Strategic Issues In Emission Monitoring and Testing

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Summary

- A Brief Comparison with Other Industries
- Why More and Better Emission Test Data Are Needed
- Some Changes in Emission Testing Field
- Expansion of Traditional CEMS Requirements for Lime Kilns
- Future HAPS Monitoring and Testing

Limited Lime Industry Emission Testing

- Typical PM Tests 1-5 Year Intervals
  - Test 1 Kiln in a Group
  - Avoid Difficult Tests for Baghouses with Multiple Stacks or Monovents
  - Three 1-Hour Runs, One Operating Condition
- Infrequent SO2, NOx, and CO Compliance Tests
- Few Hazardous Air Pollutant (HAP) Tests
- Basic Test Methods
- Lowest Cost, Local Source Testers

Continuous Emission Monitors (CEMS) on 22 of 145 Kilns in Lime Industry (June 2011)

- SO2 – 15 kilns at 8 plants
- NOx – 17 kilns at 10 plants
- CO – 11 kilns at 7 plants
- CO2 – 4 kilns at 2 plants

CEMS In Utility Industry

- >2000 Generating Units Monitoring SO2, NOx, CO2, Flow Rate under Part 75 Requirements since 1995
- NSPS Subpart Da: Strict Emission Limits, Continuous Compliance 30-Day Rolling Average for EGUs after 1978 (several tightening revisions)
  - SO2 Emission Limits, SO2 %Removal
  - NOx Emission Limits
- >600 Hg CEMS Purchased for CAMR
- > 100 certified Hg CEMS under state requirements

CEMS In Cement Industry

- Most Existing Permits Include SO2, NOx, and/or CO CEMS
- One Company Requires SO2, NOx, CO, THC, O2, & PM CEMS at 100 plants worldwide
- New NSPS Requires SO2 and NOx CEMS
- New MACT Requires:
  - PM CEMS on Kilns and Clinker Coolers
  - Hg CEMS or Sorbent Monitoring Systems
  - THC/O2 CEMS
  - HCl CEMS (unless wet scrubber installed)

Purpose of Emission Test

- Two Most Important Questions for Designing Test
  - What do you want to measure?
  - How well do you need to know the answer?
- Lime Plant Conducts Test to Demonstrate Compliance with Permit Condition
  - Often Viewed as Simplest of All Tests
    - Prescribed Methods
    - Usually One Operating Condition or Product
    - Minimal Agency Involvement
  - Result Submitted to Agency: In Public Record

