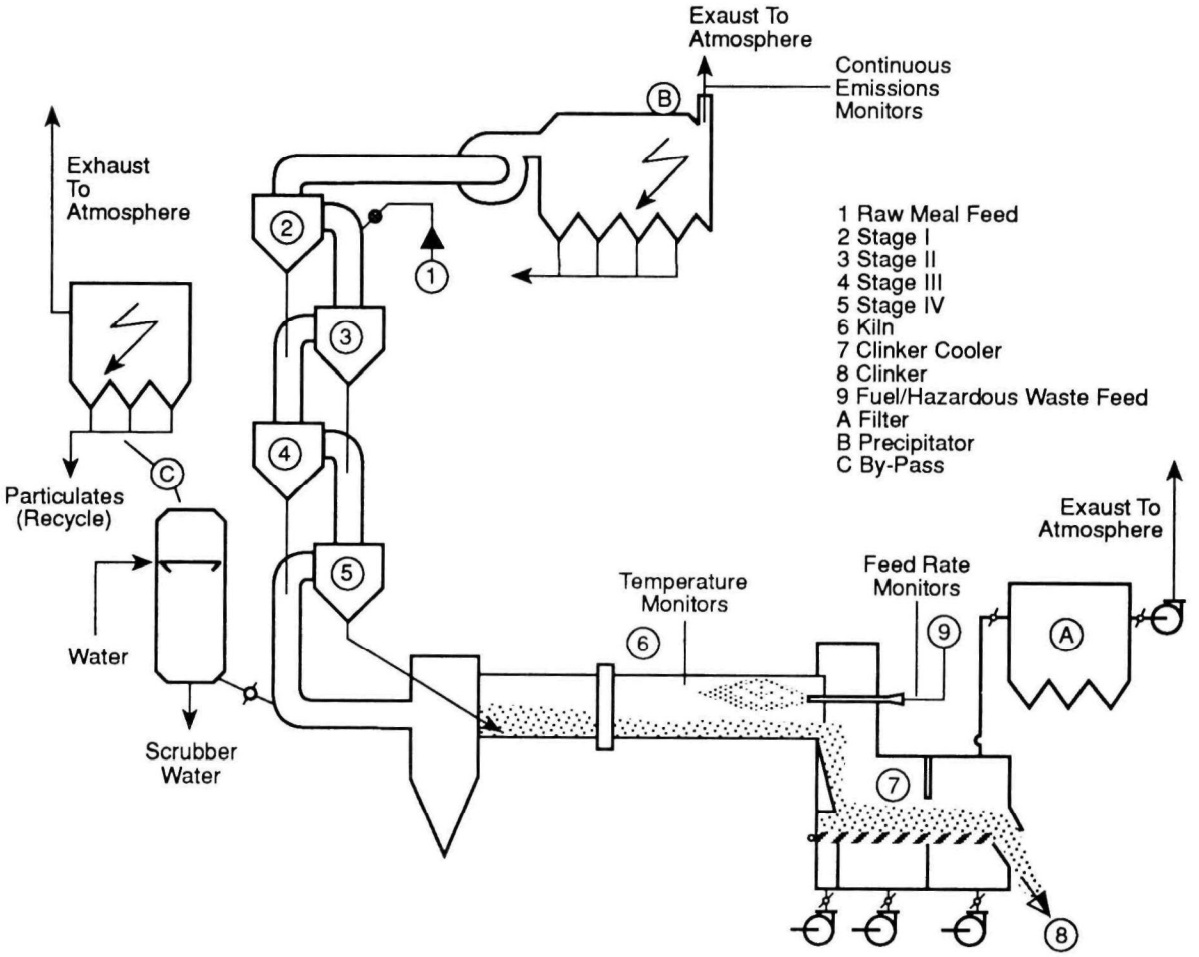


Source: U.S EPA, 1991

1 – Kiln
2 – Slurry Feed
3 – Precipitator
4 – Precipitator Dust Screw
5 – Dust Return
6 – Fuel/Hazardous Waste Feed
7 – Clinker Cooler
8 – Clinker
9 – Filter

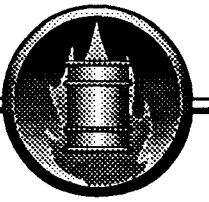
Schematic of a wet process cement kiln

(Note: This diagram is not to scale)



Schematic of a dry process cement kiln with four-stage suspension pre-heaters

(Note: This diagram is not to scale)



Notes:

- The feed material is subjected to progressively higher temperatures as it travels down the kiln.

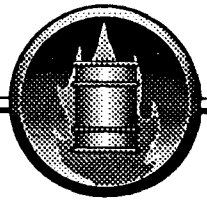
Cement Manufacturing Process

- Raw materials, including limestone and shale, are fed at the upper end of the inclined kiln and travel down while combustion gases from the low end of the kiln travel upwards (i.e., counter to the flow of feed material).

Notes:

Cement Manufacturing Process (Continued)

- The raw materials finally fuse at temperatures between 2,230 and 2,700° F to form "clinker".
- Clinker is removed from the kiln, cooled, ground to a small size, and mixed with other materials such as gypsum to form portland cement.



Notes:

- Fabric filters are generally made of woven felted clothes or synthetic fibers.
- Baghouses consist of a series of bags supported on a frame in a large chamber.

