BOILER MACT TOPICS INITIAL REVIEW
02-24-11

I. ACHIEVABILITY

Positives

1. Maintained work practice standards for Gas 1 units.[1]
2. Clear numerical criteria to allow other clean-burning gaseous fuels to qualify for "Gas 1" work practices.[2]
3. Existing Units: More realistic (i.e. higher) numerical standards for many categories, which more accurately reflect what real boilers can achieve[3]
4. Work practice standards for startups & shutdowns, in lieu of numerical standards[4]
5. Greater flexibility to average emissions at a site[5]

Areas of Concern

6. New Units: Many standards are unachievable. For example, new coal fired boilers are effectively outlawed in the US.[6]
7. Existing Units: Some standards are still too low, or were revised even lower.[7]
8. D/F limits for existing coal and biomass units are unachievable, and no proven technology solution exists to comply.[8]
9. Lack of work practice standards during malfunctions.
10. Lack of work practice standards for startup/shutdown/malfunctions in CISWI.[9]
11. Lack of flexibility for owner/operators to demonstrate compliance assurance.[10]

[1] Also expanded definition of Natural Gas to current NSPS Subpart Db definition
[2] Gaseous fuel must meet maximum H2S and Hg concentrations
[3] PM, Hg and HCl for all solid fuel units; Hg and HCl for Gas 2; CO for coal, oil & some biomass; D/F for biomass, oil & Gas 2
[4] Boiler MACT only
[5] All solid fuel units (e.g. coal + biomass) at a site can be averaged for PM, Hg and HCl
[6] PM, CO, D/F clearly unachievable; HCl questionable. Similar case for new biomass boilers.
[7] Hg, HCl for oil; CO for some biomass; D/F for biomass & coal
[8] D/F standard for coal boilers remains unchanged.
[9] How did EPA justify including work practice standards for S/S for Boiler MACT, but not for CISWI MACT?
[10] E.g. minimum O2 is mandated as proxy for CO compliance, even though some units possess CO CEMS; annual stack test + fuel limits for HCl when SO2 CEMS could be used as proxy.

II. WORK PRACTICE STANDARDS

Units	Fuels	Tune Up Timing	Comment/definitions.
New and existing gas 1 units	Natural gas Refinery gas Other clean gas	Annual	Other clean gases are gases, other than natural gas and refinery gas that meet defined contaminant level specifications (4ppmv H_2S and 40µg/m^3Hg content of fuel).
Small units	Any	Biennial	<10 MMBtu/hr
New and existing metal process furnaces		Annual	Metal process furnaces include natural gas-fired annealing furnaces, preheat furnaces, reheat furnaces, aging furnaces, heat treat furnaces, and homogenizing furnaces
Limited use units	Any	Biennial	>10 MMBtu/hr and <876 hours operation

- Tune-up includes:
  - Burner inspection;
  - Flame pattern inspection;
  - Inspection of control system; and
  - CO emission optimization which includes the measurements of CO before and after adjustments are made.
- Maintain records of required tune-ups and submit reports as necessary.

III. HEALTH-BASED EMISSIONS LIMIT (HBEL)

The "final" BMACT rule does not contain any health based compliance alternatives. EPA's rejection of industry comments supporting health based alternatives is based on the following:

1. EPA's authority to offer health based compliance alternatives under the CAA Section 112(d)(4) is discretionary. Congress intended to allow EPA to decide not to consider a health threshold even for pollutants with an established threshold (like HCl).

2. EPA continues to believe that the cumulative effects of acid gases emitted from boilers and other acid gas sources located near boilers supports its decision to not exercise its discretion under 112(d)(4). EPA cited significant data gaps in the variability of acid gas emissions from sources co-located with and nearby industrial boiler emissions. Insufficient data was available when the rule was proposed and apparently no additional data was supplied during the comment period.

3. EPA also received comments recommending that it exclude specific facilities from complying with emissions limits if the facility demonstrates that its emissions do not pose a health risk. EPA believes it must still establish emissions standards even if it decided to exercise its discretion under CAA Section 112(d)(4).

