

# Boiler MACT

## An Industry Perspective

Pat Dennis

ADM

LM-AWMA Air Conference

November 3, 2011

# Overview of EPA recent actions affecting boilers

- EPA issued three rules that reduce emissions of hazardous air pollutants (HAP) :
  - NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters (Subpart DDDDD of part 63) (“Boiler MACT”)  
Boilers at large (“major”) sources of HAP
  - NESHAP for Area Sources: Industrial, Commercial, and Institutional Boilers (Subpart JJJJJ of part 63) (“Boiler Area Source Rule”)  
Boilers at small (“area”) sources of HAP
  - Section 129 NSPS and Emission Guidelines for Commercial and Industrial Solid Waste Incinerators (CISWI)  
Boilers that burn solid waste at industrial and commercial facilities
- EPA also issued a final rule that defines “solid waste”
  - Necessary to determine whether a source must meet boiler standards or an incinerator standard

# Overview of EPA Actions (Cont)

## Schedule

- Proposals published in Federal Register on June 4, 2010
- Promulgations signed on February 21, 2011 (Court-ordered)
- Published in Federal Register on March 21, 2011
- Effective Date: May 20, 2011

## Reconsideration

- Notice of reconsideration was published on March 21, 2011 with respect to certain aspects
- No schedule was presented

## Stay

- On May 18, 2011, EPA delayed the effective date of the Boiler MACT and CISWI pending reconsideration
- Boiler Area Source Rule was NOT stayed.

# Reconsideration

Many issues raised by Trade Associations, Industries and Sierra Club – No decision yet whether any of these issues will be granted reconsideration.

- EPA's Schedule:
  - Proposal (Signature) – October 31, 2011 (Now expected late November, will include NHSM rule)
  - Public comment period – 45 days
  - Final (Signature) – April 30, 2012

# EPA's Approach

- MACT Floor for existing sources – average emission limitation achieved by the best performing 12 percent of the existing sources
- However, BMACT limits 5 surrogate pollutants and EPA established separate floors for each pollutant, i.e. pollutant by pollutant, looking at lowest emitting, not best performing sources
- The PM floor sources aren't necessarily the same sources in the floor for CO, Hg, dioxin or HCl
- Extremely challenging for a boiler to meet all the limits simultaneously, <<6% do

## Existing Unit Compliance with Final Standards

Existing Solid or Liquid Units Of 1594 total units, 31 units comply without incurring costs.			
Category	Of 31 Units, Number that Comply without Incurring Costs	Total Units	Percentage of Total Units that Comply without Incurring Costs
Biomass	26	466	5.58%
Coal	2	544	0.37%
Process Gas	2	71	2.8%
Liquid	1	513	0.19%

# Example

## ADM Boiler

187 mmBtu/hr, bubbling fluidized bed boiler fired on low sulfur coal with limestone injection and a baghouse

On EPA's solid fuel fired boiler database

- #1 cleanest for PM (set the new source floor)
- #3 cleanest for Hg (in the floor)
- #32 cleanest for HCl (in the floor)

Yet doesn't meet dioxin limit and might have to shut down.

# Uber Boiler

- New source limits reflect the emissions control achieved in practice by the best controlled similar source
- Establishing the new source limits on a pollutant by pollutant basis makes it nearly impossible for any one boiler to achieve compliance with all the limits simultaneously
- EPA's impact analysis projected that no new solid fuel fired boilers would be built and hence there was no impact from the rule
- Hence the term Uber Boiler or Frankenboiler

# BMACT Auto Analogy

Boiler MACT applied to cars would require:

- Seats 8 - *Honda Odyssey*
- 0-60 mph in less than 5 seconds - *Chevrolet Corvette*
- Tows 10,000 lbs - *Ford F-250 Super Duty*
- 4WD and off-road capability - *Jeep Grand Cherokee*
- 200,000 mile trouble-free life - *Lexus GS-350*
- 50 mpg - *Toyota Prius*
- Less than \$20,000 - *Hyundai Sonata*

Is that *really* achievable?