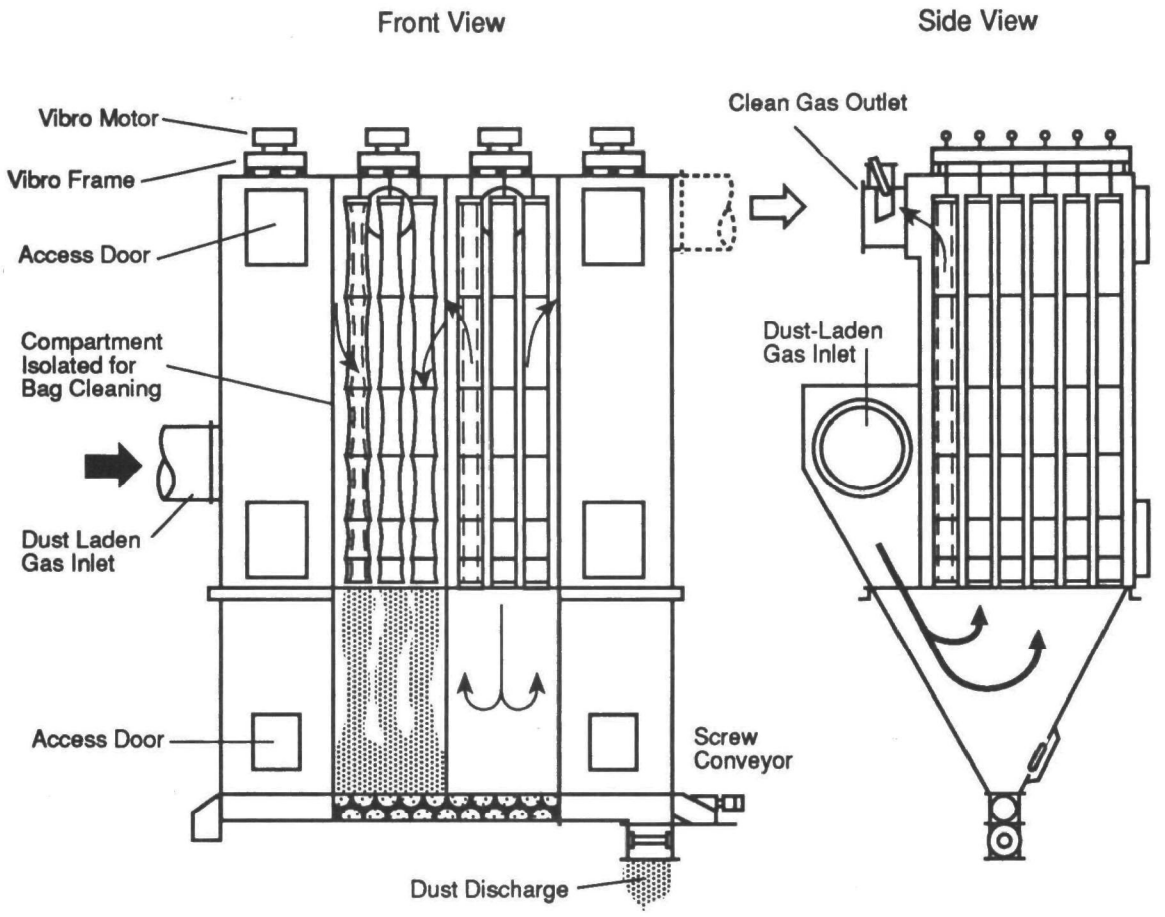
Controls for Particulate Emissions from Cement Kilns

- Combustion gases leaving the cement kilns contain 6 to 30 percent of feed solids as dust.
- Particulate emissions are controlled by electrostatic precipitators and fabric filters (baghouses).
- Collected dust is often recycled with the feed.

Notes:

By-Pass Duct for Cement Kilns Using Dry Process

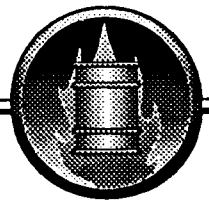
- 5 to 30 percent of kiln off-gases in a dry process are diverted to a by-pass duct.
- Gases from the by-pass duct go to the air pollution control system for the removal of particulates.



Source: Coulson, Richardson, Sinnott, 1983

Multi-compartment baghouse

(Note: This diagram is not to scale)



Notes:

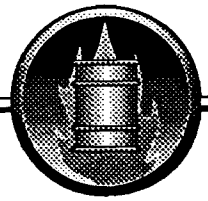
By-Pass Duct for Cement Kilns Using Dry Process (Continued)

- Removal of particulates from the system is necessary to prevent accumulation of metal salts in the combustion chamber that can adversely affect the production process.

Notes:

Residuals from Cement Kilns

- Residuals from these units include collected particulate matter from
  - Baghouses
  - Electrostatic precipitators



Notes:

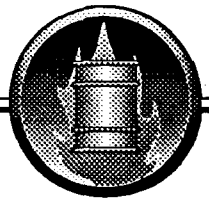
Monitoring of Cement Kilns

- Owners or operators of cement kilns must monitor for
  - Carbon monoxide (and hydrocarbons, if an alternative CO limit is allowed)
  - Combustion temperature (and flue gas temperature if an air pollution control system is used)
  - Total feed rates of hazardous waste and other raw materials and fuels

Notes:

Hazardous Waste is Burned to Serve as Fuel in a Cement Kiln

- Operators of cement kilns have been able to replace up to 50 percent of the kilns' normal fossil fuel requirement.
- Containers of liquid waste have been fired into the upper end and the midpoint of the kiln.



Notes:

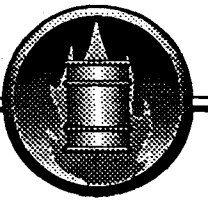
Light-Weight Aggregate (LWA) Kilns

- Light-weight aggregate is material with a specific gravity much less than that of sand and gravel.
- Light-weight aggregate is used to produce insulation and nonstructured and light-weight concrete.

