

Reinhold Environmental Ltd.



2008 APC Round Table
& Expo Presentation

July 13-15, 2008, in Savannah, GA



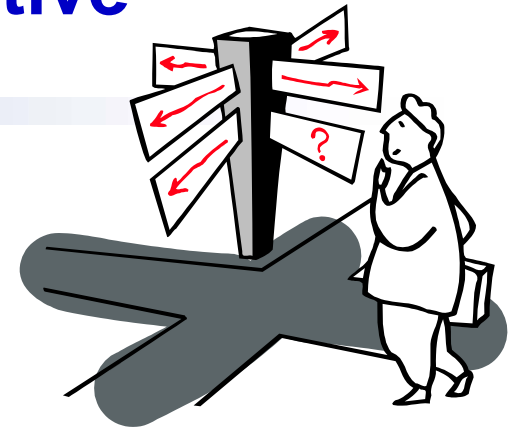
Mercury Measurements and Calibration Standards

APC/PCUG Conference
Savannah, GA
July 14, 2008

Chuck Dene
Project Manager, IEC & CEMS
650-855-2425 or cdene@epri.com

2008 Mercury Measurement Perspective

- **Court CAMR Ruling**
 - Short term uncertainty
 - Long term monitoring needs unchanged
- **Most CMM purchase decisions made**
 - Orders placed
 - Delivered
 - Certification?
 - Operation?
- **Orders shipped without NIST traceable calibrators**
 - Must resolve NIST traceability in the field
 - Provide valid QA/QC procedures



Mercury Calibrator Study



- **Objectives: Practical traceability/transferability**
- **Related info:**
 - **Most initial certification of calibration gas generators will need be in field**
 - **Ongoing periodic QA/QC checks proposed by EPA**

Project Status:

- **12 companies with 26 sites are participating**
 - Up to 45 calibrators
- **Successful Bracketing Tests completed on 15 calibrators**
- **Three companies have completed cylinder tests**
 - Cylinder Procedures have been modified to correct regulator passivation problem and reduce gas consumption/test



