power generation group

Industrial Boiler MACT
Proposed Rules and Compliance Strategies

McIlvaine Hot Topic Hour
Industrial MACT - Impact and Control Options
November 18, 2010

Dave Novogoratz
Business Development

Agenda

- Proposed Rules
- Monitoring & Data Collection
- Compliance Strategies

Industrial Boiler MACT

Maximum Achievable Control Technology

- **Regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP)**
- **Requires EPA to control 187 Hazardous Air Pollutants (HAPs)**

What does the Industrial Boiler MACT apply to?

- **Major Sources - Stationary source or group of stationary sources that emit:**
  - **>10 tons per year of a single HAP; or**
  - **>25 tons per year of combined HAPs**
- **Coal / Biomass / Liquid / Process gas fired boilers & fired heaters**
- **Fossil fuel fired boilers <25 MWe**
- **Utility boilers firing non-fossil fuel that is not a solid waste**

Proposed Boiler Area Source Rule

What does the Boiler Area Source MACT apply to?

- Area Sources - Stationary Source or group of stationary sources that emit:
  - <10 tons per year of a single HAP; or
  - <25 tons per year of combined HAPs
- Coal / Biomass / Oil fired boilers & fired heaters
- Existing Boilers
  - Large Boiler > 10 MBtu/h
  - Small Boiler < 10 MBtu/h
- New Biomass Boiler
  - PM & CO Emission Limits
- Existing Large Biomass Boiler
  - CO

Industrial Boiler MACT

What doesn't the Industrial Boiler MACT apply to?

- **Fossil fuel fired units >25 MWe that <u>produce electricity for sale</u>**
- **Non-hazardous pollutants (NO_x, SO_x)**
- **Hot water heaters less than 120 U.S. gallons**
- **Blast furnace gas fuel-fired boilers**
- **Pulp mill recovery boilers, lime kilns**
- **Temporary Boilers <180days**

Industrial Boiler MACT

ICI Boiler MACT History

- **EPA Promulgated ICI Boiler MACT September 2004**
- **Vacated June 2007 due to various lawsuits from environmental groups**

Timeline

- **Draft MACT released - April 29, 2010**
- **Published in Federal Register - June 4, 2010**
- **Comment period ends - August 23, 2010**
- **Promulgation - January 16, 2011 (30 day extension)**
- **Compliance - January 16, 2014**

Different Fuels – Different Regulations

If fuel fired (on annual heat input basis):			Will fall under this Category
>10% Coal			Coal
>10% Biomass	and	<10% coal	Biomass
>10% Liquid	and	<10% solid	Liquid
>10% Gaseous	and	<10% liquid or solid	Gaseous

Proposed MACT Emission Limits

Major Source:

Subcategory	Particulate Matter (lb/MBtu)	Hydrogen Chloride (lb/MBtu)	Mercury (lb/TBtu)	Carbon Monoxide (ppm @3%O_2)	Dioxins/ Furans (Total TEQ) (ng/dscm)
Coal Stoker	E - 0.020 N - 0.001	E - 0.02000 N - 0.00006	E - 3.00 N - 2.00	E - 50 N - 7.0	E - 0.003 N - 0.003
Coal Fluidized Bed	E - 0.020 N - 0.001	E - 0.02000 N - 0.00006	E - 3.00 N - 2.00	E - 30 N - 30	E - 0.00200 N - 0.00003
Pulverized Coal	E - 0.020 N - 0.001	E - 0.02000 N - 0.00006	E - 3.00 N - 2.00	E - 90 N - 90	E - 0.004 N - 0.002
Biomass Stoker	E - 0.020 N - 0.008	E - 0.006 N - 0.004	E - 0.90 N - 0.20	E - 560 N - 560	E - 0.00400 N - 0.00005
Biomass Fluidized Bed	E - 0.020 N - 0.008	E - 0.006 N - 0.004	E - 0.90 N - 0.20	E - 250 N - 40	E - 0.020 N - 0.007
Liquid	E - 0.004 N - 0.002	E - 0.0009 N - 0.0004	E - 4.00 N - 0.30	E - 1.0 N - 1.0	E - 0.002 N - 0.002
Gas (Other Process Gases)	E - 0.050 N - 0.003	E - 0.000003 N - 0.000003	E - 0.20 N - 0.20	E - 1.0 N - 1.0	E - 0.009 N - 0.009

