Final Rules to Reduce Air Toxics from Boilers and Incinerators

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Topics

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Overview of EPA actions

- **EPA is issuing four rules that will reduce emissions of air pollutants from**:
  - Boilers at large sources of air toxics (“major sources”)
  - Boilers at small sources of air toxics (“area sources”)
  - Incinerators that burn solid waste at industrial and commercial facilities (CISWI)
  - Incinerators that burn sewage sludge at wastewater treatment facilities (SSI)
- **EPA is also issuing a final rule that defines “solid waste”**
  - Necessary to determine whether a facility has to meet a boiler standard or an incinerator standard
- **A federal court required EPA to issue these standards no later than February 21.**
  - Prior Administration’s standards were overturned in court.
  - Final standards signed on February 21, 2011.
- **EPA made significant changes to the proposed standards based on our review of additional data and 4,800 public comments received during comment period.**
  - Final standards achieve significant health benefits while being more practical and less costly to implement.
- **EPA is initiating a reconsideration process for the two boiler rules and the Commercial, Industrial Solid Waste Incinerator (CISWI) rule.**

Two rules cover boilers & process heaters

- ***Boilers*** burn fuel to produce steam that is used for heat or electricity
- ***Process heaters*** heat raw or intermediate materials during an industrial process
- **EPA has issued two standards covering:**
  - **Boilers and process heaters at major sources of air toxics**
    - A major source is a facility that emits or has the potential to emit 10 or more tons per year (tpy) of any single air toxic or 25 tpy or more of any combination of air toxics.
    - Expected to apply to about 13,800 boilers located at 1,600 facilities, primarily larger industrial sources such as refineries, chemical and manufacturing plants, pulp and paper mills
      - Also includes boilers at some larger commercial and institutional facilities, such as shopping malls and universities
    - More than 80% of large boilers are gas-fired and will only have to conduct an annual tune-up rather than meet an emission standard.
    - 15 subcategories identified based on design; specific requirements for each subcategory
    - Standards vary slightly for existing units vs. new units
  - **Boilers at area sources of air toxics**
    - An area source facility emits or has the potential to emit less than 10 tons per year (tpy) of any single air toxic and less than 25 tpy of any combination of air toxics.
    - Expected to apply to about 187,000 boilers located primarily at commercial facilities (e.g., hotels, office buildings, restaurants) and institutional facilities (e.g., schools, hospitals, prisons)
    - Rule does NOT apply to boilers that are gas-fired (approximately 1.3 million units, or 87% of all area source boilers).
    - Most units that are covered by this rule will be required to conduct a tune-up every other year and will not have to install pollution control equipment.
    - Subcategories based on boiler type
    - Standards vary slightly for existing units vs. new units

Two rules cover incinerators

- **Incinerators burn waste**
  - Sometimes the heat is used for heat, energy or steam
- **EPA has issued two standards covering:**
  - **Commercial and Industrial Solid Waste Incinerators (CISWI)**
    - Number of units subject to this rule: 88
    - Commercial and industrial facilities that burn solid waste
    - Includes all size sources – no major and area source distinction
    - 4 subcategories based on type of incinerator
  - **Sewage Sludge Incineration (SSI)**
    - Number of units subject to this rule: 204
      - 155 of these 204 units already meet the emission limits established in this rule
    - Incinerators or combustion devices that burn dewatered sewage sludge, typically at wastewater treatment facilities designed to treat domestic sewage sludge
    - Includes all size sources – no major and area source distinction
    - 2 subcategories based on type of incinerator
    - Units incinerating sludge at other types of facilities (e.g., commercial, industrial, and institutional) will be covered under different air pollution standards.

These rules satisfy Clean Air Act requirements for air toxics

- Developed under Clean Air Act sections 112 and 129
  - Require EPA to set technology-based standards for toxics
  - Reflect levels achieved by best-performing existing sources
    - Generally may set less stringent standards for boilers at area sources.
- Court-driven deadlines to fix rules
  - Previous final rules for major source boilers and CISWI were overturned by the D.C. Circuit Court of Appeals in 2007
- EPA under court order to sign final rules no later than Feb. 21, 2011
- EPA's process
  - Conducted a Small Business Advocacy Review (SBAR) panel for the boiler rules prior to proposal.
  - Proposed standards for boilers and CISWI in April 2010
  - Three public hearings; extended public comment period
    - Received more than 4,800 public comments, including significant new data from industry
- EPA significantly modified the rules in response to comments and new data
  - Final standards reflect the latest and best information provided during the public comment period
- EPA is initiating a reconsideration of certain aspects of the two boiler rules and Commercial Solid Waste Incinerator (CISWI) rule
  - Some of the comments raise difficult technical issues that would benefit from additional public involvement.
  - Stakeholders may petition for reconsideration of other issues.