Bracketing Comparison



Reference Source Measurement 1

Candidate Source Measurement 1

$$= \frac{\text{Candidate 1}}{\text{Ref 1} + \text{Ref 2}}$$

Reference Source Measurement 2

Candidate Source Measurement 2

$$= \frac{\text{Candidate 2}}{\text{Ref 2} + \text{Ref 3}}$$

Reference Source Measurement 3

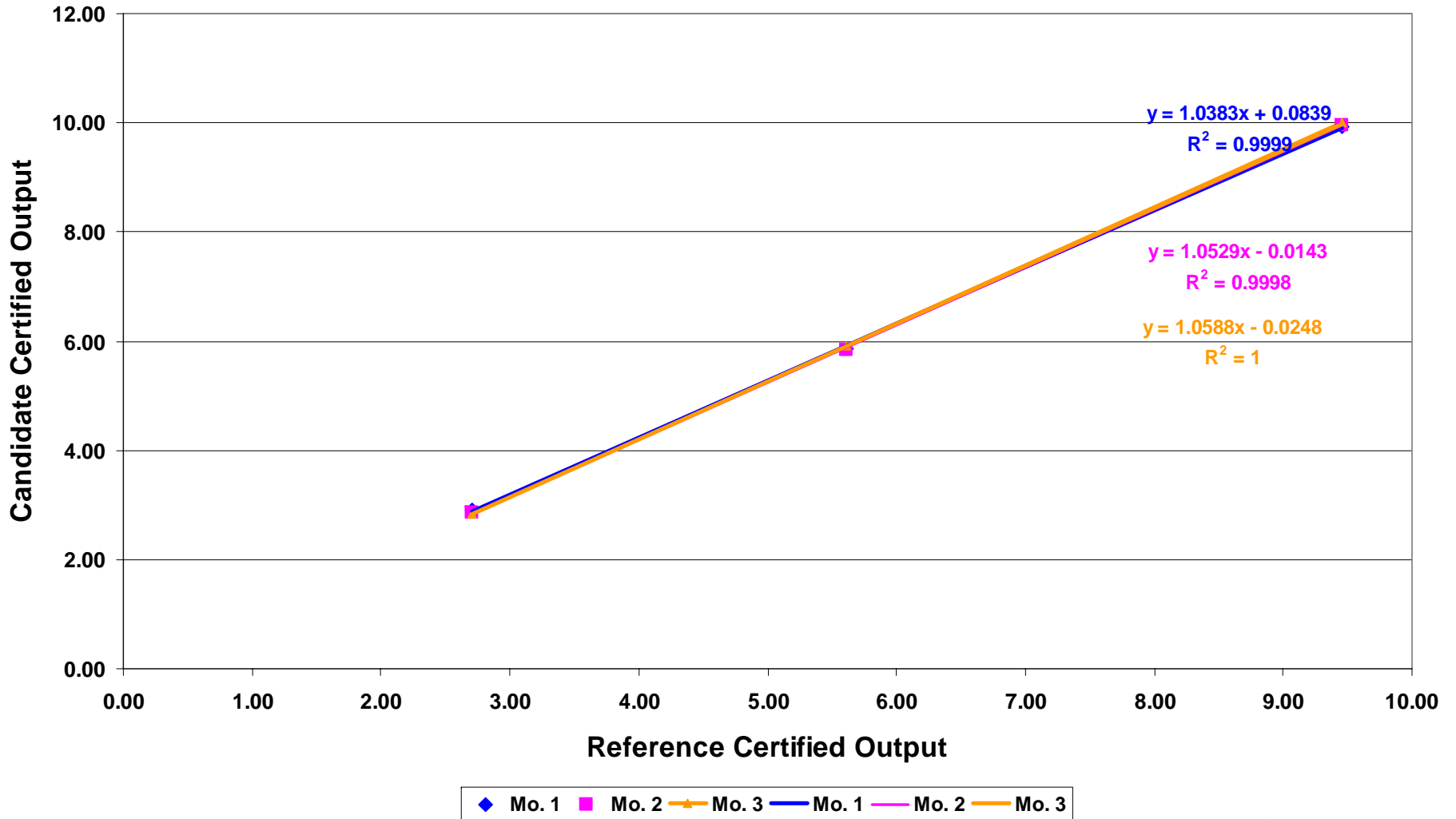
Candidate Source Measurement 3

$$= \frac{\text{Candidate 3}}{\text{Ref 3} + \text{Ref 4}}$$