E = Existing Units N = New Units

Proposed MACT Emission Limits

Area Source >10 MBtu/hr:

Subcategory	Particulate Matter (lb/MBtu)	Mercury (lb/MBtu)	Carbon Monoxide (ppm @7%O_2)
Coal	E - N/A N - 0.030	E - 3.0 N - 3.0	N - 310 E - 310
Biomass	E - N/A N - 0.030	N/A	N - 100 E - 160
Oil	E - N/A N - 0.030	N/A	N - 1.0 E - 2.0

Area Source <10 MBtu/hr:

- **Conduct a tune-up of the boiler biennially**

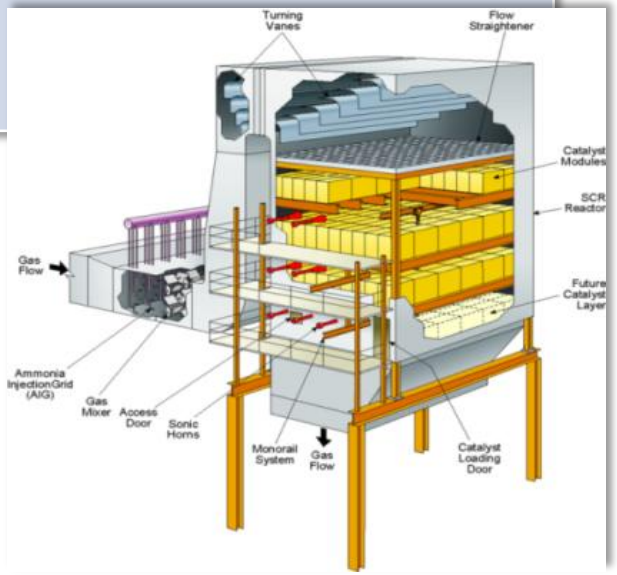
E = Existing Units **N = New Units**

Monitoring & Data Collection

CO (and O_2) CEMS	**Continuous**
PM CEMS	**Boilers >= 250 MBtu/hr**
Parametric Monitoring	• **Fabric Filter Leak Detection** • **ESP – Secondary collection Voltage & Current** • **Scrubbers – pH, pressure drop, liquid flow rate** • **Sorbent Injection – Injection Rate** • **Coal – Fuel Analyses – Hg & Chlorine** • **Daily hours of operation, total fuel used, fuel types, supplier**
Annual energy conservation Assessment	**Existing Units**
Annual tune-up and inspection of boiler	**Unit < 10 MBtu/hr, Gas & metal processing Units**

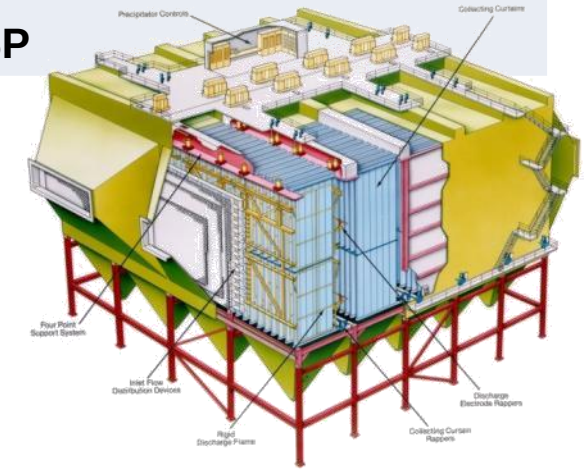
Compliance Strategies - CO

Existing unit has:	
Grate Fired	• Upgrade air system / convert to vibrating grate • Higher O_2 • Convert to BFB • Add thermal oxidizer / CO catalyst
BFB	• Upgrade air system • Higher O_2



