Boiler Area Source Rule Compliance Planning

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Boiler Area Source Rule Compliance

Topics:

- Background & Refresher
  - Changes to Final Rule
- Compliance Requirements and Timeline

Boiler Area Source Rule
40 CFR 63 Subpart JJJJJJ

- Applicable at “Area Source” facilities - Not “Major Source” Facilities
- Major Source Facilities subject to more stringent requirements
- Applies to sites that have boilers that can combust fuels other than natural gas
  - Requires Tune-ups once every 2 years
  - Requires a one-time energy assessment
  - Requires Coal-fired units to meet Hg & CO Limits

Background & Refresher

- 3/21/2011 - Original Rule Promulgated
- 9/17/2011 – Initial Notification Required
- 3/21/2012 – Tune-ups Required
- 7/19/2012 – Initial Notice of Compliance Status
- 3/21/2014 – Final Compliance due:
  - Sites must complete energy assessment
  - Existing Coal-fired units must meet Mercury & CO Limits

Background & Refresher

- 16 sites subject to area source rule
  - Capable of burning fuel oil back-up
  - Chose to opt in to avoid being “new” unit under EPA policy
- Training Sessions in 2011
  - Background & Details of Recordkeeping, Reporting Requirements on 10/16 & 10/19
  - Tune-up Requirements: 10/3 & 10/19/2011
- Submitted initial notification – 9 17 11
- Conducted tune-ups before due
- Submitted NOCS by due date

Milestones & Changes to Final Rule

- **3 21 2011 – Final Rule promulgated**
- **5 21 2011 – EPA stayed effectiveness of MACT and CISWI Rule - not Area Source Rule**
- **12 23 11 – EPA Proposed Changes to Rules:**

  Area Source Rule Proposed Changes:
  - Extend compliance date for initial tune-ups by 1 year
  - Mercury limit for coal-fired units improved (database correction)
- **2 21 2012 – Submitted Comments**
- **12 20 2012 – Final Rules Signed** (FR pub. 1/31/13, 2/1/13 & 2/7/13)
- **2 1 2013 Area Source Rule promulgated in FR**

Area Source was one of 4 rules dealing with boilers, incinerators and fuels/waste

Area Source FINAL Rule Summary

- Much more reasonable rule
- Rule not stayed – <1 year till final Compliance
- Initial Notification due 1 20 2014
- Compliance due 3 21 2014
  - Existing coal-fired units - Hg & CO limits
  - Initial tune-ups for existing biomass and oil-fired units
  - Energy Assessments for Existing units
- EPA guidance: http://epa.gov/ttn/atw/boiler/boilerpg.html

Subpart JJJJJJ GACT Comparison *(existing vs. new units)*

Existing Units	New Units
No requirements for gas units	No requirements for gas units
Work practice for oil & biomass • biennial tune-ups • start-up/shut-down work practices	Emission limits for oil & biomass – PM only
Emission limits for coal – Hg, CO	Emission limits for coal – Hg, CO and PM
One time Energy Assessment (Audit) • for oil, biomass and coal (only for units >10 MMBTU /hr)	Work practice for oil, coal & biomass • biennial tune-ups only

Existing units are units which were in existence on or before JUNE 4, 2010.
New units are units which were constructed or reconstructed after JUNE 4, 2010

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.

Area Source Rule – Key Change New/Existing Policy Change

Current policy allows a unit that has capability to burn other fuels as of 6 4 2010 to be an existing unit if it wants to burn fuel oil/coal/ biomass in future without being considered a new unit.

An existing dual-fuel fired boiler meeting the definition of gas-fired boiler that meets the applicability requirements of subpart JJJJJJ after June 4 2010 due to a fuel switch from gaseous fuel to solid fossil fuel, biomass or liquid fuel is considered to be an existing source under this subpart as long as the boiler was designed to accommodate the alternate fuel.