# Pros and Cons of Final Rule

## Positives

- Work Practice standards were retained for natural gas
- Work practice standards were imposed for startup and shutdowns
- Some standards were made more reasonable
- More flexible emission averaging provisions

## Negatives

- Natural gas equivalency limitations are extremely tight, e.g. 4 ppm H<sub>2</sub>S concentration
- Some standards were tightened
- no work practices for malfunction periods
- No Health Based Emission Limit provisions were included in lieu of meeting threshold standards
- 10% Discount required for averaging
- New Unit standards, other than Gas1, are not achievable
- Standards for Dioxin/Furans are not achievable
- PM and O<sub>2</sub> requirements including CEMS are impractical
- Definitions of Energy Assessment and Energy Use Systems and Energy Audit requirements are questionable

# Industry Major Issues

- Do “best performing” and “best controlled” mean lowest emission rate or highest % control efficiency?
- Did Congress intend for EPA to establish floors on a pollutant by pollutant basis?
- MACT standards are intended to be achievable
- Are final standards reflective of MACT on MACT?
- Capital Costs for compliance are projected to exceed \$14.3 Billion
- Compliance time of 3 years will be much too short
- competition for resources with utilities can hamper efforts

# COMPARISON OF FINAL FEB 2011 BOILER MACT LIMITS TO JUNE 2010 PROPOSED BOILER MACT LIMITS

<u>HAP/Fuel</u>	<u>Proposal</u>	<u>Final</u>	<u>Factor Better</u>	<u>Proposal</u>	<u>Final</u>	<u>Factor Better</u>	<u>Units</u>
	<b>Existing Boilers</b>			<b>New Boilers</b>			
Hg Biomass	0.9	4.6	5.1	0.2	3.5	17.5	lb/TBtu
PM Biomass	0.02	0.039	2.0	0.008	0.0011	<b>0.1</b>	lb/MMBtu
HCl Biomass	0.006	0.035	5.8	0.004	0.0022	<b>0.6</b>	lb/MMBtu
Hg Coal	3	4.6	1.5	2	3.5	1.8	lb/TBtu
PM Coal	0.02	0.039	2.0	0.001	0.0011	1.1	lb/MMBtu
HCl Coal	0.02	0.035	1.8	0.00006	0.0022	36.7	lb/MMBtu
Hg Oil	4	3.5	<b>0.9</b>	0.3	0.21	<b>0.7</b>	lb/TBtu
Hg Oil non-continental	4	0.78	<b>0.2</b>	0.3	0.78	2.6	lb/TBtu
PM Oil	0.004	0.0075	1.9	0.002	0.0013	<b>0.7</b>	lb/MMBtu
HCl Oil	0.0009	0.00033	<b>0.4</b>	0.0004	0.00033	<b>0.8</b>	lb/MMBtu
Hg Gas 2	0.2	13	65.0	0.2	7.9	39.5	lb/TBtu
PM Gas 2	0.05	0.043	<b>0.9</b>	0.003	0.0067	2.2	lb/MMBtu
HCl Gas 2	0.000003	0.0017	566.7	0.000003	0.0017	566.7	lb/MMBtu
Or clean gas 2 can opt in to Gas 1 work practice if:	NA	Hg content <40 ug/m3		NA	Hg content <40 ug/m3		-
		H <sub>2</sub> S content <4ppmv			H <sub>2</sub> S content <4ppmv		-

## COMPARISON OF FINAL FEB 2011 BOILER MACT LIMITS TO JUN 2010 PROPOSED BOILER MACT LIMITS (cont)

<u>HAP/Fuel</u>	<u>Proposal</u>	<u>Final</u>	<u>Factor Better</u>	<u>Proposal</u>	<u>Final</u>	<u>Factor Better</u>	<u>Units</u>
	Existing Boilers			New Boilers			
CO Biomass stoker	560	490	0.9	560	160	0.3	ppm at 3%O2
CO Biomass FB	250	430	1.7	40	260	6.5	ppm at 3%O2
CO Biomass Dutch/ Suspension	1010	470	0.5	1010	470	0.5	ppm at 3%O2
CO Biomass Fuel Cell	270	690	2.6	270	470	1.7	ppm at 3%O2
CO Biomass Hybrid Suspension/ Grate	NA	3500	NA	NA	1500	NA	ppm at 3%O2
CO Coal pulverized	90	160	1.8	90	12	0.1	ppm at 3%O2
CO Coal stoker	50	270	5.4	7	6	0.9	ppm at 3%O2
CO Coal FB	30	82	2.7	30	18	0.6	ppm at 3%O2
CO Oil	1	10	10.0	1	3	3.0	ppm at 3%O2
CO Oil non-continental	1	160	160.0	1	51	51.0	ppm at 3%O2
CO Gas2	1	9	9.0	1	3	3.0	ppm at 3%O2
D/F Biomass stoker	0.004	0.005	1.3	0.00005	0.005	100.0	ng/dscm at 7%O2
D/F Biomass FB	0.02	0.02	1.0	0.007	0.02	2.9	ng/dscm at 7%O2
D/F Biomass Dutch/ Suspension	0.03	0.2	6.7	0.03	0.2	6.7	ng/dscm at 7%O2
D/F Biomass Fuel Cell	0.02	4	200.0	0.0005	0.003	6.0	ng/dscm at 7%O2
D/F Biomass Hybrid Suspension/Grate	NA	0.2	NA	NA	0.2	NA	ng/dscm at 7%O2
D/F Coal pulverized	0.004	0.004	1.0	0.002	0.003	1.5	ng/dscm at 7%O2
D/F Coal stoker	0.003	0.003	1.0	0.003	0.003	1.0	ng/dscm at 7%O2
D/F Coal FB	0.002	0.002	1.0	0.00003	0.002	66.7	ng/dscm at 7%O2
D/F Oil	0.002	4	2000.0	0.002	0.002	1.0	ng/dscm at 7%O2
D/F Gas2	0.009	0.08	8.9	0.009	0.08	8.9	ng/dscm at 7%O2