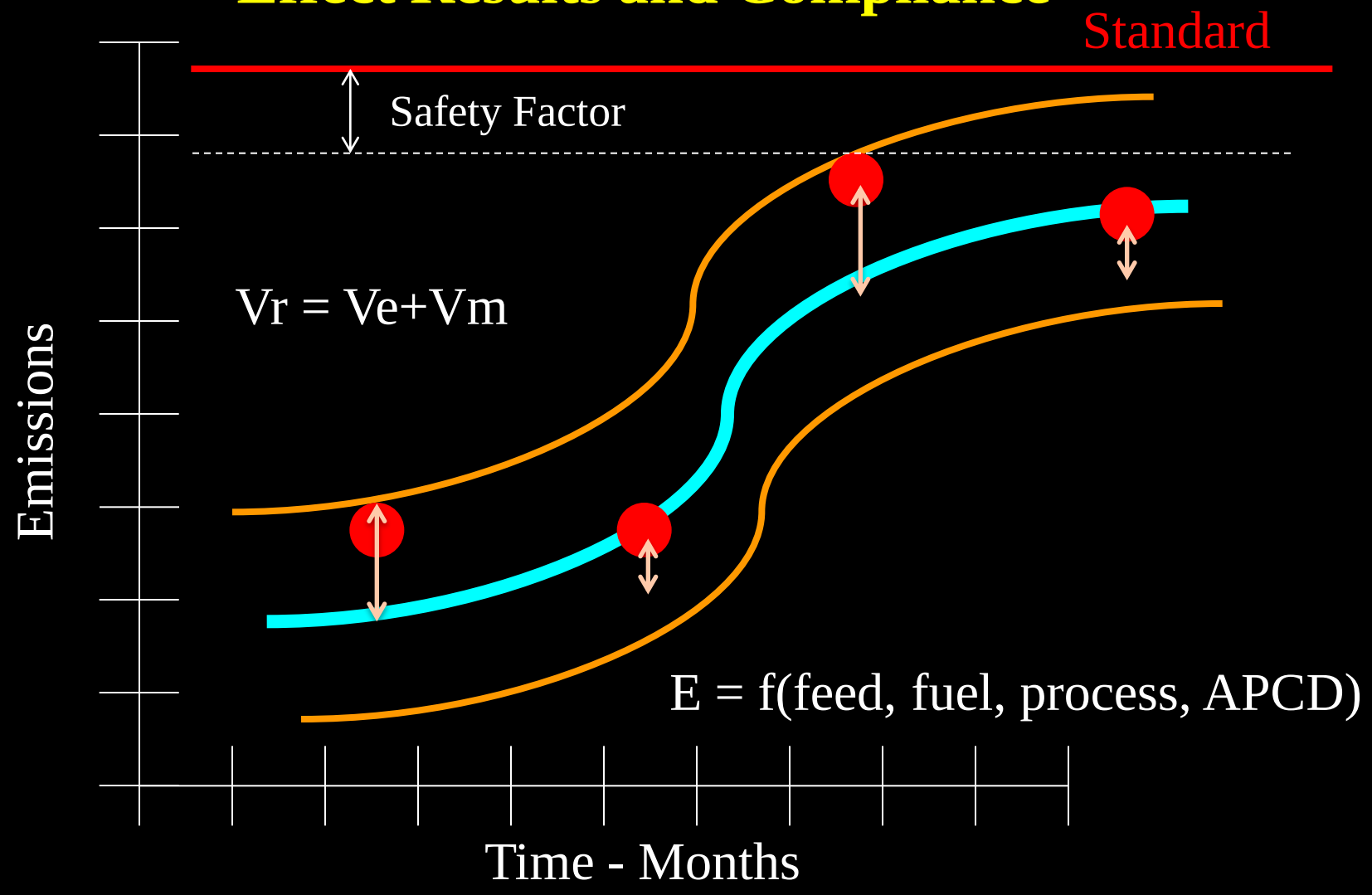
Years Later: Test Results Used For Different Purposes

- EPA Analyzes Test Data:
  - To Characterize Emission Variability
  - To Establish New Standards
- Citizen Suit Uses Data
  - To Identify Better Performers in BACT or MACT disputes
  - Evidence of Violation
- Neither EPA nor Citizen Suites Fairly Evaluate the Limitations, Biases, Deficiencies of Test Data

“Emission Test a Snap-Shot in Time”

- Cannot represent variability of emissions due to feed, fuel, process, and APCD variation over full range of conditions and life of the plant!
- Cannot separate the bias, precision and reproducibility of the test method from results
- Is often affected by flaws or other limitations of specific test
  - (Many test reports reviewed by EMI seriously flawed)
- Includes no safety factor for what is not known