4. EPA continues to believe that the co-benefits of establishing conventional MACT limits for HCl are significant and should be considered when deciding whether to invoke Section 112(d)(4). EPA stated in the preamble: "Although MACT standards may directly regulate only HAPs and not criteria pollutants, Congress did recognize, in the legislative history to section 112(d)(4), that MACT standards would have the collateral benefit of controlling criteria pollutants as well and viewed this as an important benefit of the air toxics program."

5. EPA believes it had no reason to consider a HBEL for Manganese because it decided to use PM as a surrogate for all metal HAP emissions. No compound specific limit for Manganese was presented in the proposal nor is any adopted in the final rule.

IV. EMISSIONS AVERAGING

- The only significant change made to the emissions averaging provisions is to clarify that all solid fuel boilers would be considered in the same subcategory, so they can be in the same emissions average.
    - This is helpful for Hg, HCl, and PM.

- EPA did not respond (at least not in the preamble) to comments such as:
    - (1) adding D/F
    - (2) deleting the demonstration at boiler design capacity
    - (3) deleting the 10% penalty
    - (4) deleting the compliance demonstration during the first 12 months
    - (5) reducing the annual stack test frequency.

- There is no provision to allow use of CEMS data (eg. PMCEMS) to show compliance. Stack tests must be used.

V. MONITORING AND TESTING

- PM CEMs are still required for coal, biomass and residual oil boilers >250 mmbtu. Unable to see where EPA attempted to make any concessions there.
- Stack testing frequency– initial and annual tests are required for all pollutants but dioxins. Only an initial test is required for dioxins. This may be a concession
- Continuous Compliance – parameters during performance tests become operating limits. EPA will allow pro-rating for heat input for certain things like sorbent injection.
- O2 monitoring is required and the lowest hourly average O2 during testing must be maintained on a 12 hr. block avg.
- Fuel analysis – if using fuel analysis to meet HCl or Hg, then you have to either keep your monthly coal below the level during the test or recalculate the pollutant level for every new fuel or new supplier of fuel and if it exceeds the test value, do a new test.
- SSM – It looks like during startup and shutdown, you must follow the mfr's recommended procedures. Malfunctions are not exempted and they are creating an affirmative defense for operation during malfunction that you can use to prove a malfunction was unavoidable.

VI. Startup, Shutdown (SS) and Malfunction (M)

How did EPA handle SS?

- In lieu of numerical emission limits, all subcategories of new and existing boilers and process heaters will be required to meet source work practice standards by following the manufacturer's recommended procedures for minimizing periods of startup and shutdown (p. 27; 60; 194-5)
    - If manufacture's recommendations are unavailable, sources must follow recommendations for units of similar design (p. 195)

BMACT Excerpts:

> EPA has revised this final rule to require sources to meet a work practice standard, which requires following the manufacturer's recommended procedures for minimizing periods of startup and shutdown, for all subcategories of new and existing boilers and process heaters (that would otherwise be subject to numeric emission limits) during periods of startup and shutdown. (p.27)

How did EPA handle M?

- EPA has determined not to regulate malfunctions. (p.28; 195):
    - EPA is not required to account for M in emissions standards (p. 29)
    - M should not be viewed as a distinct operating mode, and therefore do not need to be factored into 112(d) standards, which apply at all times (p. 195)
    - It would be impracticable to take M into account when setting standards (p. 29)
    - Even if source fails to comply with CAA §112(d) as a result of M, EPA would determine response based on good faith efforts to minimize emissions during M periods, preventative and correctional actions, and attempts to ascertain and rectify excess emissions (p.29-30; 195)
    - EPA created an affirmative defense to civil penalties for exceeding limits numeric caused by M (p. 30; 196). *See* 40 CFR 63.7575.

VII. DIOXIN/FURAN STANDARDS

- EPA did not change- the data we have shows we do not meet the standards (despite our levels being very low).
- There is no emissions averaging provision for D/Fs.
- The ICR data was all evaluated at the detection limit for each congener, but compliance can be evaluated by treating ND congeners as zero.
    - Evaluating it by both ways does not help enough

VIII. DEFINITION OF SOLID WASTE (ie Non Hazardous Secondary Materials rule)

What does EPA say has changed from the proposed rule in how "solid waste" is defined?