Notes:

Light-Weight Aggregate Production Process

- Light-weight aggregate is produced like cement, but is made from special clays, pumice, scoria, shale, or slate.



Notes:

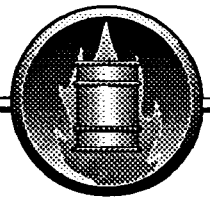
Burning of Hazardous Wastes in LWA Kilns

- LWA kilns are configured like cement kilns.
- They typically burn liquid hazardous wastes.
- Raw material is crushed and introduced at the upper end of a rotary kiln.
- Temperature of the kiln is 1,900 to 2,100°F.
- Heat provided by burners at the lower end of the kiln where aggregate is discharged.

Notes:

Air Pollution Control Devices for LWA Kilns

- LWA kilns are equipped with wet scrubbers, fabric filters, or electrostatic precipitators (ESPs).
- Dry systems (fabric filters, ESPs) reduce the cost of residue management .
- Recycling of collected particulates to the kiln is a common practice.



Notes:

- Scrubber water generated from these units is usually treated in tanks on site and either (1) discharged to a POTW or (2) sent off site for treatment or disposal.

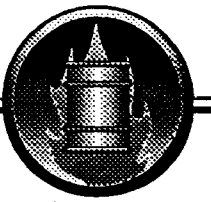
Residuals from Light-Weight Aggregate Kilns

- Residuals from these units include
  - Collected particulates from fabric filters and electrostatic precipitators
  - Scrubber water from wet scrubbers

Notes:

Monitoring Requirements for Light-Weight Aggregate Kilns

- Because the process is similar to that of cement kilns, the monitoring requirements are the same
  - Carbon monoxide, oxygen, and hydrocarbons (if necessary)
  - Combustion and flue gas temperature (if necessary)
  - Feed rates of hazardous waste, metals, chlorine, and chlorides



Notes:

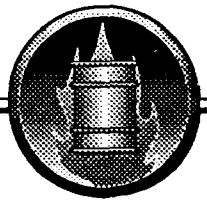
Halogen Acid Furnaces (HAFs)

- HAFs are typically modified firetube boilers.
- HAFs that generate steam are regulated as boilers. HAFs that do not generate steam are regulated as industrial furnaces.
- HAFs generate a halogen acid by scrubbing chlorine or bromine from combustion gases or by processing secondary wastestreams containing 20 to 70 percent chlorine or bromine.

Notes:

Halogen Acid Furnaces (Continued)

- The acid product from a HAF must be fed into a manufacturing process and the feed should contain a minimum halogen acid content of 3 percent.



Notes:

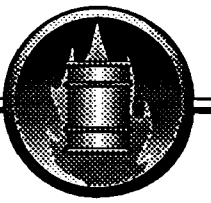
Designation of HAFs as Industrial Furnaces

- HAFs have been designated as industrial furnaces in response to DOW's petition that they are furnaces and not incinerators.
- HAFs are integral components of the manufacturing process and are not used to destroy wastes as is the case with incinerators.

Notes:

Designation of HAFs as Industrial Furnaces (Continued)

- HAFs are used to recover materials by reclaiming secondary materials to produce ingredients for an industrial process that manufactures a product.



Notes:

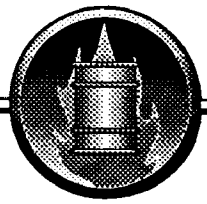
Designation of HAFs as Industrial Furnaces (Continued)

- HAFs also recover energy. A typical HAF burns wastes with heating values of approximately 9,000 Btu/pound.

Notes:

Air Pollution Control Systems for Halogen Acid Furnaces

- HAFs use wet scrubbers to capture halogens from stack gas to produce a halogen acid.



Notes:

- The scrubber water from a halogen acid furnace is required to be a product acid and cannot be a waste such as scrubber water from an incinerator.

Residuals from Halogen Acid Furnaces

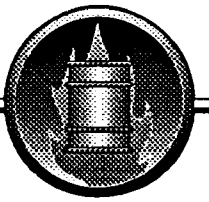
- Halogen acid furnaces are typically part of a process and do not usually generate significant quantities of residuals. However, certain feedstreams, when burned, may generate a bottom ash.

Notes:

- Unlike cement kilns and LWA kilns, owners or operators of halogen acid furnaces may have to monitor ash content in the feed to their units.

Monitoring Requirements for Halogen Acid Furnaces

- These units are subject to many of the same monitoring requirements as cement kilns and light-weight aggregate kilns.



Notes:

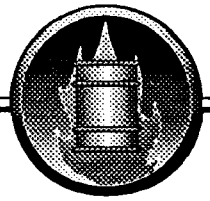
Smelting, Melting, and Refining Furnaces

- Smelting, melting, and refining furnaces are primarily designed to recover metals.
- Scrap metal is used as feed to these furnaces.
- Organic emissions are generally not a problem because typically organics are not present in the feed.

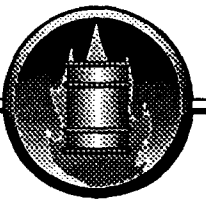
Notes:

Examples of Smelting, Melting, and Refining Furnaces

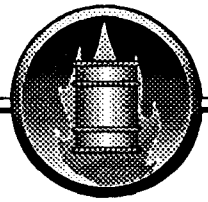
- These units include pyrometallurgical devices such as cupolas, sintering machines, roasters, smelters, and foundry furnaces. These units do not include cement kilns, LWA kilns, and HAFs.