Boiler Area Source Rule – Key Changes

- Gas-fired boilers (not subject to rules)
  - Includes any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, start-ups, or periodic testing on liquid fuels. Periodic testing of liquid fuel shall not exceed a combined total of 48 hours during any calendar year.
- Period of gas curtailment or supply interruption (definition broadened)
  - Means a period of time during which the supply of gaseous fuel to an affected ~~facility~~ boiler is restricted or halted for reasons beyond the control of a facility. The act of entering into contractual agreement with a supplier of natural gas established for curtailment purposes does not constitute a reason that is under the control of a facility for purposes of this definition. An increase in the cost of natural gas due to normal market fluctuations not during periods of supplier delivery restriction does not constitute a period of natural gas curtailment or supply interruption. On-site gaseous fuel system emergencies or equipment failures qualify as periods of supply interruption when the emergency or failure is beyond the control of the facility.
- Original definition did not reflect supplier gas restrictions
  - Gas supply not halted. Price goes sky high when gas supply restricted
  - Final definition provides authority to use fuel oil during curtailments

Updated Compliance Plan

- Recommend 12 sites opt-out. Leaving:
  - Site that burns coal and has installed good controls
    - Must meet Hg Limits by 3 21 14
    - Must conduct Energy Assessment by 3 21 14
  - Site in Puerto Rico that cannot burn gas
    - Must conduct Energy Assessment by 3 21 14
  - Two sites without gas capability to stay
    - small combustors only - not subject to assessment
- Status:
  - One site has incorporated details into permit
    - Must change permit to opt-out
  - All other sites will opt out.

Work Practice Standards

For units subject to Subpart JJJJJJ

Work Practice Standards for Remaining Area Source Units:

- Biennial Tune-ups for existing and new units
  - Same scope as prior rule; special provisions for oxygen trim systems that allow for reduced tune-up frequency.

- Energy Audits for existing affected units –
  - Duration of audit based on capacity of Affected boilers
  - Rule specifies maximum duration of the energy assessments
  - Clarified requirements; Tiered duration of audit to boiler size

- Start-up/Shut-down Procedures (63.11223 (g)) Applies to Boiler #6
  - If you own or operate a boiler subject to emissions limits in Table 1 of this subpart, you must minimize the boiler's startup and shutdown periods following the manufacturer's recommended procedures, if available. Otherwise, you must follow recommended procedures for a unit of similar design for which manufacturer's recommended procedures are available. You must submit a signed statement in the NOCS report that indicates that you conducted startups and shutdowns according to the manufacturer's recommended procedures or procedures specified for a boiler of similar design if manufacturer's recommended procedures are not available.
  - Remember – mercury and CO limits would not apply during these times. Instead you need to meet this work practice standard.

Startup Shutdown Issues

Startup means either the first-ever firing of fuel in a boiler for the purpose of supplying steam or heat for heating and/or producing electricity, or for any other purposes, or the firing of fuel in a boiler after a shutdown event. Startup ends when any of the steam or heat from the boiler is supplied for heating and/or producing electricity or for any other purpose.

Shutdown means the cessation of operation of a boiler for any purpose. Shutdown begins either when none of the steam or heat from the boiler is supplied for heating and/or producing electricity, or for any other purpose, or at the point of no fuel being fired into the boiler, whichever is earlier. Shutdown ends when there is no steam and no heat being supplied and no fuel being fired into the boiler.

Industry has submitted an administrative petition asking EPA to fix definitions.

Tune-up Requirements

- Can Provide Details from internal Webinar from 2011 (dates and forms not updated but can be)

Energy Assessment – by 3 21 2014

Existing (oil, coal, biomass) units >10 MMBtu/hr must conduct facility-wide energy assessment to identify cost-effective energy conservation measures. :

1. A visual inspection of the boiler system;
2. An evaluation of operating characteristics of the affected boiler systems, specifications of energy use systems, operating and maintenance procedures, and unusual operating constraints;
3. An inventory of major energy use systems consuming energy from affected boiler (s) and which are under control of the boiler owner or operator;
4. A review of available architectural and engineering plans, facility operation and maintenance procedures and logs, and fuel usage;
5. A list of major energy conservation measures that are within the facility's control;
6. A list of the energy savings potential of the energy conservation measures identified; and
7. A comprehensive report detailing the ways to improve efficiency, the cost of specific improvements, benefits, and the time frame for recouping those investments.

The energy assessment must include the following with extent of the evaluation for items (1) through (4) appropriate for the on-site technical hours listed in 63.11237

An energy assessment completed on or after Jan 1 2008, that meets or is amended to meet the energy assessment requirements above satisfies the energy assessment requirements. Energy assessor approval and qualification requirements are waived in instances where past or amended energy assessments are used to meet the energy assessment requirements.