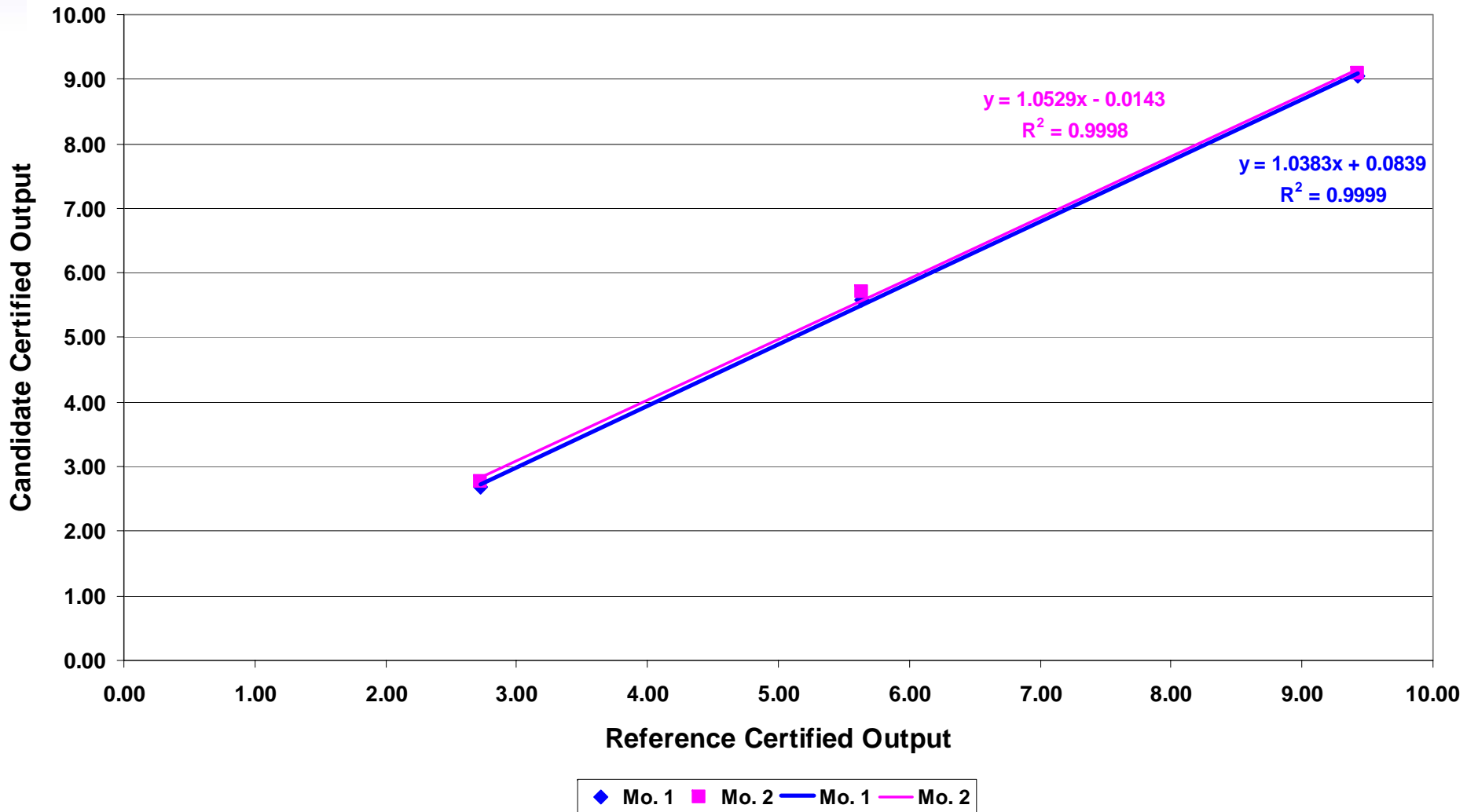
Reference Source Measurement 4

Complete for
each of three
concentration
Levels

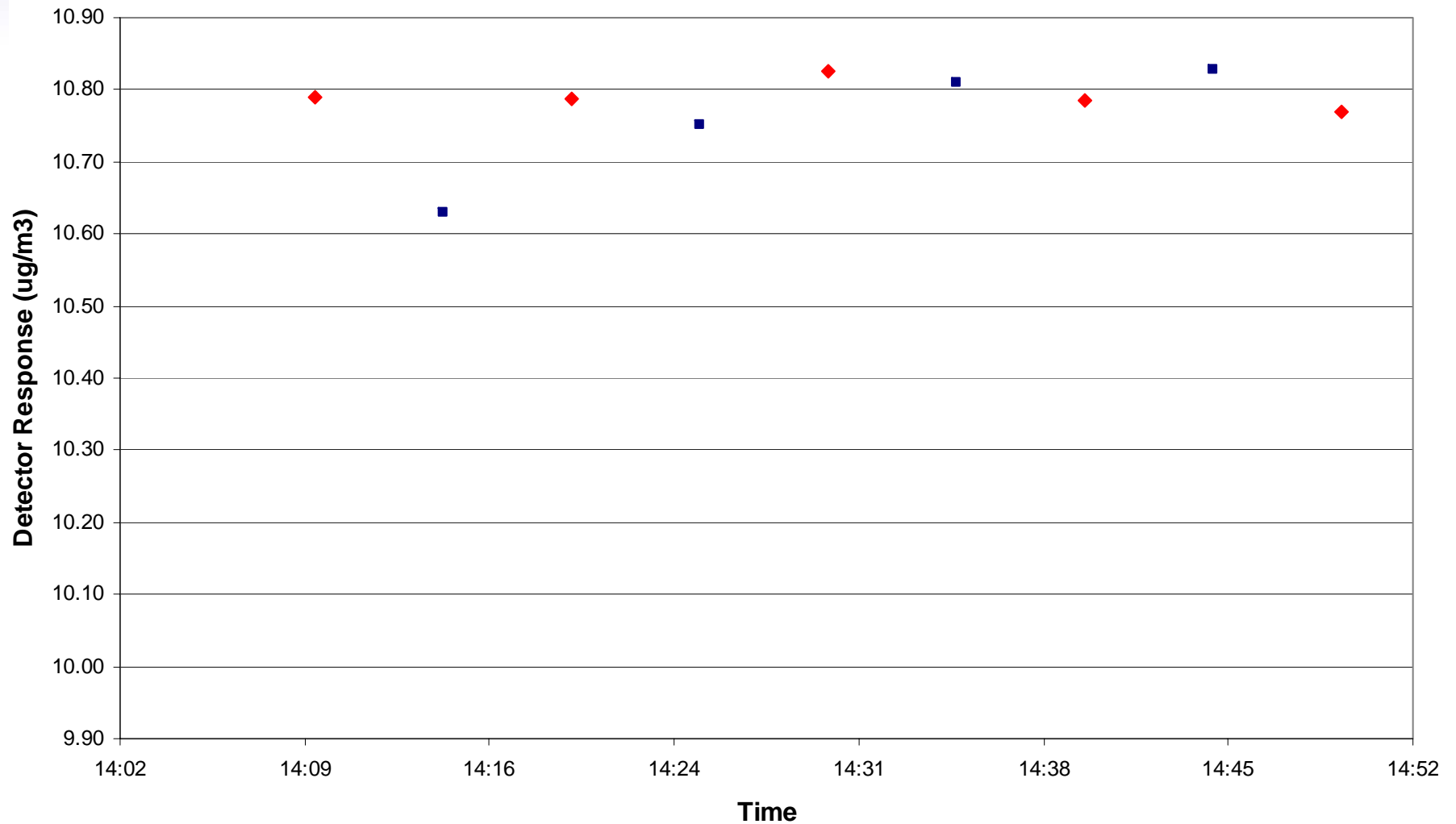
Calibrator Bracketing Test Confirms Stability