These rules reduce toxic emissions & protect human health

- Burning biomass, coal, and oil results in emissions of mercury, dioxin, furans, formaldehyde, lead, and hydrochloric acid.
- The technologies to reduce toxic air pollution have largely been available and in use for decades.
- Health effects are significant:
  - Mercury can cause adverse effects on children's developing brains, including effects on IQ, learning and memory.
  - Air toxics can cause cancer and other serious health effects in adults and children.
  - Controlling air toxics will also reduce fine particle pollution and carbon monoxide.
    - Fine particles are linked to serious cardiovascular and respiratory effects, even premature death.
    - Carbon monoxide reduces oxygen delivery to heart and brain, can cause angina and other problems for people with heart disease.

Estimated annual health benefits of these rules

Health Effect	***Estimated # Avoided***
Premature deaths	2,600 to 6,600
Nonfatal heart attacks	4,100
Hospital and emergency room visits	4,400
Chronic bronchitis cases	1,700
Acute bronchitis cases	3,800
Aggravated asthma cases	42,000
Days when people miss work or school	320,000
Acute respiratory symptoms	1.9 million

The benefits of these rules exceed their costs

- **For every $1 that these rules will cost society, the public will see at least $10 to $24 in public health benefits.**
  - These rules will yield combined health benefits valued at an estimated $23 billion to $56 billion annually.
- **Installing and maintaining pollution controls for these rules is estimated to cost $2.1 billion per year.**
- **Costs of the combined final rules are about 50 percent less than at proposal.**
  - EPA made significant changes to the proposed standards based on review of additional data and more than 4,800 comments received during the public comment period.
  - Final standards achieve significant health benefits while being more practical and less costly to implement than the proposed standards would have been.

These rules will create jobs

- Analysis of the major and area source boiler rules' positive and negative impacts on employment indicate that they alone will create a net gain of about 2,200 jobs.
  - This does not include any jobs created to manufacture and install equipment to reduce air pollution.
- The Clean Air Act has spurred innovation and is one reason why American environmental technology industry is a world leader and a growth industry.
  - Environmental firms and small businesses in the US generated $300 billion in revenues and $44 billion in exports in 2008 (Department of Commerce estimates).
- All told, the pollution control industry directly supports 1.7 million American jobs and indirectly supports another 3.8 million jobs.

EPA is initiating a reconsideration process for the two boiler rules and CISWI rule

- EPA is announcing that we are reconsidering certain aspects of both boiler rules and the solid waste incinerator rule.
- While these final rules reflect reasonable approaches consistent with the requirements of the Clean Air Act, some of the issues identified in the public comments raised difficult technical issues that we believe would benefit from additional public involvement.
- Following the reconsideration process set forth in the Clean Air Act, EPA is developing a proposed rule that will request comment on:
  - Specific elements of the final rules
  - Any provisions we propose to modify or add after more fully evaluating the data and comments already received
- We will also fully evaluate any stakeholder petitions for reconsideration.
- Existing sources will not have to comply with the standards for at least three years.
  - As part of the reconsideration of the rules, stakeholders who make a compelling case may request an extension of that deadline.

What if sources need help?

- EPA will provide ongoing compliance assistance for regulated parties as they prepare to come into compliance with the rules.
- EPA is also working with the U.S. Dept. of Energy (DOE) and the U.S. Dept. of Agriculture (USDA) to provide technical assistance that will help boilers burn cleaner and more efficiently.
  - DOE
    - DOE will provide large sources that burn coal and oil site-specific information on clean energy strategies for complying with the standards, including cost and payback information and financial incentives.
    - These facilities may have opportunities to develop energy efficient compliance strategies, such as combined heat and power.
    - This assistance effort will begin after the reconsideration is complete, although in the interim, DOE does have some resources that can provide help to facilities that need it.
  - USDA
    - USDA will reach out to small sources that burn biomass to help owners and operators understand the standards and their cost and energy saving features.

