

Novinda Corporation

Hg Measurement & Reporting

Documenting Compliance with the EGU MATS rule



Novinda
Advanced Air Quality Technologies

Critical Topics

- Hg Measurement Options
 - Measurement Frequency
 - Calculations – conversion to 30-day rolling average
 - Initial Compliance
 - Continuous Compliance
- Reporting
- Implementation considerations
- Consequence of an exceedance
- Costs

Measurement Options

- Hg CEMs
- Sorbent Trap Monitoring System
- Emissions Testing
- Low emitting EGU (LEE) Testing



Hg CEMs Option

- Continuous measurement sampled from stack
- Calculations:
 - Measurement of stack gas concentration ($\mu\text{g}/\text{scm}$, wet or dry)
 - Convert to lb/hr using $M_h = K C_h Q_h$ [mass = constant x concentration x gas flow rate]
 - Convert to lb/TBtu using Method 19 (f factor, moisture content, stack gas flow rate) OR
 - Convert to lb/GWh using $E = M_h / MW_h \times 10^3$
 - Monitor's programmable logic controller (PLC) provides hourly rolling average (HRA)
 - 24 - HRAs used to calculate daily rolling average (DRA)
 - 30 – DRAs used to calculate 30-day rolling average

M_h = Mass emission rate of mercury, lb/hr

K = unit manipulation constant 6.24×10^{-11} lb-scm/ μg -scf

C_h = Concentration of mercury in the stack gas, ppmv

Q_h = Stack gas volumetric flow rate, scfh

Hg CEMs

- Initial Compliance
 - Must first have passed the performance evaluation (Appendix A to UUUUU)
 - The test consists of all valid data recorded in the 30 boiler operating days immediately preceding the compliance date
- Continuous Compliance
 - Must demonstrate continuous compliance by using all quality-assured hourly data recorded by the CEMs and other required monitoring systems (e.g., flow rate, CO₂, O₂, or moisture systems) to calculate the arithmetic average emissions rate in the unit of the standard on a continuous 30-boiler operating day rolling average basis, updated at the end of each new boiler operating day [63.10021(b)]

Sorbent Trap Monitoring Option

- Long-term stack sampling onto activated carbon tubes
 - 3-day, 7-day, 10-day sampling periods to calculate average Hg emissions
- Calculations:
 - Measures mass of Hg collected on carbon in a pair of tubes (ng)
 - Concentrated by obtaining volume of stack gas through the tube over the duration (3-day or 7-days that the tube was in place)
 - Sampling rate is commonly 1 liter/min or 0.5 liter/min (detection limit dependent)
 - Control box can be purchased with a proportional controller that varies sampling rate if a signal is available from a stack gas flow meter
 - Mass of Hg collected on the tubes (measured by a thermal desorption analyzer) and totalized sample flow over duration is used to calculate Hg concentration (ng/scm wet); DRAs for 3, 7 or 10 days
- Convert to lb/TBtu using Method 19 (f factor, moisture content, stack gas flow rate) OR
- Convert to lb/GWh using $E_{ho} = M_h / MW_h \times 10^3$
- 30 – DRAs used to calculate 30-day rolling average

E_{ho} = electrical output-based Hg emission rate, lb/GWh

M_h = Hg mass emission rate, lb/hr

MW_h = gross electrical load for the hour, megawatts

Sorbent Trap Monitoring System

- Initial Compliance
 - Must first have passed the performance evaluation (Appendix A to UUUUU)
 - The test consists of all valid data recorded in the 30 boiler operating days immediately preceding the compliance date
- Continuous Compliance
 - Must demonstrate continuous compliance by using all quality-assured hourly data recorded by the CEMs and other required monitoring systems (e.g., flow rate, CO₂, O₂, or moisture systems) to calculate the arithmetic average emissions rate in the unit of the standard on a continuous 30-boiler operating day rolling average basis, updated at the end of each new boiler operating day [63.10021(b)]

Emissions Testing Option

- 1 or 2 hour sample using EPA Method 30B or 29 every quarter
- Must be conducted at maximum normal load (90 to 110% of design capacity)
- Calculations:
 - Measurement of stack gas concentration (ug/dscm)
 - Convert to lb/hr using $M_h = K C_h Q_h$
 - Convert to lb/TBtu using Method 19 (f factor, moisture content, stack gas flow rate) or
 - Convert to lb/GWh using $E = M_h / MW_h \times 10^3$

