

Long-Term Mercury Emissions Variability

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April 3, 2002



Long-Term Mercury Emissions Characterization

- Evaluate “long-term” mercury emissions
 - Examine effect of boiler operations (i.e. varying coal characteristics, load changes, etc.)
 - Period of performance: ~ 1 month
- Use semi-continuous Hg monitors - “SCEM”
 - Wet chemical Hg⁺² reduction w/ analyses by cold vapor atomic fluorescence spectroscopy (CVAFS)
 - EPRI experience - need someone to “babysit”, replace chemicals, change filters, etc.
 - “Good” results expected with proper oversight

Project Approach

- Set-up Hg SCEM
- Conduct Ontario Hydro method sampling to compare to responses of the Hg SCEM
- Collect data for ~1 month
 - Calibrate Hg SCEM daily
 - Operate in total gas-phase Hg mode, except ~2 hr/day for only Hg⁰
- After ~1 month, repeat Ontario Hydro method tests to re-check Hg SCEM

Data QA/QC

- Focus on total Hg data that are representative of normal boiler operation
- Following data were not included:
 - Calibration data
 - Elemental or speciation data
 - Ambient data during SCEM maintenance, i.e. pump malfunction, filter being replaced, etc.
 - After the SCEM is brought back on-line, the Hg readings have not reached equilibrium
 - >200% of the rolling 1 hour average; 30 minutes before and after

Calculation of Averages

- SCEM provides data every 2.5 minutes
- Data QA/QC to eliminate invalid data points
- Averages are computed where the total number of valid data sets are at least 50%
 - Hourly average for each 1-hour period
 - 3-hour average for each 3-hour period
 - Daily average for each 24-hour period

Results Summary

- Hg emissions from a given boiler can be highly variable, ranging from 3 to 4x
 - Limited data from 2 coal-fired units
 - Coal switching, blending
 - Inherent variability within the same coal
 - Operating load does NOT significantly affect emissions variability
- One-hour and 3-hour averages are quite similar, except for the extreme highs and lows
- Daily averages are much less variable, ranging about 2x

Previous Hg SCEM Measurements

Facility	# of Reported Hourly Samples	# of Valid Hourly Samples ($\geq 50\%$)	Extent of Tests That Limit Amount of Continuous Hg Data
SCR 1	49	38	3 tests ~ 6-8 hr each
Ammonia 2	82	71	4 tests - 1 day each
SCR 4	58	52	3 sets of tests
SCR 3	43	38	3 sets of tests
SCR 2 ESPout	46	42	2 tests ~ 2-4 hr each
SCR 2 Stack	26	17	?
Facility	Estimated # of Hourly Samples	# of Valid Hourly Samples ($\geq 50\%$)	Extent of Tests That Limit Amount of Continuous Hg Data
Gaston ESP outlet	~ 10 days	Data review in progress	
Gaston ACI outlet	~ 10 days	Data review in progress	Includes carbon injection
Abbott ESP inlet	< 1 day	Data review in progress	
Abbott ACI outlet	< 1 day	Data review in progress	Includes carbon injection
P4 ESP inlet	~ 1 week	Data review in progress	
P4 ACI outlet	~ 1 week	Data review in progress	Includes carbon injection

Planned 2002 R&D w/Hg SCEMs

- ~1 month Hg emissions studies
 - Bit. Coal/ESP ~6 months, beginning in May
 - Bit. Coal/ESP, FF – 1 month, beginning in July
 - PRB Coal – hope to locate a site, test in June?
- SCR/Hg studies - ~1 month in length
 - Bit. Coal, ESP, FGD – August
 - Bit. Coal, ESP – September
 - Bit. Coal, venturi scrubber – September
 - PRB Coal – '03?
- Activated carbon injection
 - Brayton Point - ~1 week, beginning in June
 - Salem Harbor – ~ 1 week, beginning in October