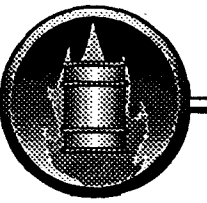
Notes:



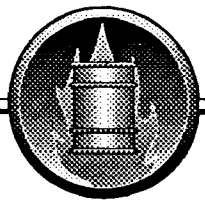
Notes:



Notes:

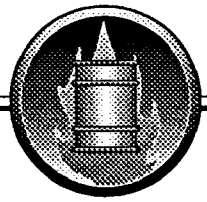


Notes:



PART III

Enforcement

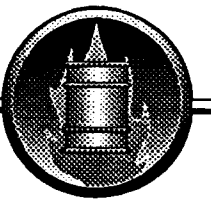


Enforcement Overview

Notes:

Key Dates Associated With Implementation of the BIF Rule

- May 22, 1991: Owners or operators of facilities with BIFs must have submitted a RCRA §3010 notification (if they had not already done so)
- August 21,1991: Facilities "in existence" on August 21,1991 must have submitted a Part A permit application and a certification of precompliance



Notes:

Key Dates Associated With Implementation of the BIF Rule (Continued)

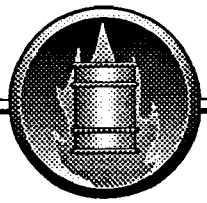
- August 21,1991: Facilities with a permit for one or more non-BIF units on February 21,1991 must have submitted a Class I permit modification
- February 17,1992: Permitted facilities must submit Class II or Class III permit modifications
- August 21,1992: Interim status facilities must submit a certification of compliance

Notes:

- The non-BIF provisions are effective in an authorized state when the state adopts them as part of their regulations.

State Authorization Issues Under the BIF Rule

- Because the BIF rule was promulgated primarily under HSWA authority, most of its provisions are effective immediately in all states
  - the only exceptions are the non-BIF provisions dealing with sludge dryers, carbon regeneration units, infrared incinerators, and plasma arc incinerators



Notes:

Major Requirements of the BIF Rule for Interim Status Facilities

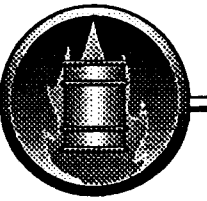
- Certification of precompliance-certify that emissions of metals, HCl, Cl_2, and particulates are not likely to exceed allowable limits
- Certification of compliance-certify compliance with emissions standards for metals, HCl, Cl_2, CO, and where applicable, HC and dioxins/furans

Notes:

- These procedures are described in more detail in a guidance memorandum issued by OWPE on January 22, 1992.

Enforcement Responses for Facilities That Submit an Inadequate Certification of Precompliance

- Issue a RCRA Section 3007 letter for minor omissions or inadequacies
- Issue a NOV for major deficiencies
- Possibly order closure of the BIF if no response is received to the two options above



Applicability of the Sham Recycling Policy to the BIF Rule

- A policy issued March 16, 1983 (48 FR 11157) stated that wastes with a heating value less than 5,000 Btu/lb were being incinerated when burned.
- This policy remains in effect until owners or operators submit a certification of compliance; after a certification of compliance is submitted, a BIF may burn wastes for any purpose, including for destruction.

Notes:

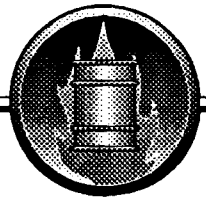
- Two exceptions to the policy are
  - wastes burned for testing purposes (40 CFR 266.103 (a)(6))
  - wastes burned solely as an ingredient

Enforcement Priorities

- Inspectors and enforcement officials should target violators who
  - Fail to submit a Part A permit application
  - Fail to submit a certification of compliance

Notes:

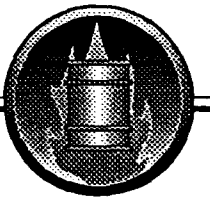
- These priorities are consistent with the recommendations of the RCRA Implementation Study conducted in 1990.



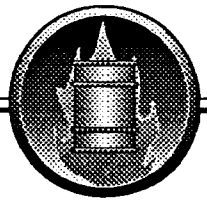
Notes:

Waste Minimization Opportunities Under the BIF Rule

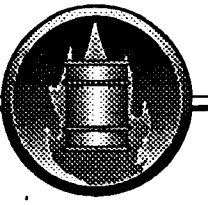
- Inspectors and enforcement officials should look for opportunities to obtain commitments from owners or operators to implement waste minimization measures.



Notes:



Notes:

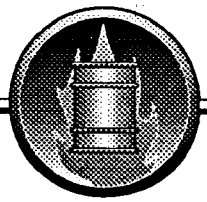


Inspections

Notes:

Inspection Types

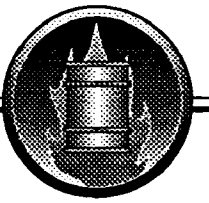
- Inspections will be conducted for facilities operating under:
  - precompliance certifications
  - compliance certifications
  - permits
  - small quantity burner exemption
  - smelting, melting, and refining exemption



Notes:

General Requirements for BIFs

- Owners or operators of BIFs must comply with:
  - TSDF standards – Parts 264 and 265, Subparts A – L, BB
  - If hazardous waste is stored before burning, the owner or operator must comply with Parts 264 and 265, Subpart I and/or Subpart J.