Qualified Energy Assessor Requirements

1. Someone who has demonstrated capabilities to evaluate a set of the typical energy savings opportunities available in opportunity areas for steam generation and major energy using systems including:
   i. Boiler Combustion Management
   ii. Boiler thermal energy recovery including: (Conventional feed water economizer, conventional combustion air preheater and condensing economizer)
   iii. Boiler blowdown thermal energy recovery
   iv. Primary energy resource selection, including (fuel switching and applied steam energy vs direct fired energy vs electricity)
   v. Insulation Issues
   vi. Steam trap and steam leak management
   vii. Steam end-use management
2. Capabilities and knowledge includes, but is not limited to:
   i. Background, experience and recognized abilities to perform the assessment activities, data analysis and report preparation
   ii. Familiarity with operating and maintenance practices for steam or process heating systems
   iii. Additional potential steam system improvement opportunities including improving steam turbine operations and reducing steam demand
   iv. Additional process heating system opportunities including effective utilization of waste heat and use of proper process heating methods.
   v. Boiler-steam turbine cogeneration systems
   vi. Industry specific steam end-use systems

Energy Assessment – Existing Units
Required Duration and Scope of Assessment (63.11237)

- Duration and Scope based on heat input capacity of affected units:
  - < 0.3 trillion BTU/year
    - minimum 8 on site technical labor hours,
    - must cover 50% of boiler's energy production (steam/elect)
  - 0.03 – 1 trillion BTU/year
    - Minimum 24 on site technical labor hours,
    - Must cover at least 33% of boilers energy production
  - > 1 trillion BTU/year (GB 700 MMBTU/hr = 64 hrs)
    - Minimum 24 hrs + 8 hours for every add'l 1 trillion BTU
    - Must cover at least 20% of boilers energy production
    - Maximum 160 on site technical hours

Energy Audit Tiers –

- Facilities with affected boilers using > 1 Tbtu/year
  - Assessment : 24 hours of on- site review for first TBTU + 8 hours for each additional TBTU of Capacity
    - Rule specifies maximum amount of on-site effort.
    - Only boiler capacity of “affected units” counts

- Scope of Energy Audit
  - Must cover energy use systems that account for at least xx% of energy production from the “affected units”
    - The scope of the energy assessment is based on energy use by discrete segments of a facility and not by a total aggregation of all individual energy using elements of a facility. Thus the on site energy use system(s) serving as a basis for the percent of affected boiler(s) energy production may be segmented by production area or energy use area (e.g., production area or building) as most logical and applicable to the specific facility being assessed.

Energy Audit

- Clarify on Energy Assessment Scope:
  - Need to define Energy Use systems and whether any of those systems use >xx% of the energy produced by affected boilers
  - Assess whether prior audits meet part of the needs and if any of those can be augmented??
  - Who will document our “energy use system” assessment?
  - Reference Jason Philpott’s presentation on how to measure energy use from affected facilities and how energy use in energy use systems are defined.
- If you haven’t started working on this and you are an area source, you might have an issue.

Compliance Milestone Dates

- 1 20 2014 – submit initial notification (done unless there has been a change)
- 3 21 2014 - Complete Energy Assessment & Tune-up
- 3 21 2014 – Demonstrate Compliance with Hg and CO limits
- Earlier of July 19, 2014 or within 60 days of performance test for Hg and NOCS
  - Submit NOCS for all requirements (limits, assessment, tune-up, s/u, s/d)

Units with Emission Limits & Monitoring

- Standard apply at all times except during start-ups and shut-downs as defined in 63.11237, during which time you must comply with Table 2 work practice standards
- Compliance based on stack testing, fuel analysis, or CMS (CEMS, COMS or CPMS)
  - Mercury - can use fuel analysis if calculated emission rate < limit (63.11211 (c))
  - Oil-fired units without PM or SO2 controls which burn low sulfur oil (<0.5%) are not subject to PM emission limits
- Compliance with Stack Testing also requires compliance with operating limits (Table 3)
  - Triennial Stack testing
  - If measured Hg/PM < 50% of limit, no future testing required
- Operating limit and continuous oxygen or CO CEM monitoring – 30 or 10 day averaging periods

Meeting Emission Limits

1. Minimize s/u and s/d emissions
2. Develop and follow a site specific testing plan
3. Develop and follow a site specific monitoring plan
4. Conduct initial and triennial performance tests for Hg and CO
5. Establish operating limits during performance test
6. Conduct initial and quarterly (as applic) fuel analysis for each type of fuel.
7. Monitor and collect data to demonstrate compliance with operating limits
8. Conduct performance evaluations of your CMS.

