

# **Adjustments to the Air Toxics Standards for Major and Area Source Boilers and Certain Incinerators**

## **Summary of 2012 Rules and Adjustments to Requirements**

Presentation for CIBO Teleconference  
January 9, 2013



# Overview



On December 20, 2012, EPA finalized a specific set of adjustments to March 2011 Clean Air Act standards, for boilers and certain solid waste incinerators.

These adjustments:

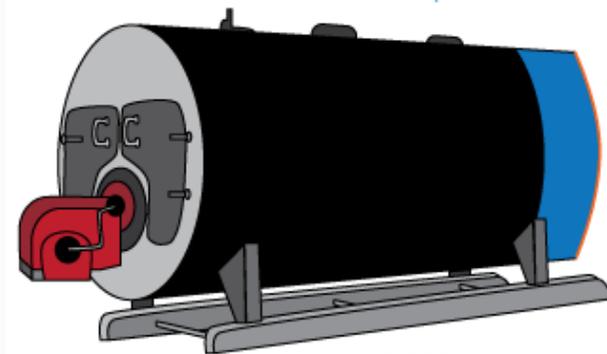
- maintain extensive public health protections achieved by the March 2011 standards by reducing toxic air pollution, including mercury and particle pollution.
- increase the rules' flexibility and address concerns raised by stakeholders.
- maintain the dramatic cuts in the cost of implementation that were achieved in the final standards issued in March 2011.
- provide clarity in identifying which non-hazardous secondary materials are, or are not, solid wastes when burned in combustion units.

Overall, these final standards address new data provided to the agency and additional information about real-world performance and conditions under which affected boilers and incinerators operate.

## Less than 1% of boilers need to meet limits

About **1.3 million** are clean and do nothing under these rules

About **197,000** will only need to do annual tune ups to reduce toxics



About **2,300** may need to use controls to reduce toxics and meet emission limits