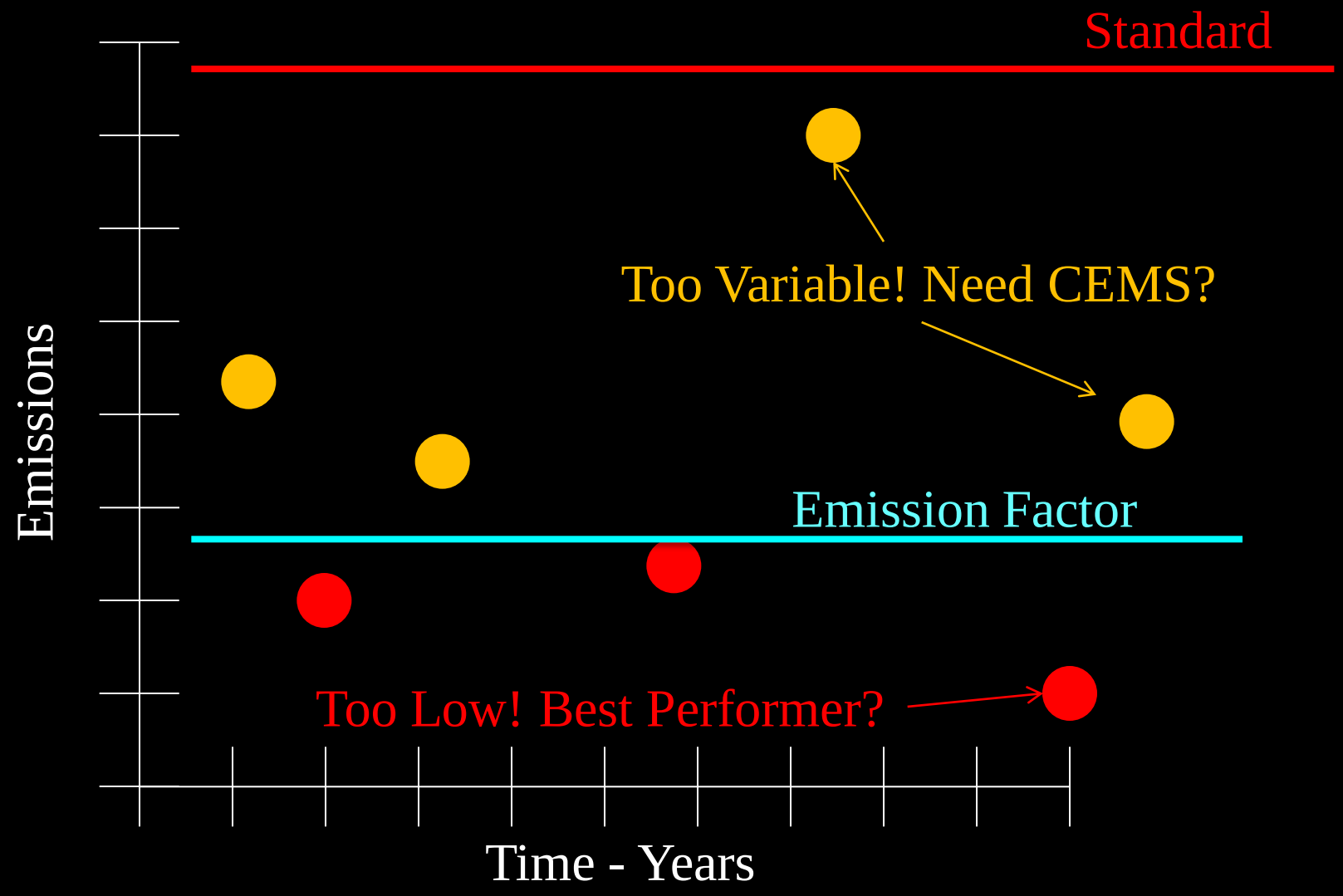
Emissions Variability, Method Bias and Precision Effect