Agenda

• SO$_3$ System Overview
• System Capabilities
• SO$_3$ Transport / Response
• Field Data
• Summary
SO$_3$ CEMS Overview

System Requirements:
- 208 VAC (30 amp service)
- 120 VAC (15 amp service)
- 80 PSIG of Compressed air @ 5 CFM
- 1000 PPM SO$_2$ Cylinder, balance air
- Instrument can be located near probe
SO$_3$ System Overview: Probe

- Inertial Filter for “Universal” sample location
- Quick connects for re-location
- Integrated SO$_3$ Generator
SO$_3$ System Overview: Generator

- Converts SO$_2$ cal gas into SO$_3$
- >98% Conversion efficiency
- Lasts for >1 year
- Calibration Gas injected at probe tip (rule out bias)
- Generator bypass for SO$_2$ Check
SO$_3$ System Overview: Analyzer

- Sample from Probe
- Heated White Cell
- Interface
- Detector
- Laser
- To Sample Pump
- MFCs
- A/C

30 Inches Sq.
System Capabilities

- Designed for stand-alone operation
- Automatic System Zero and Span Calibration, or Check
- Automatic Blowback
- Statistical Data
  - Min/Max/Stdev
  For all parameters
System Capabilities

- Thumb Drive Data Dump (csv format)
- System can hold several months worth of 1 minute data
- Modbus, AK protocol, Digital I/O, Streaming Data
- Remote control via VNC or ePort
- Graphing, View spectrum
Sample Transportation: Unit C in Lab 100 ft Line

SO3 Unit C  11-1-11: 5 min Average
90% Response Time: 30 min

30 min Response
Field Data

- 2 systems are undergoing beta evaluation at 2 power plants
  To shake out issues before commercialization

- Site B is downstream of FGD

- Site C is downstream of an ESP
Field Data: Site C

Unit C ESP Outlet
100 Ft, 5 Minute Average

SO3 PPM

System Span
In the Lab: 30 min
In the Field: 19 min
Process
System Zero
Field Data: Site C

Unit C ESP Outlet
100 Ft Line, 5 Minute Average

In the Field, 10 weeks later:
Still 19 min
Field Data

- System span response time is better in the field
  - Same system / same hot line
  - 30 min response time in lab
  - 19 min response time in field

- Surface passivation or moisture appears improves response time

- Site C sampling location is worst case (*cold ambient*)
Summary / Conclusions

- System Response time is better after the system is exposed to flue gas

- Sample Line length is not the limiting factor of response time (acceptable for process control)

- Dynamic spiking capability can detect measurement bias

- 0.4 ppm **System** Detection Limit

- A known and reliable calibration gas is the difference between trending (other technologies) and measuring

- Test data from FGD in the following weeks
Questions?

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