

Common CEMS RATA Failures and Risks



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Introduction

Stack Testing is a labor and time intensive process and requires thorough planning and communication to be conducted successfully.

Typically, an hour or two of pre-project planning (especially with input from production and maintenance) can save thousands of dollars in delays, postponements and most importantly, lost production time.



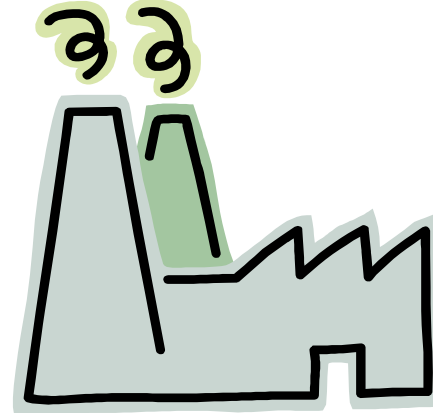
Objectives

- Common Pitfalls
- Performance Specifications
- Certification Events and Testing Requirements
- Common Causes of Failures
- Flare Sampling Considerations
- Test Protocol and Reporting Requirements



Common Pitfalls

- Technical Review
- Electrical Power Availability
- Stack Set-up
- Site Safety



Common Pitfalls: Technical Review (cont.)

Stack Gas Data

- Temperature?
- Estimated flow rate?
- Type of flow? (i.e. induced or natural draft, fixed or variable drive fan)
- Static pressure?
- Moisture Content?

Common Pitfalls: Technical Review (cont.)

Stack Gas Data

- O₂ & CO₂ concentrations?
- Target parameters?
- Expected concentrations and permit limits of target parameters?
- Are any hazardous pollutants present?

Common Pitfalls: Electrical Power Availability

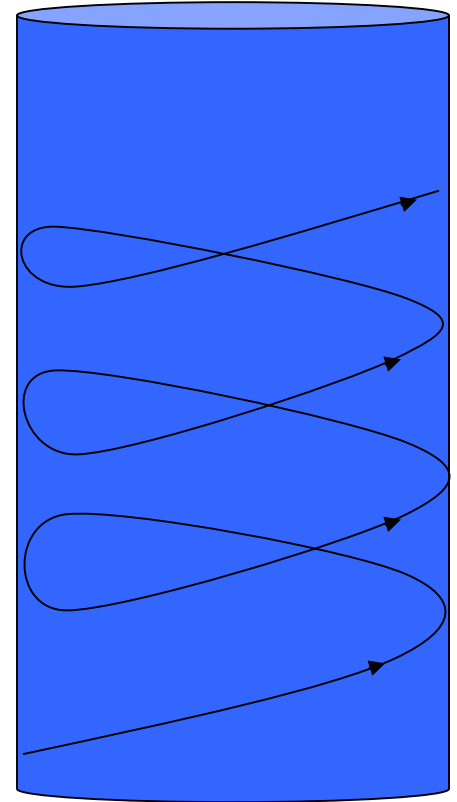
Disclaimer: All Mobile Laboratories are not created equal...check with your tester to verify their power requirements.

- How close is power supply to the mobile laboratory staging location?
- Is 480V power available? 240V power? 120V power?
- Does the source provide enough power to operate the mobile laboratory?
- Can generators be used as an alternative to plant power?
- Is 120V power available on the stack or in close proximity to the sampling location?



Common Pitfalls: Stack Test Setup – Stack Data

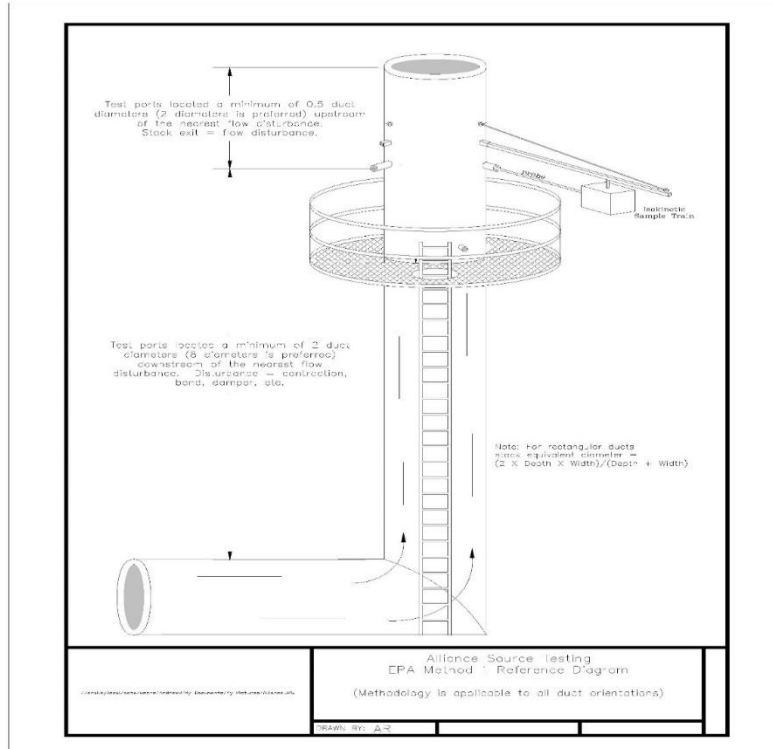
- Is the stack vertical or horizontal?
- Height to test ports from ground?
- Is the stack circular or rectangular?
- Stack diameter (circular) or width/depth (rectangular)?
- Are cyclonic flow conditions anticipated?