Meeting Emission Limits – Coal-Fired Boiler

Develop and follow a site specific testing plan for Mercury

- Plan for Fuel Analysis Test Plan. If we meet limits using Fuel analysis alone, no stack testing is needed. Also should have no operational limits.
  - If Fuel Analysis shows < 50% limit, no quarterly fuel analysis is needed
  - Otherwise, conduct and quarterly fuel analysis for each type of fuel and assure compliance with Hg limit based on quarterly fuel analysis and operation

If we cannot meet mercury limits using fuel analysis, more compliance work is required and the site will have more operating restrictions:

- Develop and follow a site specific monitoring plan
- Conduct initial and triennial performance tests for Hg
- Establish operating limits during performance test
- Monitor and collect data to demonstrate compliance with operating limits

Compliance with CO limit?

- CO CEMs – do you have one?
- Do you have a QA/QC plan and does it meet meet PS requirements?

If not we need to add this (performance evaluations of your CMS).

Units with Emission Limits & Monitoring

- Compliance based on stack testing, fuel analysis, or CMS (CEMS, COMS or CPMS)
  - Mercury - can use fuel analysis if calculated emission rate < limit (63.11211 (c))
    - If Hg < 11 (1/2 the limit) no further analysis necessary.
    - If Hg between 11 and 22 must conduct quarterly fuel sampling and demonstrate that we are below the limit
    - Area Source rule requires you to demonstrate ongoing compliance based on the t90 formula requirements.
- Compliance with Stack Testing also requires compliance with operating limits (Table 3)
  - Op limits:
    - 110% of load used in stack testing
    - Operating parameters established during stack test for control devices used to reduce Hg emissions. Dry scrubber, Baghouse parameters. (opacity or leak detection system – see provisions 11244 (f) for leak detection systems)

Conducting Performance Tests

- Hg & CO Performance Testing
  - demonstrates initial compliance and
  - used to establish operating parameters to assure ongoing compliance
  - Site specific plan required 60 days before test
  - Test per Table 4 of JJJJJJ
  - Retest every 3 yrs (37 mos max)
    - If measured Hg < 50% of limit, no future testing required
- CO for boilers with CO/O2 CEMs
  - No operating limits are required
  - All other boilers must establish op limits for minimum O2 levels
  - Compliance is based on 10-day rolling averages for CO

Fuel sampling for compliance?

Reference: Jason Philpott's excellent presentation for Boiler MACT Compliance

Learnings for area source rule:

- Hg limit is 22 lb/trillion. No Cl Limits
- Hg variability seems lower than that of Cl
- Fuel sampling alone for compliance appears achievable.
- Unfortunately if we are over 11 lb/trillion and we need to conduct quarterly fuel sampling, we must demonstrate ongoing compliance using the t90 formula

Comparison of B MACT and Area Source Rules: Understanding of Requirements & Remaining Questions

- Fuel Analysis Plans
- Initial Compliance
  - Performance Testing
  - Fuel Analysis
- Continuous Compliance
  - Performance Testing
  - Fuel Analysis

Area Source Fuel Analysis Plans

Performance Testing 63.11213(a):

Which fuels are required to be analyzed? COAL

- You are required to conduct fuel analysis for fuels subject to emission limits in Table 1
- You are not required to conduct fuel analysis for fuels used ONLY for S/U, S/D or transient flame stability purposes

Minimum Testing during Performance Tests

- At a minimum , you must obtain three composite fuel samples for each fuel type per procedures in Table 5 to this subpart. Each composite must consist of a minimum of three samples collected at approx equal intervals during a test run period. 63.11213 (b).