- The final rule has the same basic framework as the proposed rule with several exceptions:
  - **(1) scrap tires when they are combusted and used as a fuel are not solid waste**
    - EPA concluded that scrap tires- removed from vehicles, managed and collected under the oversight of a tire collection program- used as fuel in a combustion unit would not be considered solid waste (p. 281)
    - Tires from a tire collection program have not been discarded and therefore are not waste (p. 281)
  - **(2) resinated wood residuals when they are combusted and used as a fuel are not solid waste**
    - EPA concluded that resinated wood residuals when burned in a combustion unit- whether within or outside the control of a generator- would not be solid waste as long as the resinated wood meets the legitimacy criteria (p. 281-282)
    - resinated wood residuals have not been discarded and therefore are not waste (p. 281-282)
  - **(3) coal refuse that has been previously discarded, but has been processed in the same way as coal is today in not solid waste**
    - Coal refuse is distinctive from other non-hazardous secondary materials at issue in the rule because it is a raw material mined for the primary purpose of providing fuel (p. 282)
  - **(4) definitions of traditional fuel and several other terms clarified in the final rule**
    - "alternative fuels" category has been added to the definition of traditional fuels (p. 282)
    - "historically managed" has been added to the definition of traditional fuels (p. 282)
    - meanings of "traditional fuel" and "clean cellulosic biomass" have been codified in Section 241.2 (p. 282)
    - the new definition of "traditional fuel" clarifies that traditional fuels are not secondary materials and are not solid waste unless discarded (p. 282-283)

Meaningful heat value:

- Meaningful heat value presumed for materials with energy value >5,000 Btu/lb
- Materials <5,000 Btu/lb energy value can demonstrate energy can be recovered cost effectively

> "We also note that we are not establishing a bright line test for satisfying the meaningful heating value test. Rather, for purposes of meeting the legitimacy criteria for fuels, we would consider non-hazardous secondary materials with an energy value greater than 5,000 Btu/lb, as fired, to have a meaningful heating value, and satisfy this legitimacy criterion. However, for facilities with energy recovery units that use non-hazardous secondary materials as fuels with an energy content lower than 5,000 Btu/lb, as fired, we believe it is also appropriate to allow a person to demonstrate that a meaningful heating value is derived from the non-hazardous secondary material if the energy recovery unit can cost-effectively recover meaningful energy from the non-hazardous secondary materials used as fuels. See Section VII.H.1 for a discussion of how non-hazardous secondary materials can satisfy the meaningful heating value criterion for fuels." (SWD at 207).

(See separate document, Definition of Solid Waste Summary, for complete review.)

IX. CISWI CHANGES

The Good

- Overall, the limits are better – still need to evaluate overall achievability.
- Clarified and revised the applicability and compliance requirements for CISWI units that cease or begin combusting solid waste.
- Determined that this final action will not subject burn-off ovens, soil treatment units, cyclonic burn barrels, laboratory analysis units, and space heaters to this standard.
- Further subcategorized ERUs with separate limits for NOx, CO, and SO2 for coal and biomass units.
- Revised the definition of small, remote incinerators.
- Incorporated new data.
- Revised the emission limit methodology to use the UPL for ERUs and waste-burning kilns.
- Revised the statistical analysis to use the log normal distribution of data in cases where a normal data distribution is not indicated conclusively by normality tests for the data.
- Revised the non-detect methodology to calculate emission limits using three times the reported non-detect values where the value equal to three times the representative MDL was greater than the calculated MACT floor emission limit.
- No requirements for opacity.
- Revised the monitoring requirements for continuous compliance via testing and parametric monitoring and to allow CEMS use to demonstrate compliance over a 30-day rolling average as an alternative.
- Revised the CO CEMS monitoring requirement from mandatory to voluntary for existing ERUs. Only CEMS requirement is PM CEMS for large ERUs.
- Incorporated hourly CEMS data into emissions limit calculations and 24-hour CEMS data into costing and impacts analyses.
- Revised the calculation methodology of D/F TEQ and clarified that sources must comply with **either** the TMB or TEQ basis limit.
- Revised the reduced testing provision to state testing for a given pollutant may be performed every 3 years, instead of annually, if measured emissions during two consecutive annual performance tests are less than 75 percent of the applicable emission limit.
- Provided an affirmative defense to civil penalties for exceedances of emission limits that are caused by malfunctions.
- Relaxed specific requirements for calibration frequency of CPMS and instead refer to site specific plan.