# Compliance Timelines

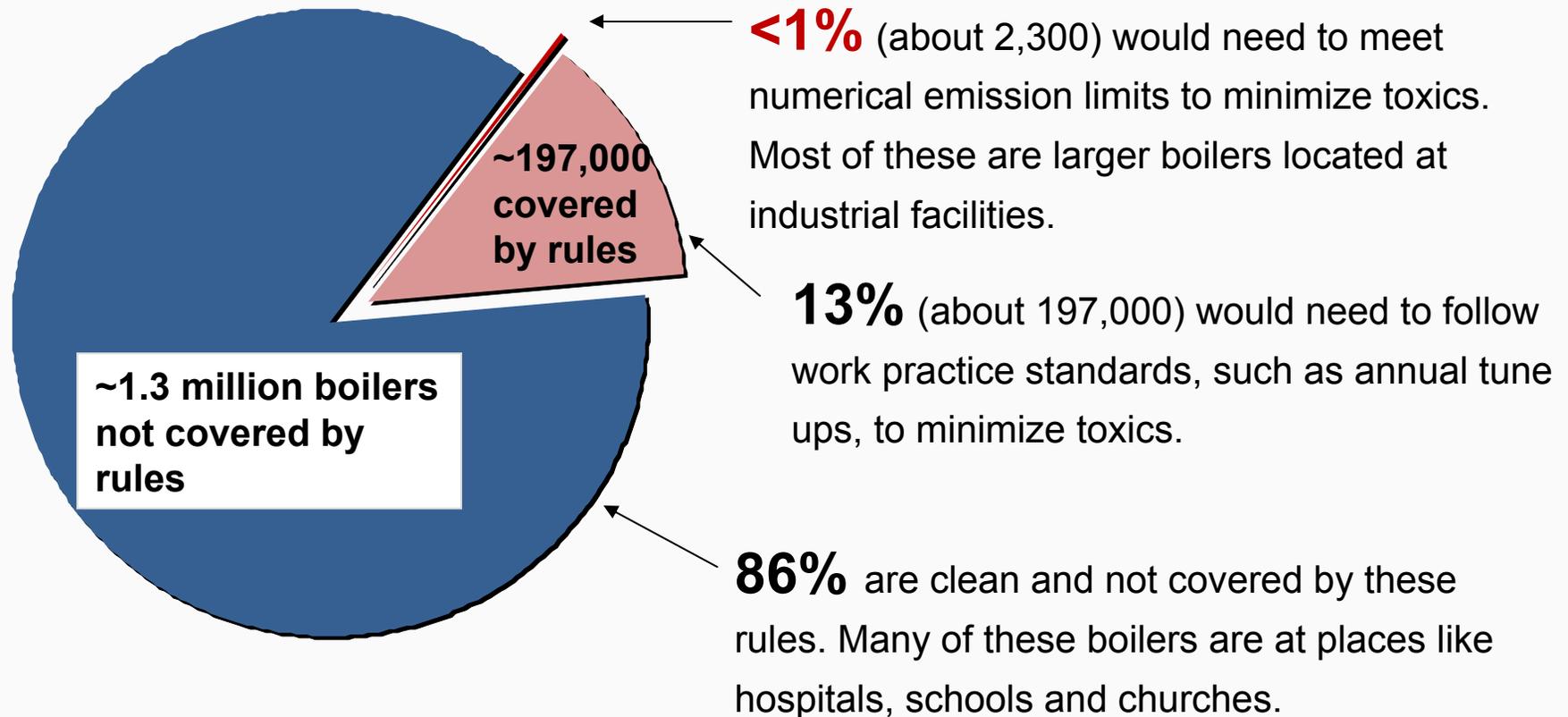


- The adjustments to numerical emission limits and to the various subcategories are significant enough to warrant allowing a full three years to allow sources the time necessary to comply.
- Compliance deadlines for major boilers and CISWI units will be in 2016 and 2018, respectively.
  - These units will have three to five years, respectively, to comply with these adjusted standards, and can do so with proven, currently available technologies.
  - Exact compliance date will depend on the date the rules are published in the Federal Register.
- For area sources:
  - The deadline for initial notification for existing area source boilers was adjusted to no later than January 20, 2014.
  - Existing area source boilers will have until March 21, 2014 to comply with these standards.
- If needed, sources may request an additional year to comply.
- EPA also has tools to address, on a case-by-case basis, additional concerns arising for individual sources.



# The Right Standards for the Right Boilers

Of 1.5 million boilers in the U.S.,  
less than 1% will need to meet numerical emission limits



# Health Benefits



- Cuts emissions of pollutants such as mercury, particle pollution, sulfur dioxide, dioxin, lead, and nitrogen dioxide.
- Pollutants can cause a range of dangerous health effects - from developmental disabilities in children to cancer, heart attacks and premature death.
- Direct benefits to many communities where people live very close to these units.
- Together, the standards will avoid up to 8,100 premature deaths, 5,100 heart attacks, and 52,000 asthma attacks.
- EPA estimates that Americans would receive \$13 to \$29 in health benefits for every dollar spent to meet the standards.

Toxic Pollutants	Emission Reductions from All Rules Combined (tons per year)	
	March 2011 Final Rule	2012 Final Standards
Mercury	1.6	2.0 – 3.0
Non-mercury metals	3,000	2,100
Hydrogen Chloride	30,500	40,500
Particulate Matter (PM <sub>2.5</sub> )	30,000	18,000
Sulfur Dioxide	450,000	580,000

# Key Adjustments



## Area Source Boilers

- Adjusting emission limits
  - Revising Hg emission limit for new and existing large coal-fired boilers to  $2.2 \times 10^{-5}$  lb/MMBtu of heat
  - Revising CO emission limit for new and existing large coal-fired boilers to 420 ppm by volume on a dry basis corrected to 3% oxygen
- Allowing the necessary time to implement the standards
  - Revising the deadline for initial notification for existing area source boilers to no later than January 20, 2014
  - Extending by two years the compliance date for existing boilers subject to the tune-up requirement such that the compliance date is March 21, 2014 (which is also the compliance date for boilers subject to emission limits and subject to the energy assessment requirement)

# Key Adjustments



## Area Source Boilers

- Adding to and refining the list of subcategories
  - Clarifying that temporary boilers, residential boilers, and electric boilers are not part of the source categories being regulated
  - Revising definition for “Boiler” to clarify that process heaters are not part of the source categories being regulated
  - Revising definition for “Hot water heater” to clarify that the definition includes small hot water boilers
  - Adding subcategories for seasonally-operated boilers and limited-use boilers
- Reducing tune-up frequency for certain boilers
  - Requiring tune-ups every 5 years, instead of every 2 years, for:
    - seasonally-operated boilers
    - limited-use boilers
    - oil-fired boilers with heat input capacity of equal to or less than 5 MMBtu/hr
    - boilers with oxygen trim systems
  - Specifying that initial tune-ups are not required for new boilers