Emissions Testing

- Initial Compliance
 - Use data from performance testing using EPA Method 30b or 29 to show compliance with applicable emission limits in Table 1 and 2.
 - Repeat every quarter [63.100006(b)(1)]
 - You may skip performance testing in those quarters during which less than 168 boiler operating hours occur
 - except subsequence compliance demonstration must occur every year [63.10021(d)(1)]
- Continuous Compliance
 - Initial Compliance data is basis for continuous compliance for the next 90 days

LEE Testing Option

- Low emitting EGU (LEE)
 - Unit with Hg emissions < 90% of Hg standard
 - Unit with PM or HCl/chlorine emissions < 50% of respective standard
- Same as Emissions Testing in previous slide with the following clarifications:
 - Standard is 10% of the applicable Hg standard OR less than 29 lbs/yr
 - Demonstration frequency is every year
 - Testing consists of EPA Method 30B measurements plus flow and moisture, and
 - Minimum sample volume for performance testing is doubled
- Exception! LEE is not an option if your unit is equipped with an acid gas scrubber AND has a main stack AND bypass stack configuration or is new [63.100000(c)(1)(i)(A) and (B)]

Reporting (limited to Hg context)

- If you use *Hg CEMs* or *activated carbon sorbent tubes*:
 - 30-day rolling average emission rates in applicable units and excluding periods of startup or shutdown or monitor out of control
 - Performance evaluations (certifications, RATAs, see Appendix A)
 - Performance evaluation plans
- If you use emissions testing:
 - Submit Compliance Reports
- Performance tests, RATA reports, 30-day rolling average data must be submitted electronically quarterly to EPA's WebFIRE database using the Compliance and Emissions Data Reporting Interface (CEDRI)

EPA WebFIRE Database

- Submit RATA and performance test data into EPA's database
- Using the Central Data Exchange (CDX) via the Electronic Reporting Tool (ERT)
- See *<http://www.epa.gov/ttn/chief/ert/erttool.html/>*

Implementation Considerations - 30-day rolling averages

- Continuous operation is straightforward
- Must exclude periods of startup, shutdown, monitoring system out of control
 - Definition of startup
 - Either the first-ever firing of fuel in a boiler for the purpose of producing electricity, or the firing of fuel in a boiler after a shutdown event for any purpose. Startup ends when any of the steam from the boiler is used to generate electricity for sale over the grid or for any other purpose (including on-site use)
 - Definition of shutdown
 - The cessation of operation of a boiler for any purpose. Shutdown begins either when none of the steam from the boiler is used to generate electricity for sale over the grid or for any other purpose (including on-site use), or at the point of no fuel being fired in the boiler, whichever is earlier. Shutdown ends when there is no electricity being generated and no fuel being fired in the boiler
 - These definitions are topics of current litigation
 - Out of control monitor requires knowledge of QA/QC criterion
 - If a failure, then data exclusion

Implementation Considerations - RATAs

- Required annually
- Must meet Performance Specification 12B; Appendix A to Subpart UUUU and Part 75.



Consequence of an exceedance - Definitions

Excess emissions: results of any required measurements outside the applicable range (e.g., emissions limitations, parametric operating limits) that is permitted by this subpart. The values of measurements will be in the same units and average time as the values specified in this subpart for the limitations

Deviation: any instance in which an affected source subject to this subpart, or an owner or operator of such a source:

- Fails to meet any requirement or obligation established by this subpart including, but not limited to, any emission limit, operating limit, work practice standard or monitoring requirement; or

- Fails to meet any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit.

A deviation is not always a violation. The determination of whether a deviation constitutes a violation of the standard is up to the discretion of the entity responsible for enforcement of the standards.

Note: EGU MATS does not have provision that dictate shutdown as a result of excess emissions; merely the creation of accurate data, recordkeeping and reporting.

Range of Costs for Compliance Monitoring Options

	Installation Cost	Annual Cost
Hg CEMs system	\$175K – and up	\$100K
Sorbent tube system	\$80K – and up	\$60K
Stack Testing	\$15K - \$20K	\$60K - \$80K
LEE Testing	\$15K - \$20K	\$15K - \$20K