Major Source Boiler Rule

Establishing MACT standards: Setting air toxics emission limits

- The 1990 Clean Air Act Amendments established the Maximum Achievable Control Technology ("MACT") program in section 112 of the Act, which is quite prescriptive in its directions to the EPA Administrator.
  - Reflected concern that insufficient air toxic reductions had been achieved under the 1970 Act provisions.
- Section 112 required MACT standards to be issued for relevant source categories no later than 2000.
  - EPA finalized MACT standards for industrial, commercial and institutional boilers in 2004.
  - In 2007, the standards were vacated and remanded by the U.S. Court of Appeals for the District of Columbia Circuit.
- Section 112 specifies the 187 pollutants that must be addressed in setting a MACT standard.
  - EPA may address multiple pollutants by setting a standard for one pollutant, provided there is adequate technical justification.
- Section 112 requires that a MACT standard be:
  - For existing sources, at least as stringent as the average of the best performing 12 percent of sources in the category (or sub-category).
  - For new sources, at least as stringent as the emission control achieved by the best controlled similar source.
- Section 112 allows the Administrator to set work practice standards (such as an annual tune-up requirement) in certain limited situations.
- Section 112 allows the Administrator to subcategorize, which allows similar equipment to be treated similarly.
- Existing sources must comply with MACT requirements within 3 years of the effective date of the rule, although in certain circumstances a year extension may be granted.

Boiler MACT – Final Subcategories

- **Fifteen subcategories based on design type:**
  - Solid fuel
  - Pulverized coal units
  - Coal-fired stokers
  - Coal-fired fluidized bed combustion units
  - Biomass-fired stokers
  - Biomass-fired fluidized bed combustion units
  - Biomass-fired Dutch Ovens/Suspension burners
  - Biomass-fired fuel cells
  - Biomass-fired hybrid suspension/grate units
  - Liquid fuel-fired units
  - Liquid fuel-fired units located in non-continental States and territories
  - Gas 1 (Natural gas/refinery gas)
  - Gas 2 (other gases)
  - Metal processing furnaces (natural gas-fired)
  - Limited Use

Major source boiler rule: Compliance requirements

Summary of requirements for boilers at major sources (i.e., those sources that emit or have the potential to emit more than 10 tons per year (tpy) of any single air toxic or more than 25 tpy of any combination of air toxics)

- **Existing large boilers** (>=10mm/BTU)
  - **Clean gas** *(natural gas, refinery gas, or process gas as clean as natural gas)*
    - Annual tune-up
    - No numeric emission limits
    - 1-time energy assessment
  - **Solid fuel (coal or biomass)**
    - Numeric emission limits for 5 pollutants
      mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
    - 1-time energy assessment
  - **Oil**
    - Numeric emission limits for 5 pollutants
      mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
    - 1-time energy assessment
  - **Process gas that is not "clean" gas**
    - Numeric emission limits for 5 pollutants
      mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
    - 1-time energy assessment
  - **Limited Use**
    - Tune-up every other year
    - 1-time energy assessment
    - No numeric emission limits

Major source boiler rule: Compliance requirements

- **New large boilers** (>=10mm/BTU)
  - **Clean gas** *(natural gas, refinery gas, or process gas as clean as natural gas)*
    - Annual tune-up
    - No numeric emission limits
  - **Solid fuel** (coal or biomass)
    - Numeric emission limits for 5 pollutants
      mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
  - **Oil**
    - Numeric emission limits for 5 pollutants
      mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
  - **Process gas that is not "clean" gas**
    - Numeric emission limits for 5 pollutants
      mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
  - **Limited Use**
    - Tune-up every other year
    - No numeric emission limits

Major source boiler rule: Compliance requirements

- **Existing small boilers** (<10mm/BTU)
  - **Gas, solid fuel, oil, or limited use**
    - Tune-up every other year
    - 1-time energy assessment
    - No numeric emission limits

- **New small boilers** (<10mm/BTU)
  - **Gas, solid fuel, oil, or limited use**
    - Tune-up every other year
    - No numeric emission limits