# Key Adjustments



## Area Source Boilers

- Revising energy assessment provisions
  - Clarifying that the energy assessment is limited to only those energy use systems located on-site associated with the affected boilers
  - Specifying that sources that operate under certain energy managements programs that include the affected boilers satisfy the energy assessment requirement
- Providing compliance alternative for PM for certain oil-fired boilers
  - Specifying that new oil-fired boilers that combust only low-sulfur oil are considered to be meeting the PM emission standard via an alternative method and are not subject to the PM emission limit (same provision as is in subpart Db)
- Providing continuous compliance alternative for CO emission limit
  - Allowing CO CEMS as compliance alternative

# Key Adjustments



## Area Source Boilers

- Reducing fuel sampling and performance testing requirements under certain circumstances
  - Specifying that if, when demonstrating initial compliance with the Hg emission limit, the Hg constituents in the fuel or fuel mixture are measured to be equal to or less than half of the Hg emission limit, the owner or operator of that coal-fired boiler does not need to conduct further fuel analysis sampling
  - Specifying that if, when demonstrating initial compliance with the PM emission limit, the performance test results show that the PM emissions are equal to or less than half of the PM emission limit, the owner or operator of that boiler does not need to conduct further PM emissions testing
- Revising provisions for dual-fuel fired boilers
  - Specifying that existing dual-fuel fired boilers (i.e., commenced construction or reconstruction on or before June 4, 2010) that fuel switch from gas to coal, biomass or oil after June 4, 2010 would still be considered existing sources as long as the boiler was designed to accommodate the alternate fuel
  - New dual-fuel fired boilers that make such a fuel switch would continue to be considered new sources

# Key Adjustments



## Major Source Boilers

- Extending the compliance date for existing units to implement the standards
  - Compliance date is 3 years from publication of amendments
- Adjusting emission limits
  - Changes to emission limits based on new and corrected data
  - New particulate matter (PM) emission limits for biomass fueled boilers
    - Each biomass subcategory has separate PM limit based on best performing units within the subcategory
  - New carbon monoxide limits to address variability
    - Added an alternate CO CEMS-based limits for most subcategories
    - CO limits for several subcategories revised to reflect a threshold level (130 ppm@ 3%O<sub>2</sub>)
  - Allowing metals emission limits as an alternative to using PM limit as a surrogate for metallic air toxics
  - Replacing dioxin limit with work practice standards – data shows dioxin emissions are below levels that can be accurately measured.

# Key Adjustments



## Major Source Boilers

- Adding to and refining the list of subcategories
  - Split the biomass stoker subcategory into two separate subcategories – wet biomass stoker & kiln-dried biomass stoker
  - Split the liquid fuel subcategory into two separate subcategories – heavy liquid & light liquid
  - Added separate subcategory for coal fluidized bed units with fluidized bed heat exchanger (i.e., coal refuse units)
- Work practices – tune-up requirement
  - Requirement to optimize CO emissions to manuf. Specs. To also be consistent with any NOx requirements
  - Allow units with O2 trim system to conduct tune-up every 5 years
  - Allow delay of inspections for certain situations
- Work practices – Startup & Shutdown
  - Revised definitions from based on operating load to based on starting & stopping supplying steam
  - Require clean fuel at startup and engaging control devices when coal, biomass or heavy oil is fired

# Key Adjustments



## Major Source Boilers

- Revising energy assessment provisions
  - Clarifying that the energy assessment is limited to only those energy use systems located on-site associated with the affected boilers
  - Specifying that sources that operate under certain energy managements programs that include the affected boilers satisfy the energy assessment requirement
  - Added a cap (not to exceed 160 hours) on on-site technical hours for large fuel use facilities
- Compliance monitoring - increased flexibility
  - Removed requirement for large biomass units to install PM CEMS
  - Replaced requirement for large coal units to install PM CEMS with requirement to install a PM CPMS but have option to use PM CEMS
  - Allow the use of SO<sub>2</sub> CEMS as operating limit for demonstrating continuous compliance with the HCl limit
- Continue to allow units burning clean gases to qualify for work practice standards instead of numeric emission limits
  - Removing hydrogen sulfide (H<sub>2</sub>S) fuel specification from the rule