The Bad

- Still PM CEMS for ERUs over 250 MMBtu/hr.
- Still pollutant by pollutant approach, not many units meet all limits.
- No separate treatment of startup/shutdown – standards apply at all times and sources should be able to meet them.
- No emissions averaging included.
- Remain subject to CISWI for 6 months after waste is no longer combusted, can't switch back and forth between CISWI and MACT frequently.

X. HEALTH BENEFITS

- Table 5 summarizes the main benefits
  - Avoided 2,500 to 6,500 premature mortalities
  - Summary of Health Avoided Incidences
    - Chronic Bronchitis 1,600
    - Acute Myocardial Infarction 4,000
    - Hospital Admissions, Respiratory 610
    - Hospital Admissions, Cardiovascular 1,300
    - Emergency Room Visits, Respiratory 2,400
    - Acute Bronchitis 3,700
    - Work Loss Days 310,000
    - Asthma Exacerbation 41,000
    - Minor Restricted Activity Days 1,900,000
    - Lower Respiratory Symptoms 44,000
    - Upper Respiratory Symptoms 34,000
    - School Loss Days 810
- The Final Rule updated the health benefits analysis using Comprehensive Air Quality Model with extensions(CAMx)
- The model used in this rule assumes all fine particles, regardless of their chemical composition, are equally potent in causing premature death because clear scientific evidence to support estimates by particle type is lacking.
- Considers the health benefits prospective
- Found human health benefits associated with reducing exposure to PM2.5
- EPA assumes that all fine particles have equivalent health effects, with varying benefits
- EPA unable to estimate the benefits associated with HAPS because limited by resource, date, and methodology
- It is difficult to quantify HAPs benefits
- SO2 has a lower benefit-per-ton estimate than direct PM2.5 because it does not directly transform into PM2.5, and because sulfate particles formed from SO2 emissions can travel many miles
- Energy disbenefits are valued at $23 million for the selected option and $35 million for the alternative option.
- Ozone benefits are valued at $3.6 to $15 million for both options. and because sulfate particles formed from SO2 emissions can transport many miles, including over areas with low populations.

XI. COSTS

2010 Proposed	2011 Final
The resulting total national cost impact of the proposed rule is 9.5 billion dollars in capital expenditures and 3.2 billion dollars per year in total annual costs. Considering estimated fuel savings resulting from work practice standards and combustion controls, the total annualized costs are reduced to 2.9 billion dollars. 75 FR 3207.	The **resulting total national** cost impact of this final rule is 5.1 billion dollars in capital expenditures and 1.8 billion dollars per year in total annual costs. Considering estimated fuel savings resulting from work practice standards and combustion controls, the total annualized costs are reduced to 1.4 billion dollars (245).
We estimate **the monetized benefits** of this proposed regulatory action to be $17 billion to $41 billion (2008$, 3 percent discount rate). The monetized benefits of the proposed regulatory action at a 7 percent discount rate are $15 billion to $37 billion (2008$). 75 FR 32039.	We estimated the **total monetized benefits** of this final regulatory action to be $22 billion to $54 billion (2008$,3 percent discount rate) in the implementation year (2014). The monetized benefits at a 7 percent discount rate are $20 billion to $49 billion (2008$) (248).
Based on estimated compliance costs associated with the proposed rule and the predicted change in prices and production in the affected industries, the **estimated social costs** of the proposed rule are $2.9 billion (2008 dollars). 75 FR 32043.	Based on estimated compliance costs associated with this final rule and the predicted change in prices and production in the affected industries, the **estimated social costs** of this final rule are $1.5 billion (2008 dollars) (279).
The annual **monitoring, reporting, and recordkeeping burde**n for this collection (averaged over the first 3 years after the effective date of the standards) is estimated to be $87.6 million. This includes 208,832 labor hours per year at a total labor cost of $19.8 million per year, and total non-labor capital costs of $67.8 million per year. 75 FR 32045.	The **annual monitoring, reporting, and record keeping** burden for this collection (averaged over the first 3 years after the effective date of the standards) is estimated to be $95.9 million. This includes 280,459 labor hours per year at a total labor cost of $26.5 million per year, and total non-labor capital costs of $69.3 million per year (265).
The total **burden for the Federal government** (averaged over the first 3 years after the effective date of the standard) is estimated to be 93,648 hours per year at a total labor cost of $4.9 million per year. 75 FR 32045.	The total **burden for the Federal government** (averaged over the first 3 years after the effective date of the standard) is estimated to be 97,563 hours per year at a total labor cost of $5.2 million per year (265).
The costs of handling the **additional solid waste generated** are $3.4 million for existing sources and $6.3 million for new sources. These costs are also accounted for in the control costs estimates. 75 FR 32037.	The costs of handling the **additional solid waste generated** are $4.2 million for existing sources and $25,000 for new sources. These costs are also accounted for in the control costs estimates (242).
The annual costs of treating the **additional wastewater** are $4.0 million for existing sources and $774 for new sources. These costs are accounted for in the control costs estimates. 75 FR 32037.	The annual costs of treating the **additional wastewater** are $1.4 million for existing sources and $1,055 for new sources. These costs are accounted for in the control costs estimates (241).

