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Regulatory Requirements for Boiler Tune-ups and Energy Assessments for Major & Area Source Boilers



CIBO Technical Focus Meeting

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Overview: Regulatory Requirements

- Tune-ups: Major and Area Sources
  - Initial Schedule & Frequency
  - Regulatory Requirements
- Energy Assessments
  - Initial Schedule & Frequency
  - Regulatory Requirements
- Roundtable Discussion

What is a Tune-Up?

- A tune-up means adjustments made to a boiler in accordance with procedures supplied by the manufacturer (or an approved specialist) to optimize combustion efficiency.
  - Definition for Major Source Boiler MACT
  - Does not include process heaters
  - Not defined for Area Source Boilers

Initial Compliance/Frequency

- Major Sources Initial Compliance
  - Existing Sources: By the compliance date (TBD)
  - New Sources: Within one year after start-up
- Major Sources Frequency
  - Current (3/21/2011)
    - Annual
      - New & Existing; ≥10 MMBtu/hr; Gas 1, Metal processing furnaces
    - Biennial
      - New & Existing; < 10 MMBtu/hr, All
      - Limited-use; All

Initial Compliance/Frequency

- Major Sources Frequency
  - Proposed (12/23/2011)
    - Annual
      - New & Existing; ≥10 MMBtu/hr; All
    - Biennial
      - New & Existing; < 10 MMBtu/hr; Heavy liquid, solid
      - New & Existing; ≥ 5 MM & < 10 MMBtu/hr; natural gas, refinery gas, other gas 1, gas 2 (other), light liquids
      - Limited-use; All
    - Every 5 years
      - New & Existing; < 5 MMBtu/hr; natural gas, refinery gas, other gas 1, gas 2 (other), light liquids

Initial Compliance/Frequency

- Area Sources Initial Compliance
  - Existing Sources: March 21, 2012 (current)
    March 21, 2013 (proposed)
  - New Sources: Not required
- Area Sources Frequency
  - Current (3/21/2011)
    - Biennial
      - New & Existing; < 10 MMBtu/hr; Coal
      - New & Existing; > 5 MM Btu/hr; Oil
      - New & Existing; All; Biomass

Initial Compliance/Frequency

- Area Sources Frequency
  - Proposed (12/23/2011)
    - Biennial
      - New & Existing; < 10 MMBtu/hr; Coal
      - New & Existing; > 5 MM Btu/hr; Oil
      - New & Existing; All; Biomass
    - Every 5 years
      - New & Existing; Seasonal; All
      - New & Existing; ≤ 5 MMBtu/hr; Oil

Tune-Up Protocol

1. Inspect the burner and clean & replace any components as necessary; at least once every 36 months.
2. Inspect the flame pattern and adjust as applicable
3. Inspect the air-to-fuel ratio control system and ensure that it is correctly calibrated and function properly
4. Optimize total emissions of carbon monoxide
5. Measure CO concentrations (ppm) [and oxygen in percent] in the effluent stream before and after the adjustments are made
6. Maintain onsite biennial report with CO concentrations, corrective actions, type and fuel used over the past 12 months

Tune-up Summary

- Initial compliance TBD for major sources
- Initial compliance for area sources March 21, 2012
  - Administrative stay?
- Frequency depends upon size and major or area source rules
  - Most major source boilers are annual (≥ 10 MMBtu/hr)
  - Most area source boilers are biennial
  - Proposed rules provide some relief for small boilers

What is an Energy Assessment?

- A one-time assessment to identify cost-effective energy conservation measures
- Focus on major *energy using systems* and *energy management practices*
- Identify conservation measures, with *energy savings potential* and payback period for each
- Scope dependent on total annual heat input to all boilers at facility
- Must be performed by a "*qualified assessor*"
- Comprehensive written report to be submitted to EPA

Who Needs to do an Energy Assessment?

- One-time energy assessment is required for:
  - ***Major Source:*** all existing boilers and process heaters
  - ***Area Source:*** all existing boilers > 10 MMBtu/hr
- Schedule
  - Must be completed by the compliance date and included on the Notification of Compliance Status (NOCS)
  - "This facility has had an energy assesssment performed according to §63.7530(e) - major (§63.11214(c)- area)

Energy Assessment Scope

Facility-wide energy use <0.3 Tbtu/yr	Facility-wide energy use >0.3 and < 1.0 Tbtu/yr	Facility-wide energy use > 1.0 Tbtu/yr
• Corresponds to <34 MMBtu/hr at 8760 hrs/yr. • Eight technical hours or longer. • At least 50% of the **[affected boiler(s)]** energy output must be evaluated to identify energy savings opportunities. • Boiler System and Energy Use System.	• Corresponds to >34 and <114 MMBtu/hr at 8760 hrs/yr. • 24 technical hours or longer • At least 33% of the **[affected boiler(s)]** energy output must be evaluated to identify energy savings opportunities. • Boiler System and Energy Use System.	• Corresponds to >114 MMBtu/hr at 8760 hrs/yr. • At least 20% of the **[affected boiler(s)]** energy output must be evaluated to identify energy savings opportunities. • Boiler System and Energy Use System.