# Key Adjustments



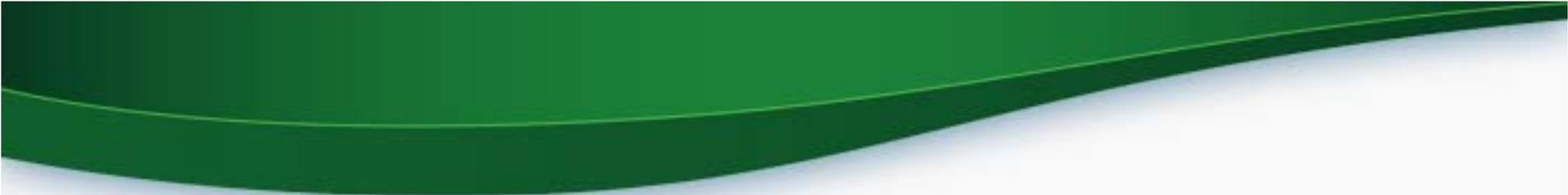
## Commercial and Industrial Solid Waste Incinerators

- Adjusting emission limits
  - For all subcategories
  - Coal and biomass energy recovery units – separate standards for all nine pollutants
- Allowing the necessary time to implement the standards
  - Existing units must comply no later than 3 years after EPA approves a state plan or five years after the publication date of these final changes, whichever is earlier
- Monitoring provisions - adjusted, particularly for CO and PM
- Reinstating the definition of contained gaseous material
- Startup and shutdown - expanded authorization to use uncorrected continuous emissions monitoring system (CEMS) data
- Homogeneous waste - removed definition and requirement that certain facilities that combust solid waste obtain a determination from EPA that such waste is homogenous
- Waste-burning kilns
  - Revising the definition and clarifying that the threshold for determining if a unit is subject to the CISWI rule is whether it “combusts” solid waste material
  - Requiring continuous parameter monitoring systems, instead of PM CEMS



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# Appendix

# Timeline



- March 2011: EPA issued rules
  - Boiler major source rule
  - Boiler area source rule
  - Commercial and industrial solid waste incineration (CISWI) rule
- Concurrently, EPA initiated a reconsideration process affecting all three rules:
  - Address technical issues that arose from public comments
  - Give the public ample opportunity to comment on changes in the rules that were not in the proposal
- May 16, 2011: EPA announced a stay of the Boiler major source and CISWI rules and solicited additional input, through July 15, 2011, on these rules
- December 2, 2011: EPA proposed reconsideration.
- December 20, 2012: Final rules signed.



## How many boilers are there and where are they used?

- **Boilers located at small sources of air toxics emissions are known as area source boilers.** There are about 1.3 million boilers located at small sources of air pollutants, including universities, hospitals, hotels and commercial buildings, that burn natural gas and are not covered by EPA's area source boiler rule.
  - About 183,000 boilers would be covered by EPA's area source boiler rule. Of these, approximately 182,400 (over 99%) need only to conduct periodic tune-ups, and some of these also need to perform a one-time energy assessment.
  - Approximately 600 coal-burning units (less than 1%) are required to meet numerical emission limits.
- **Boilers at large sources of air toxics emissions are known as major source boilers.** There are about 14,000 boilers located at large sources of air pollutants, including refineries, chemical plants, and other industrial facilities.
  - All of these will be required to conduct periodic tune-ups.
  - About 12% will be required to meet numerical emission limits
- The final adjusted standards will have direct benefits to many communities where people live, work, and play.



## Boilers and CISWI

- These standards were developed under sections 112 and 129 of the Clean Air Act, two provisions that target toxic air pollution.
- Under these sections, EPA is required to set technology-based standards for toxic air pollutants, reflective of levels achieved by the best performing sources.
- For CISWI units, EPA adjusted emission limits for certain units that reflect the best performing commercial and industrial waste incineration units.
- For CISWI units, existing incinerators will need to comply no later than three years after EPA approves a state plan or five years after the publication date of these final changes, whichever is earlier. New incinerators will need to meet the standards 180 days following publication in the Federal Register.