Results and Compliance



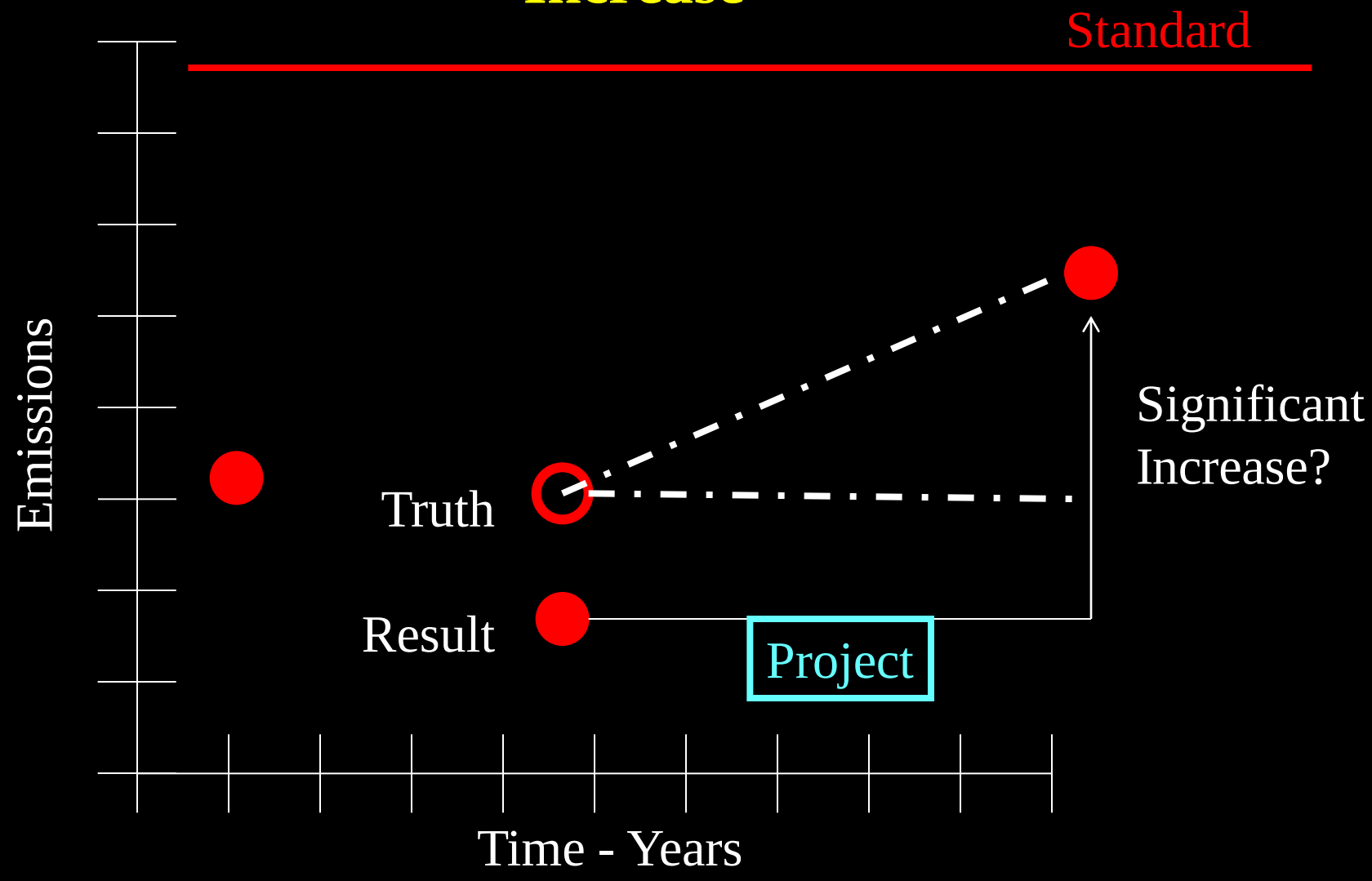
Beware Test Results Too Good:

- Test Results Significantly Less Than:
  - Established Emission Factor
  - Emission Limit
- Test Results Reflecting Unexplained Variation from Historical Values
- Test Results that Do Not Reflect Range of Operating Conditions
- Test Results that Provide False Baseline for Potential Future Increases

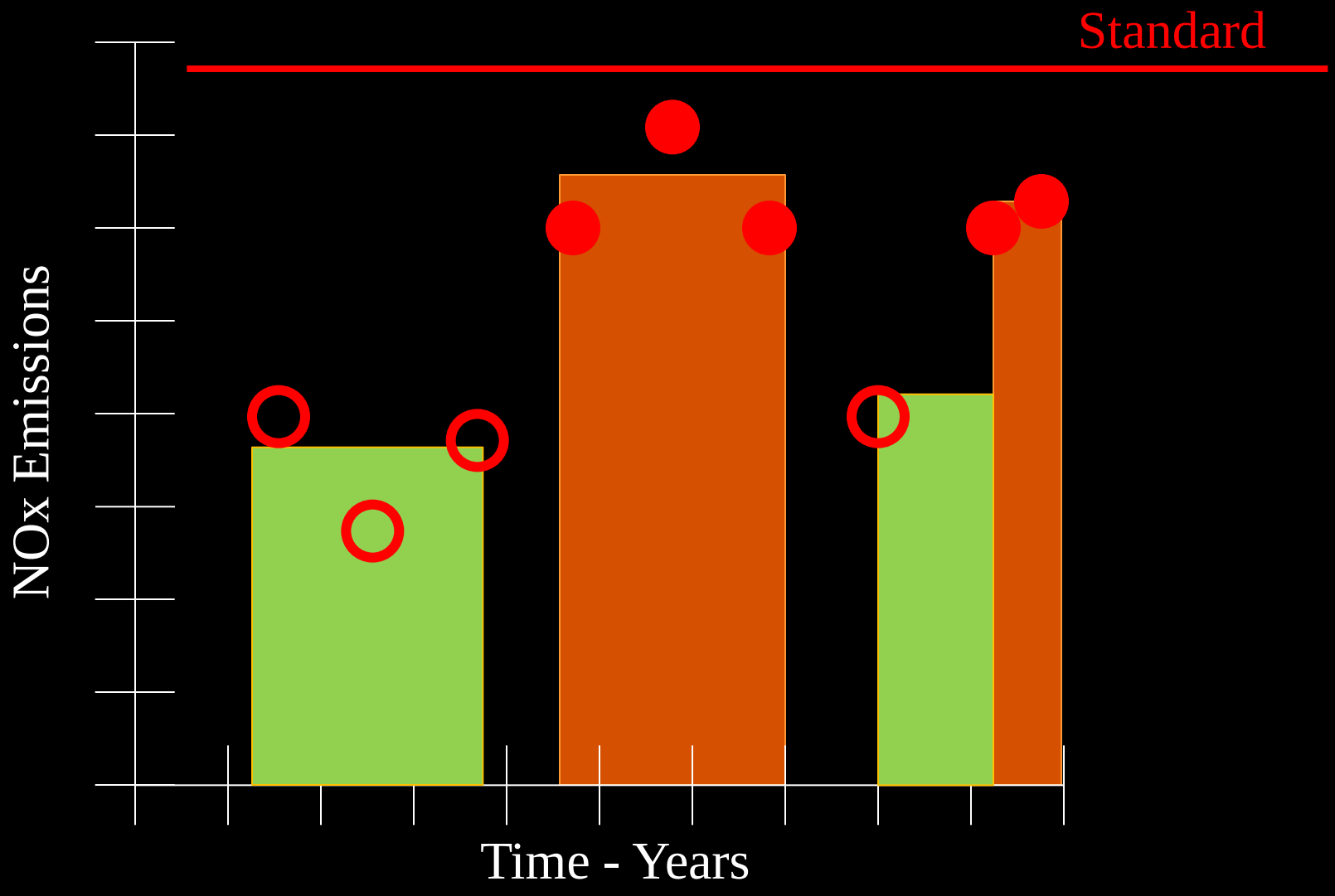
Questionable Test Results



Flawed Baseline Affects Apparent Emission Increase



Multiple Products With Different Emissions



Plan and Execute Better Source Tests (1)

- Know the emission test results or range of results you expect before the test
- Know the range of flow rates, oxygen concentrations, moisture values for each kiln
- Demand on-site results for gas parameters and flow rates from testers
- Figure out what is wrong when there are surprises

Plan and Execute Better Source Tests (2)

- Develop internal technical expertise with EPA test methods or retain a qualified advisor to plan, observe and review tests
- Test at multiple conditions if necessary to better characterize long term emissions or variability
- Conduct additional test runs for minimal incremental cost

Plan and Execute Better Source Tests (3)

- NESHAP/MACT Compliance Tests Require
  - Detailed Site-Specific Test Plan Submitted 60 Days Prior to Test (See 63.7(2)(i))
  - Notification, Submit Detailed Test Plan and Execution of Performance Evaluation of COMS prior to Test (See 63.8(e)
- Many States Require Development and Submission of Test Protocol for All Tests
- Tests Conducted During Enforcement Action Require Negotiated Test Protocol

Plan and Execute Better Source Tests (4)

- EMI Position: All Source Tests Should Have Detailed Test Protocol as Management Tool
  - Explicitly Identify Process Operational Conditions, How Measured, Data to Be Recorded
    - Fuel(s), Feed, Product, Production Rate, Kiln Conditions
    - Expected exhaust air flow, moisture, oxygen
  - Expected APCD conditions,
    - Cleaning cycle, pressure drop, other parameters
    - Normal opacity levels
  - Test Methods, Deviations and Durations
  - Responsibilities: Plant Operator, Tester, Coordinator

Plan and Execute Better Source Tests (5)

- Many Test Methods Require Pre-Test Measurements
  - Flow traverse, temperature and oxygen measurements
- Most Test Methods Afford Preliminary Results
- COMS and Other Monitors Must be Properly Calibrated
- Do Not Start Test When Conditions Do Not Match Expectations in Protocol! Investigate and Resolve

Plan and Execute Better Source Tests (6)

- Legitimate Reasons to Stop A Test
  - Unsafe Conditions: Plant or Severe Weather
  - Test Equipment Failure
  - Process or APCD Equipment Failure
  - Clear Failure of Relevant QA Criteria
  - Serious Blunder of Tester That Renders Data Useless

Plan and Execute Better Source Tests (7)

- Stopping Test When Outcome is Apparent is a Failed Test (especially with real-time method)
- See EPA Stack Test Policy
- Part 75 Regulations are Explicit
  - Stopped RATA is Failure
  - CEMS is Out-of-Control Until Successful RATA
  - Punitive Missing Data Applies
  - Qualification for Reduced RATA Frequency Removed