Benefits of major source boiler rule

- For every $1 this rule will cost society, the public will receive at least $15 to $36 in health and other benefits.
  - EPA monetizes the benefits of the standards' reduction of ozone and fine particle pollution, but is unable to monetize the standards' other benefits, including the benefits of reduced exposure to air toxics.
- These standards will reduce ozone and fine particles, which will protect public health by avoiding each year:
  - 2,500 to 6,500 premature deaths
  - 1,600 cases of chronic bronchitis
  - 4,000 nonfatal heart attacks
  - 4,300 hospital and emergency room visits
  - 3,700 cases of acute bronchitis
  - 78,000 cases of respiratory symptoms
  - 310,000 days when people miss work or school
  - 41,000 cases of aggravated asthma
  - 1,900,000 days when people must restrict their activities
- These standards will also reduce exposure to air toxics, including pollutants of particular concern for the health of our children. For example, it will reduce mercury and lead, which adversely affect developing brains, including having adverse effects on IQ, learning and memory.

Major source boiler rule: Key changes between proposal and final

- Based on public comment and additional data provided during the comment period, EPA made significant changes, including changes to the requirements for:
- **Large Boilers:**
  - EPA established solid fuel subcategory
    - This ensures all solid fuel-burning units are appropriately regulated, and recognizes there is no clear technical distinction between units that burn coal and biomass
  - Biomass-fired units
    - EPA provided additional flexibility in how units comply, through increased CO emission limits for several subcategories, solid fuel subcategory, establishment of work practice standards for startup and shutdown.
      - Lowers costs, encourages coal-fired units to co-fire or switch to biomass.

Major source boiler rule changes, cont.

- **Small Boilers** (heat input capacity less than 10 million Btus/hr)
  - New data identified difficulties with small units design that preclude the use of emissions testing for new and existing small boilers.
  - EPA did not set specific numerical emission limits; instead, rules require tune-up every other year for efficiency
- **Limited Use Boilers** (operated less than 10% of year as emergency and backup boilers to supplement process power needs)
  - EPA established a tune-up requirement instead of numeric emission limits for all new and existing limited use boilers; operator will be required to perform tune-up every two years.
- **Clean Gas Units** (natural gas or other gaseous fuels from refineries, landfills, etc. that meet specifications for mercury and hydrogen sulfide similar to natural gas)
    - Subject to tune-up requirements in lieu of numeric emissions limits
- **Energy audits** continue to be required; Agency clarified audit provisions to minimize costs.

Major source boiler rule changes, cont.

- Adjusted **compliance testing requirements for carbon monoxide** (CO) based on comments
  - Rather than continuous monitoring, units are required to measure CO once a year at full load, while conducting routine parametric testing to track oxygen levels that indicate combustion efficiency
  - Will lower compliance costs
- Adjusted **compliance testing requirements for dioxin/furan** (D/F) based on comments
  - Rather than annual testing, units are required to measure D/F one time and to monitor oxygen levels to ensure good combustion
  - Will lower compliance costs
- Did not develop a health-based emissions limit for acid gases
  - Did not receive information sufficient to form a basis for this type of limit
- Boiler MACT costs now projected at $5.1 billion capital cost and $1.8 billion annualized cost ($1.4 billion considering fuel savings)
  – Proposal was $2.9 B annualized cost

Area Source Boiler Rule

Area source boiler rule: Compliance requirements

Summary of requirements for boilers at area sources (i.e., those sources that emit or have the potential to emit less than 10 tons per year (tpy) of any single air toxic and less than 25 tpy of any combination of air toxics)

- **Existing large boilers** (>=10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal**
    - Numeric emission limits for 2 pollutants *mercury, carbon monoxide (CO)*
    - 1-time energy assessment
  - **Biomass, Oil**
    - Tune-up every other year
    - 1-time energy assessment
    - No numeric emission limits
- **Existing small boilers** (<10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal, Biomass, Oil**
    - Tune-up every other year
    - No numeric emission limits

Area source boiler rule: Compliance requirements

- **New large boilers** (>=10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal**
    - Numeric emission limits for 3 pollutants
      mercury, carbon monoxide (CO), particulate matter (PM)
  - **Biomass, Oil**
    - Numeric emission limit for 1 pollutant
      particulate matter (PM)
    - Tune-up every other year
- **New small boilers** (<10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal, Biomass, Oil**
    - Tune-up every other year
    - No numeric emission limits