Regulatory Definitions

- **Same definition for both major and area sources**
- ***Energy Use System*** includes:
  - Process heating
  - Compressed air systems
  - Machine drive (motors, pumps, fans)
  - Process cooling
  - Facility heating, ventilation, and air conditioning systems
  - Hot heater systems
  - Building envelope
  - Lighting

EPA Definitions

- ***Boiler system (Major):*** the boiler and associated components, such as, the feed water system, the combustion air system, the fuel system (including burners), blowdown system, combustion control system, and energy consuming systems.

- **Boiler System (Area):** the boiler and associated components, such as, the feed water system, the combustion air system, the **boiler** fuel system (including burners), blowdown system, combustion control system, **steam system, and condensate return system**

Regulatory Definitions

- ***Cost-effective energy conservation measure***
  - Payback (ROI) of 2 years or less
- ***Energy management practices***
  - Practices and procedures designed to manage energy as demonstrated by:
    - Facility's energy policies,
    - A facility energy manager and other staffing responsibilities,
    - Energy performance measurement and tracking methods,
    - Energy saving goal,
    - Action plans,
    - Operating procedures,
    - Internal reporting requirements, and
    - Periodic review intervals used at the facility

Energy Assessment (Major Source - Proposed) Includes:

- Visual inspection of the boiler or process heater system
- Evaluation of operating characteristics of the facility, specifications of energy using systems, operating and maintenance procedures, and unusual operating constraints
- Inventory of major systems consuming energy from affected boilers and process heaters which are under the control of the boiler O/O.
- Review of available A&E plans, facility O&M procedures and logs, and fuel usage
- Review of the facility's energy management practices

Energy Assessment (Major Source - Proposed) Includes:

- Recommendations for improvements consistent with the definition of energy management practices
- List of major energy conservation measures
- List of the energy savings potential of the energy conservation measures identified
- Comprehensive report detailing:
  - Ways to improve efficiency,
  - Cost of specific improvements,
  - Benefits
  - Time frame for recouping costs (i.e., Payback or ROI)

Energy Assessment (Area Source - Proposed) Includes:

- Visual inspection of the boiler or process heater system
- Evaluation of operating characteristics of the facility, specifications of energy using systems, operating and maintenance procedures, and unusual operating constraints
- Inventory of major systems consuming energy from affected boilers.
- Review of available A&E plans, facility O&M procedures and logs, and fuel usage

Energy Assessment (Area Source - Proposed) Includes:

- List of major energy conservation measures that are within the facility's control
- List of the energy savings potential of the energy conservation measures identified
- Comprehensive report detailing:
  - Ways to improve efficiency,
  - Cost of specific improvements,
  - Benefits
  - Time frame for recouping costs (i.e., Payback or ROI)

Qualified Energy Assessor

- Demonstrated capabilities to evaluate steam generation and major energy using systems, including:
  - Boiler combustion management
  - Boiler thermal energy recovery, incl. conventional feed water economizer, conventional combustion air pre-heater, and condensing economizer
  - Boiler blowdown thermal energy recovery
  - Primary energy resource selection,
    - fuel switching
    - *steam energy* vs. *direct-fired energy* vs. *electricity*
  - Insulation issues
  - Steam trap and steam leak management
  - Condensate recovery
  - Steam end-use management

Qualified Energy Assessor (Cont.)

- Capabilities and knowledge which include:
  - Background, experience, and recognized abilities to perform the assessment activities, data analysis, and report preparation
  - Familiarity with O&M practices for steam or process heating systems
  - Potential steam system improvement opportunities
    - improving steam turbine operations, and
    - reducing steam demand
  - Process heating system opportunities
    - effective utilization of waste heat, and
    - use of proper process heating methods
  - Boiler-steam turbine cogeneration systems
  - Industry specific steam end-use systems

Summary – Energy Assessments

- One-time only assessments
- All major source HAP facilities
- Level of effort determined by total facility heat input
- Must be performed by a "***qualified energy assessor***"
- Comprehensive report required (for submittal)
- Signed certification of energy assessment completion submitted with the Notification of Compliance Status
- **Energy Assessment is for an environmental permit!**

Roundtable Discussion

- What is your company's approach to the EPA regulatory requirements for a boiler tune-up and an energy assessment?

- Scope variations for environmental vs. energy efficiency audits?