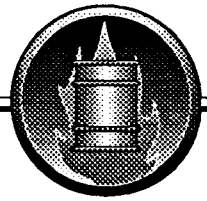
Direct Transfer Operations

Notes:

- EPA encourages facilities to use permanent storage areas and allows changes during interim status for this purpose.
- Units exempt (e.g., small quantity burners) under the rule are not required to meet these standards.

Storage Before Burning in BIFs

- The final rule regulates direct transfer operations in 40 CFR 266.111.
  - Rule includes standards for areas where transport vehicles and ancillary equipment are located.
- Concerns with direct transfer include the potential for fires, explosions, and spills and the ability of the burner to consistently provide efficient combustion of the waste.



Notes:

Requirements for Direct Transfer Areas

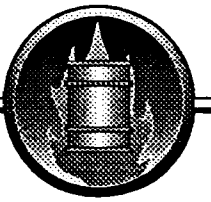
- The requirements for direct transfer areas include:
  - structural integrity
  - containment
  - leak detection
  - response to leaks and spills
  - design and installation of new direct transfer equipment
  - closure

Notes:

- Enforcement personnel should arrange a visit to the facility so they can witness a direct transfer operation.

Inspection of Direct Transfer Operations

- Inspectors should focus on requirements for:
  - managing incompatible wastes
  - spill prevention controls
  - automatic waste feed cutoffs
  - applicable Subpart I and Subpart J requirements
  - inspection requirements
  - integrity of equipment

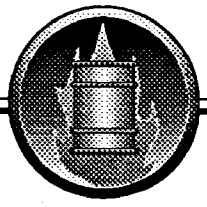


Inspection and Recordkeeping Requirements for Facilities with Direct Transfer Operations

- Direct transfer operations should be inspected **hourly** for leaks and other potential problems. Facilities should inspect:
  - overfill and spill control equipment
  - direct transfer equipment
  - monitoring equipment
  - cathodic protection systems
- Records of inspections must be maintained in the operating record

Notes:

- Facilities must document these inspections.

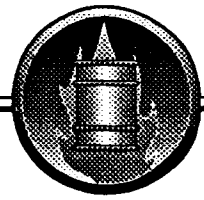


Integrity Assessments for Direct Transfer Areas

- Owners or operators of direct transfer equipment without secondary containment must perform an integrity assessment of the equipment. The assessment must consider design standards, hazardous characteristics of wastes, corrosion protection, age of equipment, and results of leaks tests.

Notes:

- The integrity assessment must be certified by a registered professional engineer.



Notes:

Standards for New Direct Transfer Equipment

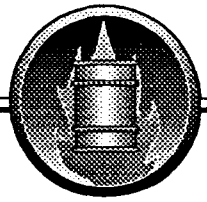
- New direct transfer equipment must meet the design and installation standards for tank systems, and include:
  - backfill requirements
  - tightness tests
  - equipment support and protection requirements
  - corrosion protection
  - certification of construction

Notes:

Response to Leaks or Spills*

- When a leak or spill occurs, the owner or operator must:
  - cease feeding of waste
  - inspect direct transfer equipment
  - remove wastes from the system
  - determine cause of release
  - notify the Regional Administrator
  - certify major repairs

* same as for tanks 40 CFR 265.196 (Subpart J)



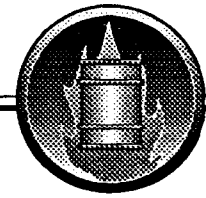
Precompliance

Notes:

Inspection Preparation*

- Prior to an inspection, inspectors should:
  - review the certification
  - become familiar with the types of units at the facility (draw process flow diagrams)
  - obtain checklists (if available)

* These preparation activities are important for any inspection



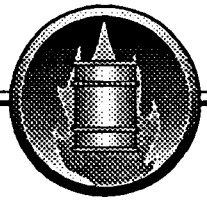
Key Operating Parameters for Which Precompliance Limits Must Be Established

- Total feed rate of all pumpable hazardous wastes* and total feed rate of all hazardous wastes.
- Feed rate of each of the 10 BIF-regulated metals in:
  - Total feed streams**,
  - Total hazardous waste feed streams, and
  - Total pumpable hazardous waste feed streams.*
- Total feed rate of chlorine and chlorides in total feed streams.
- Total feed rate of ash in total feed streams, except for cement and light-weight aggregate kilns.
- Maximum production rate.

* Not applicable if complying with the Tier I or adjusted Tier I metals feed rate screening under §266.106(b) or (e)

** Not applicable for industrial furnaces recycling particulate matter complying with §266.103(b)(4)

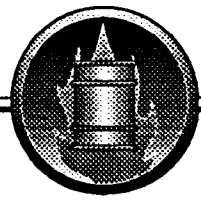
Notes:



Facilities that Recycle Particulate Matter

- Feed rates of metals may need to be adjusted because this recycling may lead to a gradual increase in metals concentrations within the unit.
- Facilities must
  - Specify concentration limits for metals in collected particulate matter;
  - Sample the stack gas for metals; or
  - Condition the furnace prior to precompliance or compliance testing

Notes:



Notes:

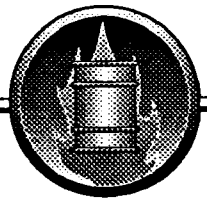
Effect of Selected Tier on Inspections

- Under Tier I or adjusted Tier I, a facility will not have limits on feed rate of pumpable hazardous waste or feed rate of each metal in the total pumpable hazardous wastestream.
  - Inspectors should examine only total hazardous waste feed rates.
  - Conservative hazardous waste feed rates are found in Appendix I to the rule.