Area source boiler rule: Key changes between proposal and final

- Based on public comment and additional data provided during the comment period, EPA made significant changes, such as:
  - Changed requirements for new small boilers (less than 10 MMBtu/hr) to tune-ups instead of numeric emission limits
  - Changed from MACT-based CO limits for new and existing biomass and oil-fired area source boilers to GACT-based management practices of tune-ups
  - **Energy audits** continue to be required for large boilers; Agency clarified audit provisions to minimize costs.

Incinerator Rules

Incinerator rules: Compliance requirements

- Commercial and Industrial Solid Waste Incinerator (CISWI) rule
  - Covers four subcategories:
    - Incinerators
    - Energy recovery units
    - Waste burning kilns
    - Small incinerators in very remote locations
  - Establishes emission limits for nine pollutants emitted from covered solid waste incinerator units and provisions for stack testing, monitoring, and annual inspections of emission control devices, among other requirements
    - Cd, CO, HCl, Hg, Pb, PM, SO_2, NOx, dioxin/furans
  - Owner/operators must follow certain procedures for test data submittal.
  - Existing units will need to comply no later than three years after EPA approves a state plan to implement these standards or five years after the CISWI rule is published in the Federal Register, whichever is earlier.
  - Covered solid waste incinerator units must either comply with the emission limits in the final rule (i.e. install add-on controls to capture emissions), or use alternative waste disposal options such as diverting waste to a landfill.
  - Does not cover space heaters, burn-off ovens, soil treatment units, cyclonic burn barrels, laboratory analysis units, or agricultural units

- Sewage Sludge Incinerator (SSI) final rule
  - Covers two subcategories based on the type of incinerator: multiple hearth (MH) and fluidized bed (FB)
    - Units incinerating sewage sludge at other types of facilities (e.g., commercial, industrial, and institutional) will be covered under different air pollution incineration standards.
  - Establishes emission limits for nine pollutants and provisions for testing, monitoring, recordkeeping, reporting and operator training.

Incinerator rules: Key changes from proposal to final

Commercial and Industrial Solid Waste Incinerator Rule (CISWI)

- Burn-off ovens and cyclonic burn barrels are not regulated
- Also clarified that space heaters are not regulated
- Separated energy recovery units into two subcategories – solid and liquid
- Adjusted CO compliance testing consistent with boiler rule changes.

- Changes will result in:
  - More flexibility in achieving standards
  - Lower compliance costs
  - Slightly greater emission reductions than in proposed rule

Incinerator rule changes, cont.

Sewage Sludge Incinerator (SSI) rule

- Final solid waste definition rule verifies that these units are incinerators and must be regulated. However, based on technical data, EPA:
  - Added a second subcategory for new multiple hearth units, which are different than fluidized beds.
  - Did not set beyond-the-floor limits for mercury.
    - These were not cost-effective. Current mercury emissions from these facilities were much lower than estimated when we issued the proposed rule.
- Emission reductions and costs both are lower than at proposal.

- For more information on these rules, please visit www.epa.gov/airquality/combustion.

