

Environmental Issues, The New Energy Era & Their Implications

Testing, Analysis and Compliance Support

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How Do the Recent Regulatory Changes Affect Our Industry?

More data ... continuous compliance ... make sure it is accurate

Continuous Compliance Certifications

“With the possible exception of those permit terms and conditions identified below (referring to a list of deviations, exceedances and excursions), emission units described in permit # were in compliance with all permit terms and conditions over the previous year as determined by all required testing and monitoring in the permit and other material information.”

***Manual compliance records ... >50% of time significant deficiencies in what is reported.
Continuous monitoring of compliance records ... 5-10% (can be better)***

Compliance at Energy Facilities

- Regulators more much more knowledgeable of permit requirements and ongoing obligations for facilities.
 - Site inspections are no longer a slam dunk
 - Looking at specific permit conditions and facility methodology for demonstration of compliance.
 - Cannot rely on one person at the site cognizant with permit requirements
 - Where is all the data to demonstrate compliance?
 - Is the data accurate?

Compliance at Energy Facilities

Computer Technology and Data Acquisition

- Coal going away ... natural gas
 - Regulators are looking much closer (finding new things to go after)
- Computer technology ... more data available for EPA
- Permit conditions requiring more continuous data and recordkeeping
 - Check validity of the site reporting and calculations
 - Rolling averages often in error (e.g. 30 day rolling average)

More Data ... More to Go Wrong

Compliance at Energy Facilities – Fuel Flow Analysis

- Heat Input (million Btu/hr, HHV) – hourly values
 - Regulators asking for data files, calculation methodology, accuracy determination
 - HHV values online vs. constant
 - Comparison to plant control system

Date/Hour	Unit 1 Fuel Flow (hscfh)	Unit 1 Heat Input (million Btu/hr)	Unit 1 Fuel Heating Value (Btu/scf)	Unit 1 Load (MW) Value	Unit 1 Heat Rate (Btu/kwhr, HHV)
07/01/2015 00	13480.1	1415.4	1050	109	12,985.3
07/01/2015 01	13235.1	1389.7	1050	106	13,110.4
07/01/2015 02	13238.3	1390	1050	106	13,113.2
07/01/2015 03	13253.4	1391.6	1050	106	13,128.3
07/01/2015 04	13257.1	1392	1050	106	13,132.1
07/01/2015 05	13243.4	1390.6	1050	106	13,118.9
07/01/2015 06	13262.6	1392.6	1050	106	13,137.7
07/01/2015 07	13241.3	1390.3	1050	105	13,241.0
07/01/2015 08	13232.1	1389.4	1050	106	13,107.5
07/01/2015 09	13224.7	1388.6	1050	106	13,100.0
07/01/2015 10	13223.9	1388.5	1050	106	13,099.1
07/01/2015 11	13235.2	1389.7	1050	105	13,235.2
07/01/2015 12	13239.5	1390.1	1050	106	13,114.2
07/01/2015 13	13236.5	1389.8	1050	106	13,111.3
07/01/2015 14	13238	1390	1050	106	13,113.2

Compliance at Energy Facilities Startup and Shutdown Emissions

- Startup and Shutdown Emissions
 - One minute CEMS and DCS data
 - Is the site properly looking at startup and shutdown emissions?
 - No longer have blanket exemptions. Numerical standards for these events.
- CEMS often over-range during startups
 - Sites never bother to adjust range
 - Some use manual methods to adjust emissions (bad practice)
 - Inspectors looking at SU/SD events
- Annual Emissions Impacts
 - How do facilities account for startup, shutdown, malfunction?

Air Emission Testing

- Drivers...primarily
 - NSPS (40 CFR Part 60),
 - NESHAP (40 CFR Part 61) and
 - MACT (40 CFR Part 63)
 - **Permit Conditions**
 - **Startup and Shutdown Emissions**
- Technological Changes
 - From Wet Chemistry to Real Time Monitoring
- Promulgated Methods --
<http://www3.epa.gov/ttn/emc/promgate.html>
- Approved Alternative Methods --
<http://www3.epa.gov/ttn/emc/approalt.html>



Air Emissions Testing & Monitoring

Commonly Required Tests

- Regulatory Compliance Testing
- MATs/MACT Baseline & Compliance Demonstrations
- Relative Accuracy Test Audits (RATA)
- Compliance Assurance Monitoring (CAM)
- Engineering & Energy Efficiency Studies
- Diagnostic Studies, Control System Upgrades
- Emissions Inventories

New Technologies

- Extractive/Dilution Mobile Monitoring Labs
- Continuous Emissions Monitoring (CEMs) Systems
- Back up Mobile Labs as Temporary CEMs
- On-Site Laboratory Analysis (including Speciated Mercury)
- FTIR – Instant Results vs. Lab Work
- Alternative Monitoring Programs



ALL TYPES OF EMISSIONS -- For Example:

- HAPs – Organic and Inorganic
- Mercury – Total and Speciated
- Particulates, PM₁₀ & PM_{2.5}
- Single Digit NO_x & CO
- Fixed Gases and Reactive Compounds
- VOCs – CE, DE & OCE
- Acid Gases – HCL, HF

Natural Gas and Particulate Testing

- Testing “dirtier” stacks is much easier – MORE TO MEASURE
- Particulate testing with natural gas fuel is required
 - Condensibles usually highest contributor
- Emission levels can be below levels in the EPA Reference Test Methods
 - Requires much longer test durations



Natural Gas and Particulate Testing

- Combined cycle units have special challenges
 - Typical 3,500,000 lb/hr of exhaust flow with inlet filters
 - Evaporative cooling
 - SCR system (NH₃)
- Permit levels in single digit
- Inlet condensibles can have an impact on stack emissions
 - Have seen warranties that subtract inlet particulates.
- Requires careful attention to QA/QC and trained test engineers.



Predictive Emissions Monitoring

- Subpart Db Industrial Boilers can utilize operations monitoring plan to predict NO_x emissions
 - Systems are acceptable as long as the plant instrumentation remains calibrated
 - QA checks to ensure boiler is operating within ranges established from testing



Alternative Monitoring

- Permit Conditions Can Lead to Creative Solutions to Demonstrate Continuous Compliance
 - Biomass Gasification Fuel Flow
 - Two Units with Common Fuel Supply
 - Splits to each gasifier
 - Common stack and particulate control
 - PM adjustment based on ESP operating performance



Mods and Upgrades - Permitting

- Thermal performance upgrades can be very cost effective
- New Source Review avoidance studies can simplify permitting
 - But not all states are the same! NYDEC vs Illinois EPA example
- Backup fuel (ULSD)
 - Push back from regulators due to environmental groups
- Endangered species review for recent natural gas PSD project
 - USEPA required use of an evaluation protocol used for a hazardous waste incinerator!