# Petitions and Data Submissions

- During the reconsideration process, EPA received more than 50 petitions for reconsideration from industries and industry groups, industrial energy efficiency groups, states, and Sierra Club
  - Boiler major source rule: 29 petitions
  - Boiler area source rule: 10 petitions
  - CISWI rule: 17 petitions
- Industry provided additional data for our analysis and consideration
  - Boiler major source rule:
    - Data on 150 emission tests from 108 units, including at least 8 tests each for mercury, particulate matter (PM), dioxins, carbon monoxide (CO), hydrogen chloride (HCl), and total selected metals
    - CO continuous emission monitoring system (CEMS) data
    - Data on mercury, chlorine, and metals fuel analyses from 2 facilities and a metals analysis from 1 facility
  - CISWI rule:
    - 19 • Approximately 20 data submissions, with majority pertaining to energy recovery units



# How Cost Estimates Have Been Updated

- Major source boilers and CISWI:
  - The costs to comply *per boiler* are expected to decrease because of data-driven adjustments to the emission limits, including less stringent requirements for particle pollution controls for biomass units. The cost to comply for individual CISWI units is expected to decrease as well.
  - However, based on new and updated data, the revised inventory includes 336 more boilers and 18 more CISWI units than the March 2011 final rule. Therefore, even though per unit costs are less, the additional sources increase overall costs slightly.
  - Because the per unit costs are less for major source boilers, when evaluating the same inventory of units as the March 2011 rule, the estimated annualized cost of the amended rule would be \$1.19 billion, a decrease of \$130 million
- Area source boilers:
  - The final adjustments do not change the coverage of the March 2011 final air toxics rule for area source boilers and will not affect the estimated emission reductions, control costs or benefits of the standards in substance.
  - The adjustments do not impose any additional regulatory requirements beyond those imposed by the March 2011 standards and, in fact, will afford relief to some boilers.
- The total cost to implement all these standards combined will be \$2.2 to \$2.4 billion in 2015.

# Emission Limits for Existing Major Source Boilers



Subcategory	#Units	Limits in 2011 Final Rule, lb/MMBtu unless noted					Limits for Reconsideration Final Rule, lb/MMBtu, unless noted				
		Hg, lb/TBtu	HCl	PM	CO, ppm	D/F, ng/dscm	Hg, lb/TBtu	HCl	PM	CO, ppm (CO CEMS-based)	D/F
Coal stoker	391	4.6	0.035	0.039	270	0.003	5.7	0.022	0.040	160 (340)	Work practice
Coal fluid. Bed	35	Solid fuel subcat.	Solid fuel subcat.	Solid fuel subcat.	82	0.002	Solid fuel subcat.	Solid fuel subcat.	0.040	130 (230)	Work practice
Coal PC	190				160	0.004					
Biomass wet stoker—revised subcategory	304				490	0.005					
Biomass fuel cell	14				690	4					
Biomass fluid. Bed	24				430	0.02					
Biomass dutch oven/pile burner—revised subcategory	24				470	0.2					
Biomass susp./grate	18				3,500	0.2					
Biomass suspension—revised subcategory	47				470	0.2					
Biomass dry stoker--new subcategory	74				490	0.005					
Heavy liquid-new subcategory	320				3.4	0.00033					
Light liquid-revised subcategory	581	3.4	0.00033	0.0075	10	4	2.0	0.0011	0.0079	130	Work practice
Gas 2	129	13	0.0017	0.043	9.0	0.08	7.9	0.0017	0.0067	130	Work practice
Non-cont. liquid		0.78	0.00033	0.0075	160	4	2.0	0.0011	0.27	130	Work practice