Appendix-Emission Limit Tables

Emission Limits for Major Source Boilers

Subcategory	Proposed limits, lb/MMBtu unless noted					Final limits, lb/MMBtu unless noted				
	Hg, lb/TBtu	HCl	PM	CO, ppm	D/F, ng/dscm	Hg, lb/TBtu	HCl	PM	CO, ppm	D/F, ng/dscm
New coal stoker	2.0	0.00006	0.001	7	0.003	3.5	0.0022	0.0011	6	0.003
New coal fluid. bed				30	0.00003	Solid fuel subcat.	Solid fuel subcat.	Solid fuel subcat.	18	0.002
New coal PC				90	0.002				12	0.003
New biomass stoker	0.2	0.004	0.008	560	0.00005				160	0.005
New biomass fuel cell				270	0.0005				470	0.003
New biomass fluid. bed				40	0.007				260	0.02
New biomass dutch oven				1,010	0.03				470	0.2
New biomass susp./grate	--	--	--	--	--				1,500	0.2
New liquid	0.3	0.0004	0.002	1	0.002	0.21	0.00032	0.0013	3	0.002
New gas 2	0.2	0.000003	0.003	1	0.009	7.9	0.0017	0.0067	3	0.08
New non-cont. liquid	--	--	--	--	--	0.78	0.00032	0.0013	51	0.002
Exist. coal stoker	3.0	0.02	0.02	50	0.003	4.6	0.035	0.039	270	0.003
Exist. coal fluid. Bed				30	0.002	Solid fuel subcat.	Solid fuel subcat.	Solid fuel subcat.	82	0.002
Exist. coal PC				90	0.004				160	0.004
Exist. biomass stoker	0.9	0.006	0.02	560	0.004				490	0.005
Exist. biomass fuel cell				270	0.02				690	4
Exist. biomass fluid. bed				250	0.02				430	0.02
Exist. biomass dutch oven				1,010	0.03				470	0.2
Exist. biomass sus./grate	--	--	--	--	--				3,500	0.2
Exist. liquid	4.0	0.0009	0.004	1	0.002	3.4	0.00032	0.0075	10	4
Exist. gas 2	0.2	0.000003	0.05	1	0.009	13	0.0017	0.043	9.0	0.08
Exist. non-cont. liquid	--	--	--	--	--	0.78	0.00032	0.0075	160	4

New and existing small (<10 MMBtu/hr) units, natural gas-fired units, metal process furnaces, units combusting other clean gases, and limited use units will be subject to work practice standards.

Emission Limits for Area Source Boilers

Subcategory	Proposed Emission Limits			Final Emission Limits		
	Hg, lb/TBtu	CO, ppm	PM, lb/MMBtu	Hg, lb/TBtu	CO, ppm	PM, lb/MMBtu
New Coal	3.0	310	0.03	4.8	400	0.03 (> 30 MMBtu/h) 0.42 (10 to 30 MMBtu/h)
New Biomass	-	100	0.03	-	-	0.03 (> 30 MMBtu/h) 0.07 (10 to 30 MMBtu/h)
New Oil	-	1	0.03	-	-	0.03
Existing Coal	3.0	310	-	4.8	400	-
Existing Biomass	-	160	-	-	-	-
Existing Oil	-	2	-	-	-	-

New and existing small (<10 MMBtu/hr) boiler, existing and new biomass-fired boilers, and new and existing oil-fired boilers are subject to a biennial tune-up requirement.

Final Emission Limits for Existing CISWI Sources

Pollutant (units)[1]	CISWI Subcategories											
	Incinerators		Energy Recovery Units	Energy Recovery Units - Liquid/Gas	Energy Recovery Units - Solids	Waste-burning kilns		Burn-off Ovens		Small, remote Incinerators	
	Proposed	Final	Proposed	Final		Proposed	Final	Proposed	Final[2]	Proposed	Final
HCl (ppmv)	29	29	1.5	14	0.45	1.5	25	130	-	150	220
CO (ppmv)	2.2	36	150	36	490 (biomass units)/59 (coal units)	710	110	80	-	78	20
Pb (mg/dscm)	0.0026	0.0036	0.002	0.096	0.0036	0.0027	0.0026	0.041	-	1.4	2.7
Cd (mg/dscm)	0.0013	0.0026	0.00041	0.023	0.00051	0.0003	0.00048	0.0045	-	0.26	0.61
Hg (mg/dscm)	0.0028	0.0054	0.00096	0.0013	0.00033	0.024	0.0079	0.014	-	0.0029	0.0057
PM, filterable (mg/dscm)	13	34	9.2	110	250	60	6.2	33	-	240	230
Dioxin, Furans, total (ng/dscm)	0.031	4.6	0.75	2.9	0.35	2.1	0.2	310	-	1,600	1,200
Dioxin, Furans, TEQ (ng/dscm)	0.0025	0.13	0.059	0.32	0.059	0.17	0.007	25	-	130	57
NO_x (ppmv)	34	53	130	76	290 (biomass units)/340 (coal units)	1,100	540	120	-	210	240
SO_2 (ppmv)	2.5	11	4.1	720	6.2 (biomass units)/650 (coal units)	410	38	11	-	44	420
Opacity (%)[3]	1	-	1	-	-	4	-	2	-	13	-

1 All emission Limits are measured at 7% oxygen.
2 Determined that burn-off ovens are not subject to this final action.
3 EPA is not promulgating opacity limits for CISWI units at this time.