Changes in Emission Testing Field

- New Stack Tester Accreditation
- EPA Electronic Reporting Tool (ERT)
- Safety & Training
- More Complex and Difficult Methods

New Stack Tester Accreditation

- 30 Year Debate in US Source Testing Industry
- Some States Adopt Programs (LA, CA) Others Require NELAC Lab Accreditation – 90's
- Adopted in UK (early 90's)
- Adopted by EU (CEN 15676-07)
- Proposed by EPA Aug. 22, 2006 Federal Reg
  - By Clean Air Market Division
  - For Part 75 RATAs and other tests

New Stack Tester Accreditation

- EPA Final Regulation Effective Oct. 11, 2011
- Now Required for All EPA Part 75 Tests
  - QSTI (Qualified Source Test Individual) On-Site
  - ASTM D7036 Specifies Criteria
  - STAC is an Accrediting Organization
- EPA Threatens Severe Legal Penalties for Source Testers That Do Not Comply!

New Stack Tester Accreditation Will:

- Increase cost to comply for testers
- Reduce number of firms & qualified personnel
- Might improve quality
- Increase cost and scheduling difficulty for industry

New Stack Tester Accreditation

- Issue: Can test firm operate in both accredited and non-accredited mode?
- EPA CAMD says Yes for Part 75 tests
  - Schakenbach letter 9/1/2011
- STAC questions this position
- ASTM D 7036 revisions now under development

New Stack Tester Accreditation

- Expect Stack Tester Accreditation to be expanded to Part 60 and Part 63 regulations by EPA OAPQS and OECA
  - More difficult & demanding tests than Part 75
  - Many data quality issues in ICR and other test programs used to set NSPS & NESHAPS
  - Strong support from accredited firms because of competitive issues & STAC turf

EPA Electronic Reporting Tool (ERT)

- Requires transcription of important test parameters and results and subsequent input in rigorously specified format and electronic reporting
- Intended to standardize certain reporting aspects for all tests
- Intended to facilitate retrieval, review and analysis of test data

EPA Electronic Reporting Tool (ERT)

- Attempt to address horrors of test report analysis because:
  - No specified EPA test report formats
  - State and Local requirements vary
  - Test report format and content highly variable
  - Many massive disorganized and incomplete reports
- ERT does not replace the source test report!
- ERT are additional requirements

EPA Electronic Reporting Tool (ERT)

- First Major Deployment: Electric Utility ICR Spring and Summer of 2010
- ERT version 3 (Access 2002)
- Cumbersome and Difficult Implementation
- Lots of Problems and Glitches
- Angry Response from Testing Community
- 30-day and Longer Start-up, High Cost

EPA Electronic Reporting Tool (ERT)

- New ERT Version 4
  - Based on Access 2007/2010
  - Many Improvements
- Required in all EPA ICR Test Programs
- Required in all New NSPS & MACT Stds.
- No turning back!

“Updates on Improvements to Electronic Reporting Tool”

Rachel Agnew and Ron Myers

US EPA Measurement and Policy Group

Available from NLA

EPA Electronic Reporting Tool (ERT)

- Summary Potentially Hides Problems and Data Flaws
- ERT Needs Review Before Submission by Test Company to EPA
- Test Report Remains Basis of Contract Between Plant and Test Company
  - Includes much information not in ERT

Safety & Training Changes

- Many Cement Companies Require MSHA Part 46 Training for Source Testers
- Some Companies Require Third Party Oversight
  - "Browz" Increases Cost and Delays
- Tester Required to Identify Unsafe Access, Unsafe Platforms and Unsafe Conditions
- Source Tester Accreditation in Europe has
  - Specified platform requirements
  - Prohibits testing from crane buckets, man-lifts

More Complex and Difficult Tests

- New Method 202 Condensable PM
- Method 201A Fine PM
- Dilution Tunnel PM Methods
- Controlled Condensate SO3
- Lower Pollutant Concentrations
- Longer Test Runs

- Need to Better Understand Methods and Potential Errors for Lime Plant Tests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INSTRUMENTS


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EPA Information Collections Requests (ICRs) for Standard Setting

- No EPA Funded Contractor Tests
- Require Industry to Provide Data under Information Collection Requests (ICRs) using CAA Section 114 authority:
  - Extensive and Costly Source Test Programs
  - Temporary CEMS installations