XII. STANDARDS

BMACT Final 2011 Standards Table:

Table 1. EMISSION LIMITS FOR BOILERS AND PROCESS HEATERS

(pounds per million British thermal units)

Subcategory	Particulate Matter (PM)	Hydrogen Chloride (HCl)	Mercury (Hg)	Carbon Monoxide (CO) (ppm @3% oxygen)	Dioxin/ Furan (TEQ) (ng/dscm)
Existing –Coal Stoker	0.039	0.035	0.0000046	270	0.003
Existing – Coal Fluidized Bed	0.039	0.035	0.0000046	82	0.002
Existing – Pulverized Coal	0.039	0.035	0.0000046	160	0.004
Existing – Biomass Stoker/other	0.039	0.035	0.0000046	490	0.005
Existing – Biomass Fluidized Bed	0.039	0.035	0.0000046	430	0.02
Existing – Biomass Dutch Oven/Suspension Burner	0.039	0.035	0.0000046	470	0.2
Existing – Biomass Fuel Cells	0.039	0.035	0.0000046	690	4
Existing – Biomass Suspension/Grate	0.039	0.035	0.0000046	3,500	0.2
Existing – Liquid	0.0075	0.00033	0.0000035	10	4
Existing – Gas 2 (Other Process Gases)	0.043	0.0017	0.000013	9.0	0.08
Existing – non-continental liquid	0.0075	0.0003	0.00000078	160	4

BMACT Final 2011 Standards Table cont:

New –Coal Stoker	0.0011	0.0022	0.0000035	6	0.003
New – Coal Fluidized Bed	0.0011	0.0022	0.0000035	18	0.002
New – Pulverized Coal	0.0011	0.0022	0.0000035	12	0.003
New – Biomass Stoker	0.0011	0.0022	0.0000035	160	0.005
New – Biomass Fluidized Bed	0.0011	0.0022	0.0000035	260	0.02
New – Biomass Dutch Oven/Suspension Burner	0.0011	0.0022	0.0000035	470	0.2
New – Biomass Fuel Cells	0.0011	0.0022	0.0000035	470	0.003
New – Biomass Suspension/Grate	0.0011	0.0022	0.0000035	1,500	0.2
New – Liquid	0.0013	0.0031	0.00000021	3	0.002
New – Gas 2 (Other Process Gases)	0.0067	0.0017	0.0000079	3	0.08
New – non-continental liquid	0.0013	0.0032	0.00000078	51	0.002

TABLE 1—EMISSION LIMITS FOR BOILERS AND PROCESS HEATERS

[Pounds per million British thermal units]