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 New Major Source Boilers



Subcategory	Limits in 2011 Final Rule, lb/MMBtu unless noted					Limits for Reconsideration Final Rule, lb/MMBtu, unless noted				
	Hg, lb/TBtu	HCl	PM	CO, ppm	D/F, ng/dscm	Hg, lb/Tbtu	HCl	PM	CO, ppm (CO CEMS-Based)	D/F
Coal stoker	3.5	0.0022	0.0011	6	0.003	0.80	0.022	0.0011	130 (340)	Work practice
Coal fluid. bed	Solid fuel subcat.	Solid fuel subcat.	Solid fuel subcat.	18	0.002	Solid fuel subcat.	Solid fuel subcat.	0.0011	130 (230)	Work practice
Coal PC				12	0.003			0.0011	140 (150)	Work practice
Biomass wet stoker—revised subcategory				160	0.005			0.030	620 (390)	Work practice
Biomass fuel cell				470	0.003			0.020	910	Work practice
Biomass fluid. Bed				260	0.02			0.0098	230 (310)	Work practice
Biomass dutch oven/pile burner				470	0.2			0.0032	330 (520)	Work practice
Biomass susp./grate				1,500	0.2			0.026	1,100 (900)	Work practice
Biomass suspension								0.030	2,400 (2,000)	Work practice
Biomass dry stoker								0.030	460	Work practice
Heavy liquid				0.21	0.00033			0.0013	3	0.002
Light liquid	0.21	0.00033	0.0013	3	0.002	0.48	0.00044	0.0011	130	Work practice
New gas 2	7.9	0.0017	0.0067	3	0.08	7.9	0.0017	0.0067	130	Work practice
New non-cont. liquid	0.78	0.00033	0.0013	51	0.002	0.48	0.00044	0.023	130	Work practice

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	2011 Final Rule Emission Limits			Reconsideration Final Rule Emission Limits		
	Hg, lb/TBtu	CO, ppm	PM, lb/MMBtu	Hg, lb/TBtu	CO, ppm 3% oxygen	PM, lb/MMBtu
New Coal ≥ 10 MMBtu/h	4.8	400	0.03 (≥ 30 MMBtu/h)  0.42 (10 to 30 MMBtu/h)	22.0	420	No Change
New Biomass ≥ 10 MMBtu/h	-	-	0.03 (≥ 30 MMBtu/h)  0.07 (10 to 30 MMBtu/h)	-	-	No Change
New Oil ≥ 10 MMBtu/h	-	-	0.03	-	-	No Change
Existing Coal ≥ 10 MMBtu/h (600 units)	4.8	400	-	22.0	420	No Change
Existing Coal < 10 MMBtu/h (3,100 units)	-	-	-	-	-	-
Existing Biomass (168,000 units)	-	-	-	-	-	-
Existing Oil (11,000 units)	-	-	-	-	-	-

New and existing small (<10 MMBtu/h) coal-fired boilers, new and existing biomass-fired boilers, and new and existing oil-fired boilers are subject to a biennial tune-up requirement.  
 New and existing seasonal boilers, limited-use boilers, oil-fired boilers with heat input capacity ≤ 5 MMBtu/h, and boilers with an oxygen trim system are subject to a 5-year tune-up requirement.  
 Existing coal-fired, biomass-fired, or oil-fired boilers with heat input capacity ≥ 10 MMBtu/h (not including limited-use boilers) are subject to a one-time energy assessment requirement.