Calibrator Bracketing Results



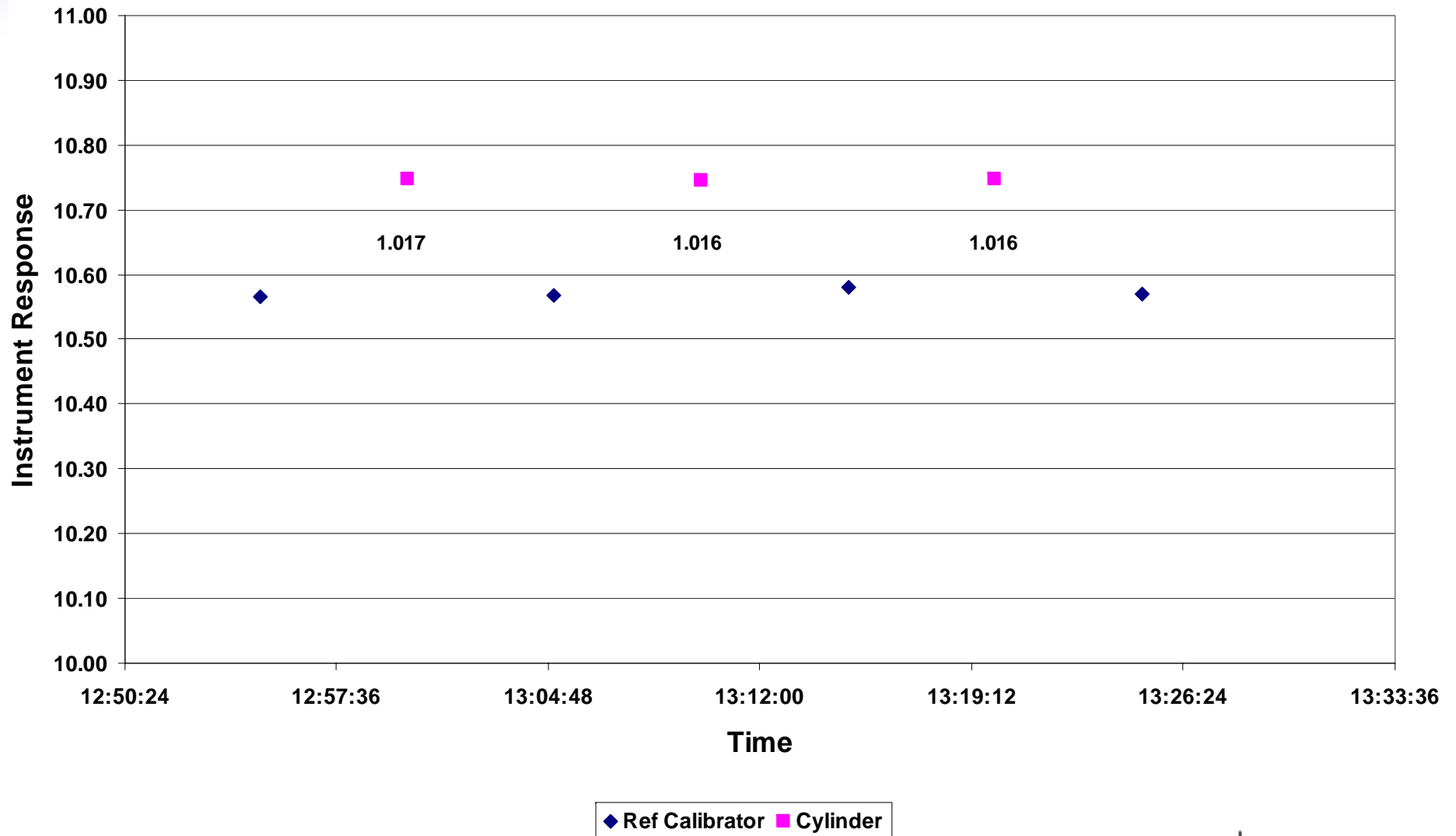
Example of Cylinder “Creep”