Common Pitfalls: Stack Test Setup – Test Ports

- Are test ports installed? How many?
- Are they located 90 degrees apart or in center of equal areas?
- What are the diameters of the test ports?
- What are the nipple lengths?
- What is the height of the test ports?
- What is the minimum EPA Method 1 criteria?

Typical Stack Diagram



Common Pitfalls:

Site Safety

- Is there a safe means available to access the test ports (i.e. ladder, stairs, man lift, elevator)?
- Is there a safe location to conduct testing (i.e. platform, scaffolding, man lift)?
- Can the area below test location be secured?
- How high are the handrails? Are handrails cut?
- Any site specific safety issues (heat stress, respiratory concerns)?
- Work area conditions due to plant operations?
- Weather?



Performance Specifications: 40 CFR 60 Appendix B

- PS-1 Opacity
- PS-2 SO₂ and NO_x (PS standard)
- PS-3 O₂ and CO₂
- PS-4,4A, 4B CO
- PS-5 TRS
- PS-6 Flow Rate
- PS-7 H₂S
- PS-8, 8A VOC, THC
- PS-9 VOC/GC
- PS-11 PM
- PS-12A & 12B Mercury
- PS-15 FTIR
- PS-16 PEMS
- PS-18 HCl



Certification Events and Testing Requirements: Typical CEMS Testing Requirements

Initial Performance Testing

- Calibration Drift Test
- Linearity Test
- Response Time Test
- Interference Check
- Calibration Error Test
- Relative Accuracy Test Audit
- Continuous Opacity Meter Audit

Routine Testing (Quarterly/Annual)

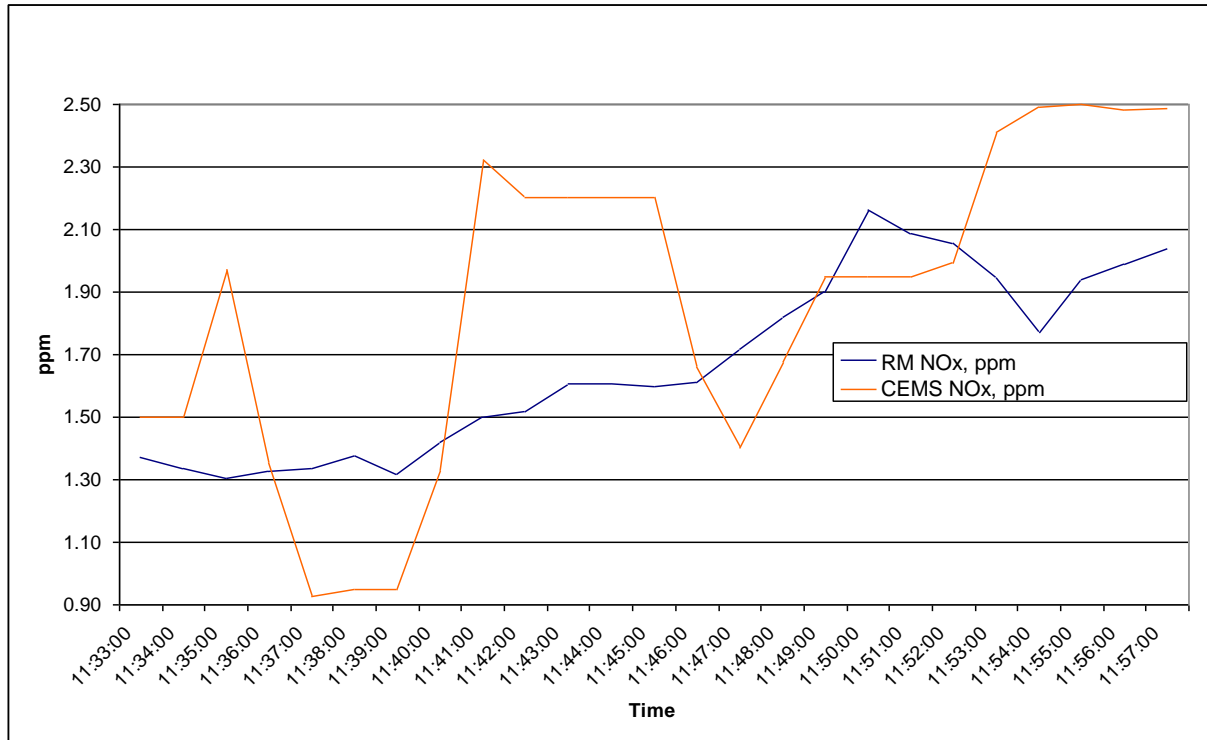
- Relative Accuracy Test Audit
- Cylinder Gas Audit
- Relative Accuracy Audit
- Continuous Opacity Meter Audit