Subsequent tests or Fuel Analyses 63.11220 (c)

- If you demonstrate compliance with the mercury emission limit based on fuel analysis you must conduct analysis per 63.11213 for each type of fuel burned as specified below. If you plan to burn a new fuel type or fuel mixture you must recalculate Hg emission rate using Eqn 1 (t_{90} method). The recalculated Hg emission rate must be less than the limit.
    1. When demonstrating initial compliance for Hg, if Hg constituents in fuel or fuel mixture are </= to half of the limit, no further fuel analysis is required but you must continue to comply with applicable operating limits and monitoring requirements
    2. When demonstrating initial compliance with the Hg limit, if the Hg constituents in the fuel or fuel mixture are > ½ of the limit, you must conduct quarterly sampling.

Compliance via Fuel Analysis

- Hg compliance based on Fuel Analysis- can use fuel analysis if calculated emission rate < limit

  (63.11211 (c))

  - If Hg < 11 (1/2 the limit) no further fuel analysis testing is necessary (unless switch to another fuel type).
  - If Hg between 11 and 22 must conduct quarterly fuel sampling and demonstrate that we are below the limit based on the t_{90} statistical approach (Area Source Rule)
    - Table 3 specifies operating limits for boilers with emission limits and states that if you demonstrate compliance with applicable emission limits using fuel analysis, you must maintain the fuel type or fuel mixture (annual average) such that the mercury emission rate calculated per 63.11211 (c) are less than the applicable emission limit for Hg. [63.11211 (c) specifies the t_{90} approach]
    - Per CIBO resources Boiler MACT Rule did **not** specify you must use t_{90} on an ongoing basis, but some state agencies are requiring this.

Fuel Sampling Requirements for Hg in Coal

Sample collection	ASTM D2234/D2234M-10
Sample Compositing	Procedure at 63.11213 (b)
Preparation of composited fuel samples	ASTM D2013/D2013M
Heat Content	ASTM D5865
Moisture Content	ASTM D3173 or E871
Mercury Concentration	ASTM D6722

Coal Sampling Method – D2234

Step 1 – Coal Sampling via Method D2234

- Conditions of increment collection
  - Type 2 Increment (human discretion)??
- Stopped-belt cut method??
- Sampling “Increments”
  - What is an increment??
- What does this mean in plain English????

Step 2 - Compositing of coal samples

- Spelled out in rule is easier to understand
- The boiler MACT Rule provides more detail

Boiler MACT Fuel Sampling Details

Fuel Analysis for Performance Test

- 63.11213 (b)Take a minimum of 3 composite fuel samples
  - Each composite must consist of at least 3 samples collected at approx equal intervals during a 2-hr test run period. (table 5 of rule)
  - Calculate Hg concentration in lb/MMBTU
- As an alternative to stack testing for Hg, you can demonstrate compliance via fuel analysis
  - Calculate emission rate using 63.11211 (c) and eqn 1 of subpart JJJJJJ
  - Comply with all operating limits and monitoring requirements if constituents in fuel are <1/2 Hg limit (you don't need to do further fuel analysis)
  - Conduct a quarterly fuel analysis for each type fuel burned
  - Conduct fuel analysis before burning new type of fuel

Compliance via Stack Testing

- Compliance with Stack Testing also requires compliance with operating limits (Table 3)
  - Op limits:
    - 110% of load used in stack testing
    - B MACT limits on Hg in coal from quarterly samples.
      - If you go over need to re-test. (need to determine if same limit exists for area source)
    - Operating parameters established during stack test for control devices used to reduce Hg emissions. Dry scrubber, Baghouse parameters. (opacity or leak detection system – see provisions 11244 (f) for leak detection systems)
    - See Table 3 for all operating parameters. You'll be locked into operation of your controls based on performance from stack test.

Where are we re 22 lb/TBTU Hg limit?

- Unit is well-controlled.
  - Equipped with dry scrubber & baghouse
  - CEM for NOx, SO2, CO and O2, O2 trim system
- Unit has not burned coal for last few years. Did not collect ANY Hg data beforehand
- Initial test from Utah coal pile:
  - 6.4 lb/TBTU using “low level” Hg test 1631
  - 4.9 lb/TBTU using SM 7471B

  Neither of the initial tests used the proper test method
- Site is confident they’ll be OK.
  - Map shows Utah coal lower than Eastern
  - Site now has 22 Hg samples (11 samples from each pile)

Plan for Compliance by 3 21 14

- Develop and implement a fuel sampling plan.
- Plan was to start unit back up on coal to conduct the test plan from belt sampling.
- Start-up on coal delayed…

Questions???