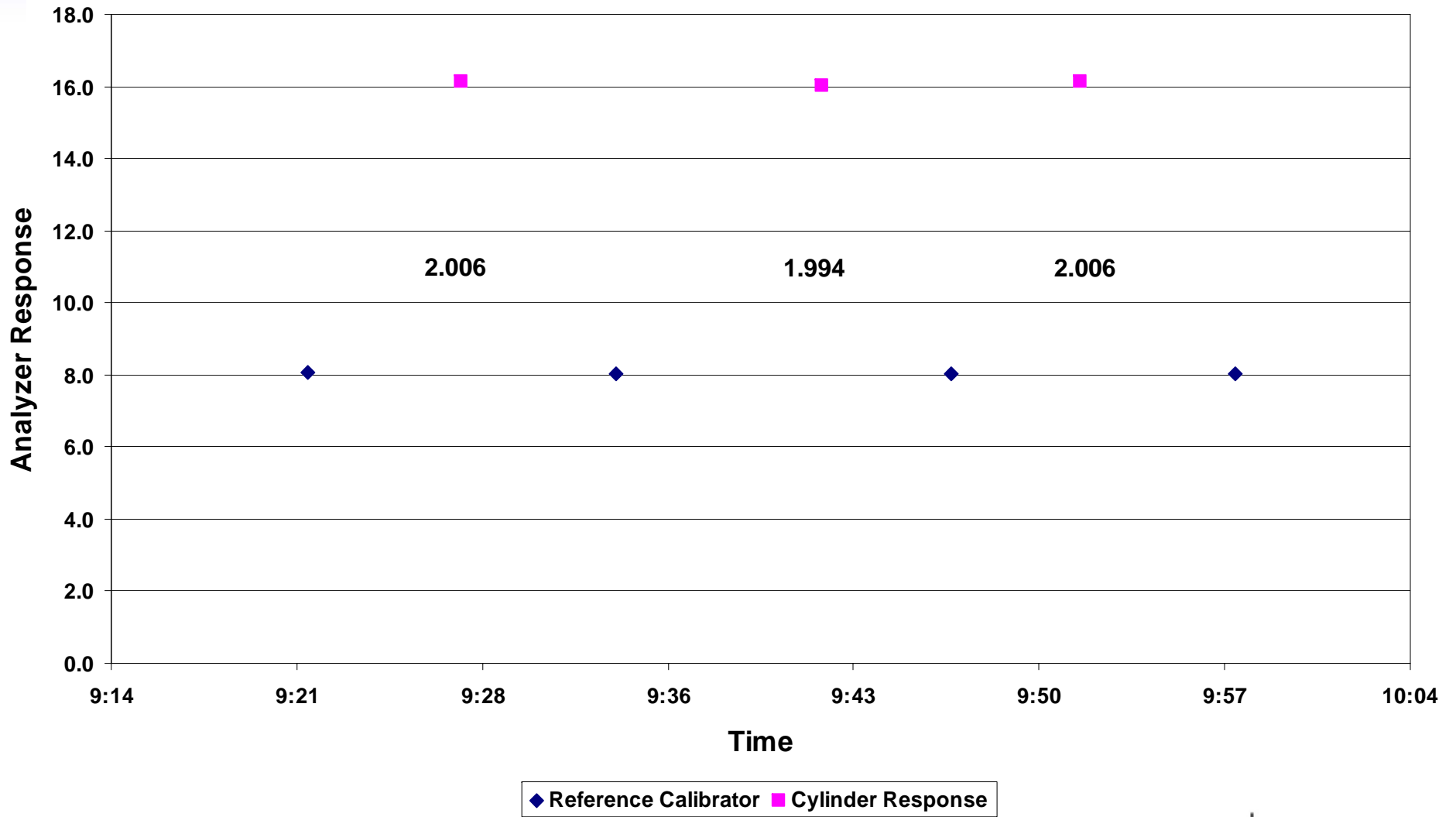
◆ Trap B Responses to Reference Calibrator