Common Causes of CEMS Failure

- Pre-test failure to properly correlate CEMS and Reference Method Systems (DAS times, response times)
- Incorrect calculations, rounding procedures (ex. emission rate calculations using same molecular weight)
- Flue gas characteristics require dilution (higher than expected concentrations, moisture, particulate)
- Dilution CEMS vs extractive CEMS error (wet vs. dry)
- Cyclonic Flow



Common Causes of CEMS Failure



Common Causes of CEMS Failure

- Flue gas location/stratification problems
- Interferences by other flue gases
- Incorrect calibration gases (calibration dilution system; bad mixture)
- Improper calibration methods, failure to properly calibrate
- Uncorrected ambient or source effects (T, P, %H₂O, especially for flow RATAs)
- DAS problems (programmed equations, input parameters, etc.)
- System design/operation problems

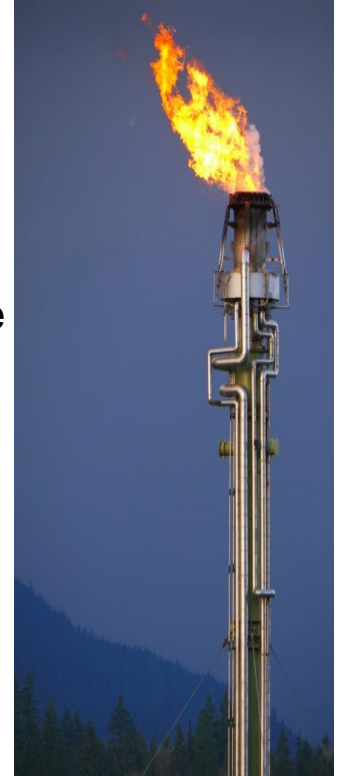
Common Causes of CEMS Failure

- Continuous monitoring systems are approved only after they have been installed, a 7-day drift test has been performed, **and** a relative accuracy test audit has been conducted.
- Reference methods are located in 40 CFR 60, Appendix A, performance specifications are located in 40 CFR 60, Appendix B and the quality assurance procedures are located in 40 CFR 60, Appendix F
- More certifying methods are found in 40 CFR Part 75 Appendix A
- Most initial RATAs are due within the first 180 days of operation
- Modifications to the CEMS require recertification.



Flare Sampling Considerations

- Flares often can not be accessed completely independent of the CEMS sample system.
 - This is a deviation and must be approved at the protocol stage
- Isolation or cut-off valve
 - If sample point can be positioned on the flare, pass-through ball valve
 - The more detail provided, the better prepared your testers will be
- Excess sampled gas
 - Special routing of potentially harmful gases
 - Proper test trailer ventilation (if applicable)
- Mobile Laboratory Location
 - Non-explosive atmosphere

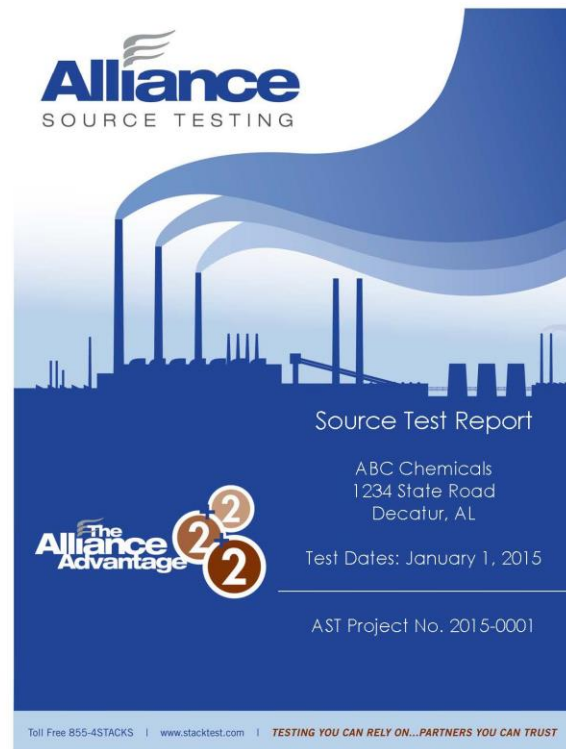


Test Protocol & Reporting Requirements

- Due Dates
 - Part 60 Testing – 30 Days Prior
 - Part 63 Testing – 60 Days Prior
 - Permit Testing – Varies by State
- Test Plan Requirements – SSTP, State Specific Protocol Requirements, Etc.
- Facility Information / Site Contact
- Current Permit & Limits
- Process Operating / Control System Data

Test Protocol & Reporting Requirements

- Basic Requirements
 - Summary of Results
 - Facility & Source Information
 - CEMS Analyzer Information
 - Methodology
 - Field Data & QA/QC Data
 - Process/Control System Data
 - Feed Rate, Fuel, Production Rate, etc.
 - Scrubber Flow, Baghouse DP, etc.



Questions/Comments

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