Example: Electric Utility ICR

- EPA Estimate: $25,000,000 for Tests
- 450 EGU's Tested - March-June 2010
- $125,000 – $150,0000 per Unit for Test Firm
- Imposed other Major Costs on Utilities
  - To start-up and operate idled generating units
  - To run inefficient units and burn costly fuels
  - To conduct tests 24 hours due to load dispatch issues and deadlines

EPA EGU ICR Testing

- Detailed specificity of methods and sampling/analysis requirements
  - Specify sample volumes and conditions to ensure desired detection limits
  - Confusing and contradictory requirements
  - 1000's of questions and comments
- No relief from deadlines
- Months of industry sponsored QA and revisions
- Result: Lots of expensive bad data

Conventional CEMS for Lime Industry?

- Agency has strong position to require CEMS where emissions are dependent on operational conditions or active controls
  - SO2, CO and NOx are kiln operational dependent
  - Some kilns have reported highly variable periodic test results
  - Future variability analysis likely based on increasing number of kilns with CEMS
- SO2, CO and NOx CEMS and effluent flow rate monitors are mature technology for boilers and cement kilns and high reliability is expected

EPA "Maneuvers" To Require CEMS in Cement MACT Standard (1)

- Separated Performance Specifications Rulemaking from Source-Category Rulemakings
  - Example PM CEMS and PC MACT
  - Eliminated Consideration of Relevant Technical Objections for Kiln Applications During PM CEMS Rulemaking
  - Industry Failed to Rigorously Object
  - Opportunity Lost For Technical Arguments

EPA "Maneuvers" To Require CEMS In Cement MACT Standard (2)

- EGU Enforcement Actions: PM CEMS Required in Consent Degrees
  - Extraordinary Effort and Cost Necessary to Meet Deadlines and Exact Technical Requirements
  - Ridiculous Measures To Achieve PM Correlations
  - Numerous Presentations Complaining About Issues
- EPA Asserts "Technology Demonstrated"
- PM CEMS Required for Cement Kilns, Clinker Coolers, Boilers and Waste Burners

EPA "Maneuvers" To Require CEMS In Revised Cement MACT Standard (3)

- EPA Proposed Weak & Flawed Bag Leak Detector Requirements Along With Request for Comments on PM CEMS
  - Set-Up To Draw Supportive Comments by Environmentalists and CEMS Equipment Vendors
  - Industry Accepted Weak Proposal Minor Comments
    - (Distracted by Hg and HCl CEMS Proposals)
  - Industry Did Not Object Strongly to PM CEMS in Promulgation
  - Industry Now Undertaking R&D Projects

EPA "Maneuvers" To Require CEMS In Revised Cement MACT Standard (4)

- Mercury CEMS required for EGUs in CAMR (later vacated)
  - Industry Wants Hg CEMS for trading
  - Supports Technical Development
  - Invests $$$ In R&D and Demonstrations
- EPA Asserts Hg CEMS work for Cement Kilns
- EPA Promulgates PC MACT, PS12A & 12B, Procedure 5
- EPA Diverts Cost/Complexity Concerns with Low-Cost Adsorbent Monitoring Alternative – Continuous Stack Testing

Some EPA "Positions" on HAPS CEMS

- "Its all we have so we are requiring it."
- "EPA has no resources or time to develop anything better."
- "If you think there is something better, you are allowed to propose a source-specific alternative and we will consider it."

A exasperated senior EPA representative after denial of EPA's request for more time on industrial boiler and CSWI rules

- "The court said we are not required to write good rules, but we are required to promulgate the regulations on time"

Conclusions

- Technical Burden Shifted to Industry to Resolve Technical Issues with Emission Tests and CEMS
- EPA Will Apply Any Previously Promulgated Method or CEMS Performance Specification to New Application/Industry
  - Little or No Technical Evaluation
  - Not Obligated to Respond to Comments on Previously Promulgated Methods & Specifications
  - Dismiss Industry Arguments as Opinions

Conclusions

- Failing arguments:
  - EPA has failed to demonstrate …
  - The monitoring costs are too great …
  - Concentrations are too low to measure accurately…
  - We cannot measure feed or product …
- Need Solid Technical Basis to Defend Positions and Alternatives

Conclusions

- The Lime Industry Needs:
  - Technically Defensible Monitoring Approach to Assure Compliance with PM Standards
    - During Regular Operation
    - During Start-Up and Shutting Down
  - Hard To Support:
    - Bag Leak Detectors
    - COMS Below 5% Opacity