■ Trap B Responses to Cylinder

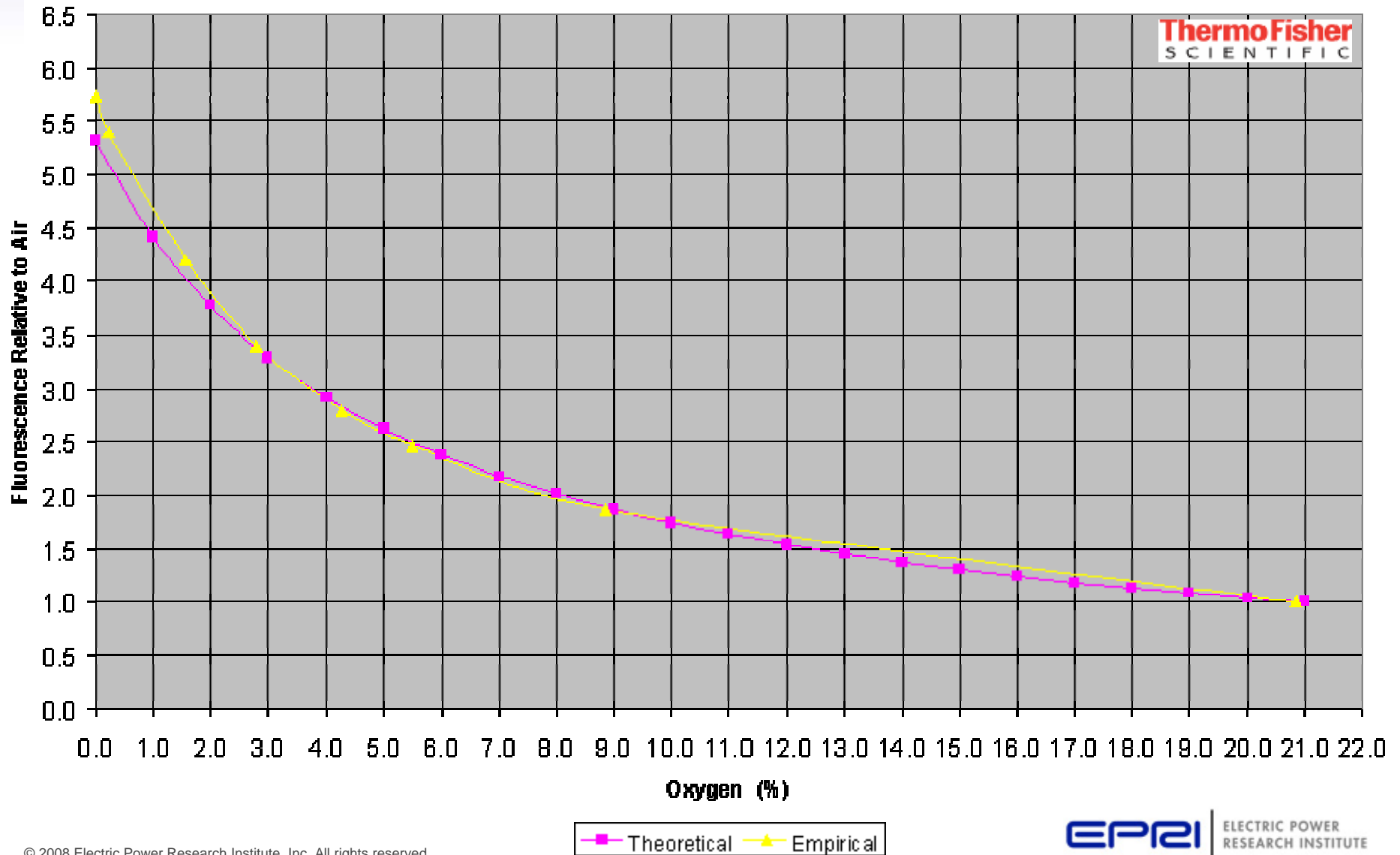
Cylinder Response Test Provides Alternative QA procedure



Example of Thermo-Fisher Cylinder Response

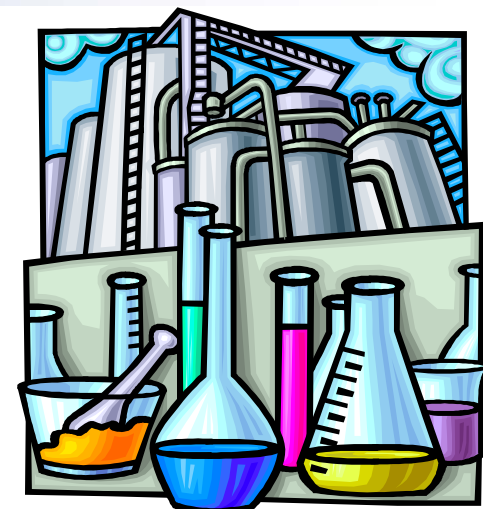


AFS Oxygen Quenching Curves



2008 Sorbent Tube Activities

- **Appendix K Mercury Spike Retention (continuation of 2007 research)**
- **Method 30B Evaluation**
 - Laboratory procedures
 - Field application
- **Sorbent Tube Sampling and Analysis Guidance**



Spike Evaluation and Optimization



- “When” and “Why” the mercury desorbs
- How can we improve spike retention?
 - Location of spike on 3rd section
 - Front vs. back of sorbent bed
 - Temperature of sorbent during spiking
 - Spiking at an elevated temperature might encourage chemisorption of Hg to the halogenated sorbent
 - Sorbent Type
 - Iodated (e.g., SKC)
 - Brominated (Sorbent Technologies)

Additional Mercury Spike Retention Tests

- 7-Day exposure to synthetic flue gas
- Front-half, 5,000 ng spike
- Same flue gas conditions, except:
 - constant SO_2 (250 ppm)
 - Add SO_3 (0, 2, 10 ppm)
- Evaluate 3 commercial sorbents
- Analysis by both acid digestion & thermal desorption





? Questions ?