# Emission Limits for Existing CISIW Units



Pollutant (units) <sup>1</sup>	CISWI Subcategories <sup>2</sup>									
	Incinerators <sup>3</sup>		Energy Recovery Units - Liquid/Gas		Energy Recovery Units - Solids		Waste-burning kilns		Small, Remote Incinerators <sup>3</sup>	
	2011 Final Rule	Reconsid. Final	2011 Final Rule	Reconsid. Final	2011 Final Rule	Reconsid. Final	2011 Final Rule	Reconsid. Final	2011 Final Rule	Reconsid. Final
HCl (ppmv)	29	29	14	14	0.45	<b>0.20 (biomass units) / 13 (coal units)</b>	25	3.0	220	<b>300</b>
CO (ppmv)	36	<b>17</b>	36	<b>35</b>	490 (biomass units)/59 (coal units)	<b>260 (biomass units) / 95 (coal units)</b>	110	<b>110 (long kilns) / 790 (preheater/precalciner)</b>	20	<b>64</b>
Pb (mg/dscm)	0.0036	<b>0.015</b>	0.096	0.096	0.0036	<b>0.014 (biomass units) / 0.14 (coal units)</b>	0.0026	<b>0.014</b>	2.7	<b>2.1</b>
Cd (mg/dscm)	0.0026	0.0026	0.023	0.023	0.00051	<b>0.0014 (biomass units) / 0.0095 (coal units)</b>	0.00048	<b>0.0014</b>	0.61	<b>0.95</b>
Hg (mg/dscm)	0.0054	<b>0.0048</b>	0.0013	<b>0.0024</b>	0.00033	<b>0.0022 (biomass units) / 0.016 coal units</b>	0.0079	0.011	0.0057	<b>0.0053</b>
PM, filterable (mg/dscm)	34	34	110	110	250	11 (biomass units) / <b>160 (coal units)</b>	6.2	<b>4.6</b>	230	<b>270</b>
Dioxin, Furans, total (ng/dscm)	4.6	4.6	2.9	2.9	0.35	0.52 (biomass units) / <b>5.1 (coal units)</b>	0.2	<b>1.3</b>	1,200	<b>4400</b>
Dioxin, Furans, TEQ (ng/dscm)	0.13	0.13	0.32	0.32	0.059	0.12 (biomass units) / 0.075 (coal units)	0.007	0.075	57	<b>180</b>
NO <sub>x</sub> (ppmv)	53	53	76	76	290 (biomass units)/340 (coal units)	290 (biomass units) / 340 (coal units)	540	630	240	<b>190</b>
SO <sub>2</sub> (ppmv)	11	11	720	720	6.2 (biomass units)/650 (coal units)	7.3 (biomass units) / 650 (coal units)	38	<b>600</b>	420	<b>150</b>

1 All emission limits are measured at 7% oxygen.

2 Number of units in each subcategory: 27 incinerators; 6 ERUs-liquid/gas; 22 ERUs-solids (18 biomass/4 coal); 23 waste-burning kilns; and, 28 small, remote incinerators.

3 Emission limits did not change from final to reconsideration proposal for this subcategory.

# Emission Limits for New CISIW Units



Pollutant (units) <sup>1</sup>	CISWI Subcategories									
	Incinerators <sup>2</sup>		Energy Recovery Units - Liquid/Gas		Energy Recovery Units - Solids		Waste-burning Kilns		Small, Remote Incinerators <sup>2</sup>	
	2011 Final Rule	Reconsl. Final	2011 Final Rule	Reconsl. Final	2011 Final Rule	Reconsl. Final	2011 Final Rule	Reconsl. Final	2011 Final Rule	Reconsl. Final
HCl (ppmv)	0.091	0.091	14	14	0.45	0.20 (biomass units) / 13 (coal units)	3.0	3.0	200	200
CO (ppmv)	12	17	36	35	160 (biomass units)/46 (coal units)	240 (biomass units) / 95 (coal units)	90	90 (long kilns) / 190 (preheater/precalciner)	12	13
Pb (mg/dscm)	0.0019	0.015	0.096	0.096	0.0031	0.014 (biomass units) / 0.14 (coal units)	0.0026	0.014	0.26	2.0
Cd (mg/dscm)	0.0023	0.0023	0.023	0.023	0.00051	0.0014 (biomass units) / 0.0095 (coal units)	0.00048	0.0014	0.61	0.67
Hg (mg/dscm)	0.00016	0.00084	0.00025	0.00056	0.00033	0.0022 (biomass units) / 0.016 (coal units)	0.0062	0.0037	0.0035	0.0035
PM, filterable (mg/dscm)	18	18	110	110	250	5.1 (biomass units) / 160 (coal units)	2.5	2.2	230	270
Dioxin, Furans, total (ng/dscm)	0.052	0.58	(no limit)	(no limit)	0.068	0.52 (biomass units) / 5.1 (coal units)	0.090	0.51	1,200	1,800
Dioxin, Furans, TEQ (ng/dscm)	0.13	0.13	0.002	0.093	0.011	0.076 (biomass units) / 0.075 (coal units)	0.0030	0.075	31	31
NO <sub>x</sub> (ppmv)	23	23	76	76	290 (biomass units)/340 (coal units)	290 (biomass units) / 340 (coal units)	200	200	78	170
SO <sub>2</sub> (ppmv)	11	11	720	720	6.2 (biomass units)/650 (coal units)	7.3 (biomass units) / 650 (coal units)	38	28	1.2	1.2

1 All emission limits are measured at 7% oxygen.

2 Emission limits did not change from final to reconsideration proposal for this subcategory.