Final Emission Limits for New CISWI Sources

Pollutant (units) [1]	CISWI Subcategories										
	Incinerators		Energy Recovery Units	Energy Recovery Units - Liquid/Gas	Energy Recovery Units - Solids	Waste-buring Kilns		Burn-off Ovens		Small, remote Incinerators	
	Proposed	Final	Proposed	Final		Proposed	Final	Proposed	Final[2]	Proposed	Final
HCl (ppmv)	0.074	0.091	0.17	14	0.45	1.5	3.0	18	-	150	200
CO (ppmv)	1.4	12	3.0	36	160 (biomass units)/46 (coal units)	36	90	74	-	4	12
Pb (mg/dscm)	0.0013	0.0019	0.0012	0.096	0.0031	0.00078	0.0026	0.029	-	1.4	0.26
Cd (mg/dscm)	0.00066	0.0023	0.00012	0.023	0.00051	0.00030	0.00048	0.0032	-	0.057	0.61
Hg (mg/dscm)	0.00013	0.00016	0.00013	0.00025	0.00033	0.024	0.0062	0.0033	-	0.0013	0.0035
PM, filterable (mg/dscm)	0.0077	18	4.4	110	250	1.8	2.5	28	-	240	230
Dioxin, Furans, total (ng/dscm)	0.0093	0.052	0.034	(no limit)	0.068	0.00035	0.090	0.011	-	1,200	1,200
Dioxin, Furans, TEQ (ng/dscm)	0.00073	0.13	0.0027	0.002	0.011	0.000028	0.0030	0.00086	-	94	31
NO_x (ppmv)	19	23	75	76	290 (biomass units)/340 (coal units)	140	200	16	-	210	78
SO_2 (ppmv)	1.5	11	4.1	720	6.2 (biomass units)/650 (coal units)	3.6	38	1.5	-	43	1.2
Opacity (%)[3]	1	-	1	-	-	1	-	2	-	13	-

1 All emission Limits are measured at 7% oxygen.
2 Determined that burn-off ovens are not subject to this final action.
3 EPA is not promulgating opacity limits for CISWI units at this time.

Final Emission Limits for Existing SSI Sources

Pollutant (units)[1]	SSI Subcategories			
	Fluidized Bed		Multiple Hearth	
	Proposed	Final	Proposed	Final
Cd (mg/dscm)	0.0019	0.0016	0.095	0.095
CO (ppmvd)	56	64	3,900	3,800
HCl (ppmvd)	0.49	0.51	1.0	1.2
Hg (mg/dscm)	0.0033	0.037	0.02	0.28
NOx (ppmvd)	63	150	210	220
Pb (mg/dscm)	0.0098	0.0074	0.30	0.30
PCDD/PCDF, TEQ (ng/dscm)	0.056	0.10	0.32	0.32
PCDD/PCDF, TMB (ng/dscm)	0.61	1.2	5.0	5.0
PM (mg/dscm)	12	18	80	80
SO_2 (ppmvd)	22	15	26	26

1 All emission Limits are measured at 7% oxygen.

Final Emission Limits for New SSI Sources

Pollutant (units)[1]	SSI Subcategories			
	Fluidized Bed		Multiple Hearth	
	Proposed	Final	Proposed	Final
Cd (mg/dscm)	0.00051	0.0011	0.00051	0.0024
CO (ppmvd)	7.4	27	7.4	52
HCl (ppmvd)	0.12	0.24	0.12	1.2
Hg (mg/dscm)	0.0010	0.0010	0.0010	0.15
NOx (ppmvd)	26	30	26	210
Pb (mg/dscm)	0.00053	0.00062	0.00053	0.0035
PCDD/PCDF, TEQ (ng/dscm)	0.0022	0.013	0.024	0.045
PCDD/PCDF, TMB (ng/dscm)	0.024	1.2	5.0	5.0
PM (mg/dscm)	4.1	9.6	4.1	60
SO_2 (ppmvd)	2.0	5.3	2.0	26

1 All emission Limits are measured at 7% oxygen.