Subcategory	Particulate matter (PM)	Hydrogen chloride (HCl)	Mercury (Hg)	Carbon monoxide (CO) (ppm @3% oxygen)	Dioxins/ furans (total TEQ) (ng/dscm)
Existing—Coal Stoker	0.02	0.02	0.000003	50	0.003
Existing—Coal Fluidized Bed	0.02	0.02	0.000003	30	0.002
Existing—Pulverized Coal	0.02	0.02	0.000003	90	0.004
Existing—Biomass Stoker	0.02	0.006	0.0000009	560	0.004
Existing—Biomass Fluidized Bed	0.02	0.006	0.0000009	250	0.02
Existing—Biomass Suspension Burner/Dutch Oven	0.02	0.006	0.0000009	1010	0.03
Existing—Biomass Fuel Cells	0.02	0.006	0.0000009	270	0.02
Existing—Liquid	0.004	0.0009	0.000004	1	0.002
Existing—Gas (Other Process Gases)	0.05	0.000003	0.0000002	1	0.009
New—Coal Stoker	0.001	0.00006	0.000002	7	0.003
New—Coal Fluidized Bed	0.001	0.00006	0.000002	30	0.00003
New—Pulverized Coal	0.001	0.00006	0.000002	90	0.002
New—Biomass Stoker	0.008	0.004	0.0000002	560	0.00005
New—Biomass Fluidized Bed	0.008	0.004	0.0000002	40	0.007
New—Biomass Suspension Burner/Dutch Oven	0.008	0.004	0.0000002	1010	0.03
New—Biomass Fuel Cells	0.008	0.004	0.0000002	270	0.0005
New—Liquid	0.002	0.0004	0.0000003	1	0.002
New—Gas (Other Process Gases)	0.003	0.000003	0.0000002	1	0.009

TABLE 1—EMISSION LIMITS AND WORK PRACTICE STANDARDS FOR BOILERS AND PROCESS HEATERS

[(Pounds per million British thermal units (lb/MMBtu)]

Source	Subcategory	Particulate Matter (PM)	or	Total Selected Metals	Hydrogen Chloride (HCl)	Mercury (Hg)	Carbon Monoxide (CO) (ppm)
New or reconstructed Boiler or Process Heater.	Solid Fuel, Large Unit.	0.025	or	0.0003	0.02	0.000003	400 (@7% oxygen).
	Solid Fuel, Small Unit.	0.025	or	0.0003	0.02	0.000003	
	Solid Fuel, Limited Use.	0.025	or	0.0003	0.02	0.000003	400 (@7% oxygen).
	Liquid Fuel, Large Unit.	0.03	.....	.....	0.0005	.....	400 (@3% oxygen).

TABLE 1—EMISSION LIMITS AND WORK PRACTICE STANDARDS FOR BOILERS AND PROCESS HEATERS—Continued

[(Pounds per million British thermal units (lb/MMBtu)]

Source	Subcategory	Particulate Matter (PM)	or	Total Selected Metals	Hydrogen Chloride (HCl)	Mercury (Hg)	Carbon Monoxide (CO) (ppm)
	Liquid Fuel, Small Unit.	0.03	.....	.....	0.0009	.....	
	Liquid Fuel, Limited Use.	0.03	.....	.....	0.0009	.....	400 (@3% oxygen).
	Gaseous Fuel, Large Unit.		.....	.....	.....	.....	400 (@3% oxygen).
	Gaseous Fuel, Small Unit.		.....	.....	.....	.....	
	Gaseous Fuel Limited Use.		.....	.....	.....	.....	400 (@3% oxygen).
Existing Boiler or Process Heater.	Solid Fuel, Large Unit.	0.07	or	0.001	0.09	0.000009	
	Solid Fuel, Small Unit.		.....	.....	.....	.....	
	Solid Fuel, Limited Use.	0.21	or	0.004	.....	.....	
	Liquid Fuel, Large Unit.		.....	.....	.....	.....	
	Liquid Fuel, Small Unit.		.....	.....	.....	.....	
	Liquid Fuel, Limited Use.		.....	.....	.....	.....	
	Gaseous Fuel		.....	.....	.....	.....	