# Reconsideration Issues Identified by EPA

- **Boiler Major Source Rule**

- Revision of dioxin emission limits or replacement with work practice standards
- Revisions to subcategories
- Work practice standards for boilers that use clean gases other than natural gas
- Work practice standards for limited-use boiler subcategory
- Changes to CO compliance demonstration requirements

- **Boiler Area Source Rule**

- GACT instead of MACT standards for biomass and oil-fired boilers
- Applicability of Title V permitting requirements

- **CISWI Rule**

- Emission limits for ERUs
- Flexibility in fuel switching
- Revision of definition of cyclonic burn barrels

# Additional Issues Raised by Industry

- **Boiler Major Source Rule**

- TSM emission limit as an alternative to PM emission limit
- Removal of PM CEMS requirement for some types of units
- Creation of additional subcategories (e.g., new category for non-drying suspension burners; separate subcategories for light and heavy liquid fuel units)
- Separate PM emission limits for each subcategory
- CEMS-based emission limits for CO as an alternative

- **Boiler Area Source Rule**

- Compliance period for tune-ups
- Subcategory for seasonal boilers

- **CISWI Rule**

- Subcategorization of ERUs (Energy Recovery Units)
- Revision of CO monitoring requirements during startup and shutdown periods
- Affirmative defense provisions
- Restoration of “contained gaseous material” definition
- Applicability to foundry sand thermal reclamation units and chemical recovery units

# PM-CEMs Logistics

- Required for solid fuel boilers >250 mmbtu/hr
- Instrument cost ~\$85G
- Certification requires 5 stack tests @ 3 different loading ranges, cost ~ \$50G, use of paired trains is recommended
- Use of multiple fuels can greatly complicate certification
- Certification must wait until all controls are installed
- ADM has 19 boilers requiring PM-CEMs, most burning different coals, some biomass, some TDF
- At 20 test runs per boiler, a total of 380 test runs must be performed, 760 if paired trains are used
- Unclear whether instrument accuracy is sufficient for the task, i.e. potential for many false exceedances exists

# Reconsideration Outcome

- Lower PM limits for coal?
- More reasonable limits for biomass?
- Broader definition of biomass?
- Work Practice Standards for Dioxin/Furans?

# CISWI Issues

- Contained gaseous material definition – could make pipeline gases solid waste but EPA intends to correct
- No exemption for startup & shutdown
- No work practice standards for malfunctions
- Sources remain subject to CISWI until 6 months after ceasing to burn waste
- Homogeneous waste definition unclear
- Waste coal-burning units not well characterized
- Database errors – some top performing units did not burn waste
- PM CEMs shouldn't be required
- Subcategorization of ERUs beyond biomass, coal and liquid/gas
- Achievability of Limits

# NHSM Issues

- Material transferred to a 3<sup>rd</sup> party for use as fuel becomes waste. If it remains under the control of generator, it is not “discarded”.
- Process by which discarded materials may be “processed” into non-waste fuels is impractical and fraught with uncertainty
- Legitimacy criteria for determining whether a material is a fuel, ingredient or waste are imprecise and pose major obstacles to the legitimate use of materials
- Reclamation of materials e.g. foundry sand should not be subject to CISWI
- Waste coal can be either a waste or a fuel depending illogically, on where it comes from
- The rule arbitrarily deals with treated seed and other biomass materials
- Concept of “Comparable Contaminants” is vague, overly stringent and will rule out use of many valuable alternative fuels. More flexibility is required

# Area Source Issues

- O<sub>2</sub> monitoring requirement is impractical
- CO monitoring should be allowed as an alternative
- Energy Assessment coverage is overly broad and inconsistent
- Testing every 3 years is unnecessarily stringent for smaller boilers
- Emission averaging should be allowed w/o 10% discount factor