Compliance Strategies – PM

If existing unit has:	
Multiclone® Only	• **Add Dry Electrostatic Precipitator (ESP) or Pulse Jet Fabric Filter (PJFF)**
Wet Particulate Scrubber	• **Add Wet ESP downstream of Wet Scrubber** • **Replace with Dry ESP or PJFF**
ESP	• **Enhance ESP performance** • **Replace with PJFF** • **Add series PJFF downstream of ESP**



Compliance Strategies – HCl

If existing unit has:	
Multiclone® Only	• Add Dry Sorbent Injection (DSI) • Add Dry ESP or Pulse Jet Fabric Filter
Wet Particulate Scrubber	• May be suitable • Add caustic to washwater if needed

ESP	• Add DSI
	  • ESP performance may deteriorate
	  • Enhance ESP performance
	  • Replace ESP with PJFF

Compliance Strategies – Hg

If existing unit has:	
Multiclone® Only	• Add Powdered Activated Carbon (PAC) • Add series PJFF

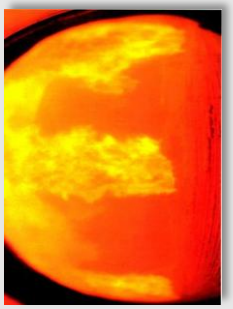
Wet Particulate Scrubber	• For oxidized Hg fraction
	  • Decrease Hg re-emission
	• For elemental Hg fraction
	  • Increase oxidized fraction

ESP	• Add PAC
	  • ESP performance may deteriorate
	  • Replace ESP with PJFF
	  • Add series PJFF

Dioxin and Furan Control

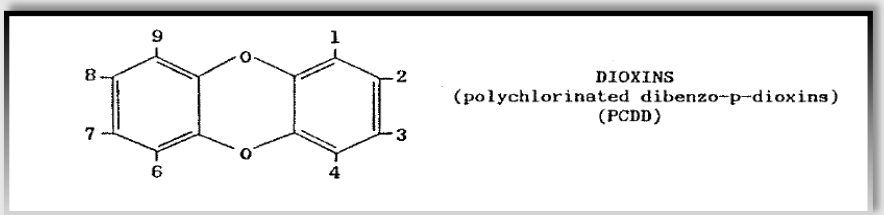
***Good Combustion Conditions in Furnace*:**

- **3 - T's of combustion (time, temperature, turbulence)**
- **Low CO, VOCs & unburned carbon**
- **Low particulate carryover**

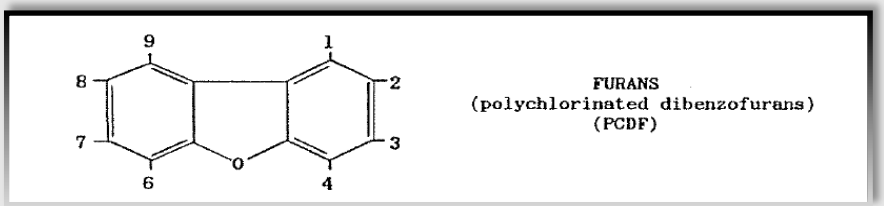


Air Pollution Control Equipment:

- **Activated Carbon Injection (PAC)**
- **Fabric Filter**
- **SDA & Wet Scrubbers**
- **Oxidation / SCR Catalysts**



DIOXINS
(polychlorinated dibenzo-p-dioxins)
(PCDD)



FURANS
(polychlorinated dibenzofurans)
(PCDF)

Industrial Boiler MACT - Implementation

- **MACT Compliance will require a "system solution" that includes the fuel, boiler, existing AQCS equipment, CEMS, and reporting**
  - **Available space**
  - **Age of equipment**
- **Other local regulations still apply, i.e. SO_2 & NO_x**
- **What are the final emission limits going to be?**
- **The large volume of environmental legislation in the pipeline requires that you start planning your compliance strategy early**

Thank you.