Notes:

Feed Rate Limits for Cement Kilns and Light-Weight Aggregate Kilns

- These units have no feed rate limit for ash



Waste Analysis and Sampling

- Inspectors should check documentation associated with waste characterization, especially the waste analysis plan
  - identification of waste streams
  - parameters to be tested
  - frequency of analysis
  - sampling and analytical methods

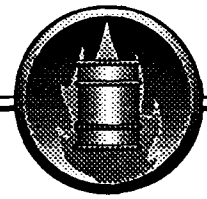
Notes:

- Inspectors should refer to the "Implementation Document for the BIF Rule" and the "Handbook on QA/QC Procedures for Hazardous Waste Incinerators" for additional guidance on testing and sampling requirements

Waste Analysis and Sampling (Continued)

- Other important information
  - date samples are obtained
  - name of laboratory conducting the analysis
  - sample preparation and analysis methods
  - date the analysis was performed
  - results (data)
  - analytical QA/QC results

Notes:



Notes:

- Inspectors should examine operating and inspection logs for feed rates; concentration of metals, chlorine, and ash; and schedules for inspecting monitors.

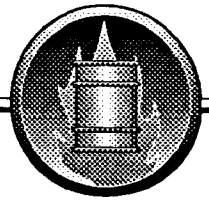
Frequency of Monitoring

- Owners or operators must monitor operating parameters on either an instantaneous or hourly rolling average basis:
  - concentrations of metals, total chlorine and chlorides, and ash in each feed stream
  - other relevant operating parameters

Notes:

Instantaneous Limit

- A value that may not be exceeded at any time



Notes:

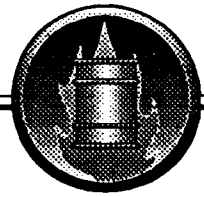
Hourly Rolling Average

- Arithmetic mean of the 60 most recent 1-minute average values recorded by a continuous monitoring system

Notes:

Continuous Monitor

- continuously samples and evaluates detector response once every 15 seconds
- computes and records the average value at least every 60 seconds



Notes:

Determining Proper Function of Monitoring Equipment

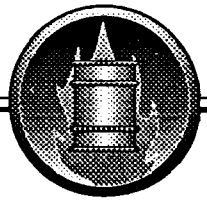
- conduct visual inspection
- ask operators questions
- review inspection log

Notes:

- Inspectors should review logs, strip charts, and printouts to verify that monitoring is conducted and that results are maintained in the operating record once monitors are installed.
- Monitors must be installed at the time of the certification of compliance

Additional Monitoring Requirements

- Once monitoring equipment is installed and operating correctly, facilities operating under a certification of precompliance are required to conduct continuous monitoring for:
  - carbon monoxide
  - hydrocarbons (in certain cases)
  - combustion chamber temperature
  - other parameters as dictated by the type of air pollution control system used



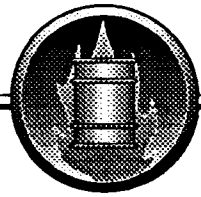
Compliance Certification

Notes:

Additional Operating Parameters for Which Compliance Limits Must Be Established

- CO concentration and where required, HC concentration in the stack gas
- maximum combustion chamber temperature*
- maximum flue gas temperature entering the PM control device*
- limits for other specified APCS operating parameters (40 CFR 266.103(c)(2)(ix-xiii))

* Not applicable if complying with the Tier I or adjusted Tier I metals feed rate screening limits under 40 CFR 266.106(b) or (e)



Continuous Emissions Monitors Operation and Maintenance

- CO, HC, and oxygen monitors must be installed, operated, and maintained per Appendix IX of Part 266
- records of operation and maintenance must be maintained in the facilities operating record

Notes:

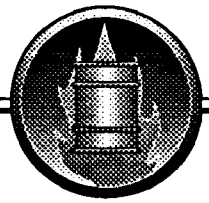
- This includes:
  - daily calibration checks for each monitor;
  - daily system audits;
  - quarterly calibration error tests; and
  - annual performance specifications tests

Compliance Monitoring Requirements

- Facilities operating under a certification of compliance must conduct continuous emissions monitoring to ensure compliance with the following in the stack gas:
  - carbon monoxide –100 ppm; corrected to 7 percent oxygen on a dry basis
  - carbon monoxide and oxygen must be monitored on a continuous basis at the same location

Notes:

- The stack gas concentrations of carbon monoxide may exceed 100 ppm for certain industrial furnaces provided that stack gas concentrations of hydrocarbons do not exceed 20 ppmv.



Notes:

- Inspectors should examine logs and/or strip charts to verify compliance and to ensure that thermocouples or pyrometers are adequately maintained and operated.
- Interviews with key facility personnel should also be conducted to verify procedures.

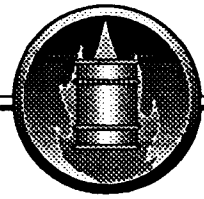
Temperature Monitoring Requirements

- Owners or operators must continuously monitor combustion chamber temperature to ensure temperature limits are met.
  - Temperature must be monitored as close to combustion zone as possible and upstream of any quench water injection.

Notes:

Automatic Waste Feed Cutoff System

- The following operating parameters must be connected to the automatic waste feed cutoff system
  - maximum CO concentration in the stack gas
  - maximum HC concentration in the stack gas
  - maximum production rate
  - maximum total feed rate of hazardous waste

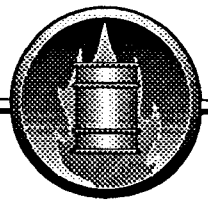


Automatic Waste Feed Cutoff System (Continued)

- minimum combustion chamber temperature
- maximum feed rate of pumpable hazardous waste*
- maximum combustion chamber temperature*
- maximum flue gas temperature entering a particulate matter control device
- limits of key APCS operating parameters

* does not apply to facilities complying with Tier I or adjusted Tier I feed rate screening limits

Notes:

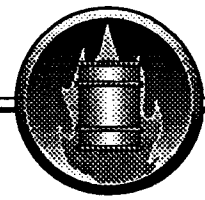


Automatic Waste Feed Cutoff System (Continued)

- After a cutoff:
  - Monitoring of all parameters must continue
  - Wastes cannot be fed back into the unit until operating conditions again meet terms of the certification of compliance.
  - Minimum combustion chamber temperature that occurred during the compliance test must be maintained while waste remains in the combustion chamber
  - When the unit is operational, the system must be tested once every 7 days, unless the owner or operator can demonstrate that less frequent testing is appropriate. However, the system must be tested at least every 30 days.

Notes:

- Inspectors should examine the operating record to determine compliance with these provisions. Inspectors should also have the facility demonstrate that the automatic waste feed cutoff system works (if possible).

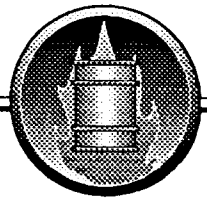


Requirements for Air Pollution Control Equipment

Monitoring requirements for air pollution control devices include:

- For wet scrubbers (including wet ionizing scrubbers):
  - minimum liquid to flue-gas ratio
  - minimum scrubber blowdown or maximum suspended solids content of scrubber waste
  - minimum pH level of the scrubber water
- For venturi scrubbers:
  - minimum differential gas pressure across the venturi

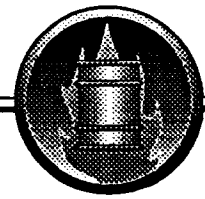
Notes:



Requirements for Air Pollution Control Equipment (Continued)

- For dry scrubbers:
  - minimum caustic feed rate
  - maximum flue gas flow rate
- For wet ionizing scrubbers or electrostatic precipitators:
  - minimum electrical power to the precipitator plates
  - maximum fuel gas flow rate
- For fabric filters or baghouses:
  - minimum pressure drop across the unit

Notes:



Notes:

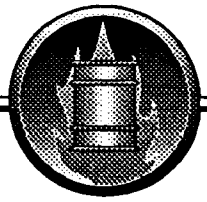
Obtaining Compliance Information

- fill out certified values on checklist prior to inspection
- verify correct value
- verify units
- determine if instantaneous versus hourly rolling average

Notes:

Strip Charts

- scale, orientation, units, and zero offset
- color of ink and number of different parameters
- time scale and dates
- recordkeeping problems



Notes:

Computerized Printouts

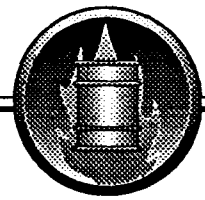
- readable and understandable format
- meaning of numbers presented
- completeness

Notes:

Additional Sources of Information for Inspections

Inspectors can obtain more information concerning a particular facility by:

- attending the compliance test burn or trial burn (inspectors may want to attend the burn with the permit writer for the facility)
- taking courses on combustion technologies and air pollution control systems
- accompanying an experienced inspector on several inspections



Notes:

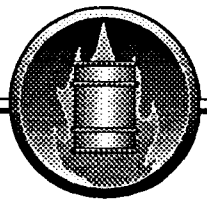
Specialized Hazardous Waste Combustion Inspectors

- New initiative in which EPA Regions are participating
- EPA eventually would like state involvement

Notes:

Inspections at Permitted Facilities

- The requirements for an interim status facility operating under a certification of compliance and a permitted facility are nearly the same.
  - However, permitted facilities must demonstrate a 99.99% destruction and removal efficiency requirement for toxic organics and a 99.9999% destruction and removal efficiency for dioxins. This is done during the trial burn.

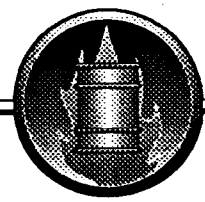


Inspections for Small Quantity Burners

- There are several conditions for obtaining the small quantity burner exemption:
  - Applies only to BIFs burning hazardous waste at the same facility where the waste was generated.
  - Hazardous waste cannot constitute more than 1% of the total heat input or mass of the feed.
  - Hazardous waste must have a minimum heating value of 5,000 Btu/pound.
  - Hazardous waste cannot contain any F-listed dioxin wastes.

Notes:

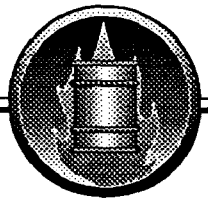
- Inspectors should examine notifications submitted by facilities and records documenting compliance with the exemption. These documents include information concerning:
  - quantities of hazardous waste and other fuels per burn
  - heating value of the hazardous waste



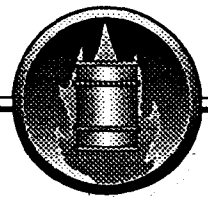
Notes:

Smelting, Melting, and Refining Deferral

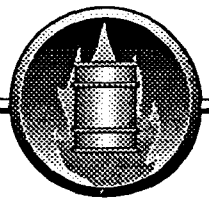
- Notification
- Sampling and analysis
- Records to document compliance



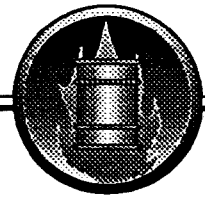
Notes:



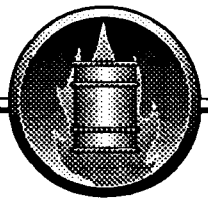
Notes:



Notes:



Notes:



Additional Information

1. Implementation Document for BIFs (available Spring 1992)

2. Hazardous Waste Incinerator Inspection Manual

   - OSWER Directive No. 9938.6 (April 1989)
   - Available from State or Region

3. Hazardous Waste Incinerator Inspection Video

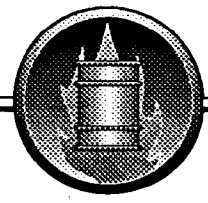
   - Available from Regional RCRA Training Coordinators

Region I:	Georgie Bishop	FTS-835-3393 or 617-565-3393
Region II:	Margarite Halley	FTS-264-9593 or 212-264-9593
Region III:	Judy Lee	FTS-597-7938 or 215-597-7938
Region IV:	Margaret Mears	FTS-257-2234 or 404-347-2234
Region V:	Alan Lang	FTS-353-2775 or 312-353-2775
Region VI:	Donna Smith	FTS-255-6700 or 214-655-6700
Region VII:	Gary Bertram	FTS-270-7533 or 913-551-7533
Region VIII:	Charles Brinkman	FTS-330-1489 or 303-293-1489
Region IX:	Eve Levin	FTS-484-2110 or 415-744-2110
Region X:	Susan Hutcherson	FTS-399-2852 or 206-553-2852

4. Federal Registers:

   February 21, 1991 (56 FR 7134)
   July 17,1991 (56 FR 32688)
   August 27,1991 (56 FR 42504)

   - Available from the RCRA Docket: 202-260-9327



Additional Information

5. Handbook on Hazardous Waste Incineration Measurement Guidance Manual (EPA/625/6-89/021)
   - Available from ORD Publications: FTS-684-7562 or 513-569-7562

6. Schedule of Air Pollution Training Courses
   - Available from: Air Pollution Training Institute
     Environmental Research Center – MD17
     Research Triangle Park, NC 27711

★U.S. GOVERNMENT PRINTING OFFICE: 1992-617-003/47085

BIF Rule Satellite Training Course

April 7, 1992

Do you have a question?

(One question per card, please)

Question directed to: _____

Name of panelist

Topic: _____

Question: _____

_____

_____

_____

Name and viewing location: _____

Your name — Office Location

_____

Affiliation — Phone

BIF Rule Satellite Training Course

April 7, 1992

Do you have a question?

(One question per card, please)

Question directed to: _____

Name of panelist

Topic: _____

Question: _____

_____

_____

_____

Name and viewing location: _____

Your name — Office Location

_____

Affiliation — Phone

BIF Satellite Training Course

Evaluation Form
April 7, 1992

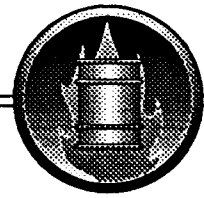
Name: _____ Affiliation: _____
Address: _____
Phone Number: (_____)_____

I. Is this your first satellite training? Yes _____ No _____

II. Please use the following key to respond to the following statements:

SA – strongly agree,
A – agree,
U – undecided,
D – disagree, and
SD – strongly disagree.

	SA	A	U	D	SD
1) "Regulations" Session					
a) The pace of the presentation was adequate.	☐	☐	☐	☐	☐
b) The level of detail of the information was appropriate.	☐	☐	☐	☐	☐
c) The length of the question and answer session was adequate.	☐	☐	☐	☐	☐
d) The questions were handled professionally.	☐	☐	☐	☐	☐
2) "Technology Overview" Session					
a) The pace of the presentation was adequate.	☐	☐	☐	☐	☐
b) The level of detail of the information was appropriate.	☐	☐	☐	☐	☐
c) The length of the question and answer session was adequate.	☐	☐	☐	☐	☐
d) The questions were handled professionally.	☐	☐	☐	☐	☐
3) "Enforcement" Session					
a) The pace of the presentation was adequate.	☐	☐	☐	☐	☐
b) The level of detail of the information was appropriate.	☐	☐	☐	☐	☐
c) The length of the question and answer session was adequate.	☐	☐	☐	☐	☐
d) The questions were handled professionally.	☐	☐	☐	☐	☐
4) The training site setting (i.e. room size, temperature, brightness) was good.	☐	☐	☐	☐	☐
5) The reception (audio/video) was good.	☐	☐	☐	☐	☐
6) The site facilitator was helpful.	☐	☐	☐	☐	☐
7) Manuals/handouts were available and useful.	☐	☐	☐	☐	☐
8) The training provided me with an adequate understanding of the topic.	☐	☐	☐	☐	☐
9) The information and ideas presented will help me on the job.	☐	☐	☐	☐	☐
10) The video segments were well produced and helped me to understand the topic.	☐	☐	☐	☐	☐



III. Was the length of the training adequate?

IV. Did your question get asked over the telephone? Yes _____ No _____

V. Did this training meet your expectations? Yes _____ No _____

VI. Do you think this satellite training was as successful as a face-to-face training?
Yes _____ No _____ Why?

VII. Describe the strengths of this satellite training.

VIII. Describe the weaknesses of this satellite training.

IX. Comments or suggestions:

Return evaluation forms to:

Kate Anderson
U.S. Environmental Protection Agency
OWPE – RCRA Enforcement Division
401 M Street, SW (0S-510)
Washington, D.C. 20460