



EPA Method 30A Instrumental Reference Method for Mercury CEMS

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Sharon Sjostrom

**ADA-ES, Inc.
8100 SouthPark Way, Unit B
Littleton, CO 80120**

Background

2003: DOE NETL awarded Clean Coal Power Initiative (CCPI) for installation of TOXECON™ at WE Energies' Presque Isle Power Plant

Key CCPI task:

Advance the mercury CEM state-of-the art

- Thermo CEM field testing and fast-track development support by ADA-ES (2003 through 2007)
- ADA-ES operates two Hg CEMs at PIPP (2005-2009)
- IRM Development (2006 through 2008)
ADA-ES development effort through internal and CCPI funding

Benefits of Method 30A

- Convenient stratification testing
- May be preferred in trading environment
- Allows for standardization of compliance calibration gas with IRM calibration gas
- 30A equipment “should” be appropriate for annual compliance calibrator certification

Instrumental Reference Method (M30A)

- Consistent with SO_x and NO_x IRM
 - Real-Time
 - Performance Based
- Key Elements
 - 3 point Calibration Error
 - 2 point System Integrity
 - Response Time
 - Traverse
 - Dynamic Spiking

Key Aspects of ADA-ES IRM

- Uses ThermoFisher analyzer and calibrator
- Configured for rapid installation (~ 4 hrs)
- Uses only 120V power
- No long umbilicals required
- Automated operation
 - RATA testing with HgCl_2 system integrity checks
 - Dynamic spiking
- Ability to traverse
- Real-time feedback
- Allows for simple cross comparison of calibration sources

Modifications to Optimize for IRM

- Upgrades and modifications to 80i for temperature stability
- Modifications to 81i for dynamic spiking
- Integrated CO₂ monitoring for dynamic spiking
- Alternate controls: did not use 82i probe controller
- Designed custom probe for traversing

ADA-ES IRM Installed at PIPP

Traversable Probe



RATA Testing – June 2007

- Ontario Hydro Method (ASTM D6784-02)
 - PIPP stack Hg very low when injecting carbon for mercury control ($\sim 0.5 \mu\text{g}/\text{m}^3$). OH not sensitive enough at these levels to provide useful process control data
- Instrumental Ref. Method (EPA Method 30A)
 - Real-time feedback
- Sorbent Trap Method (EPA Method 30B)

Compliance Hg CEMS and sorbent trap monitoring systems will need RATAs in 2008 to meet 1/1/09 deadline

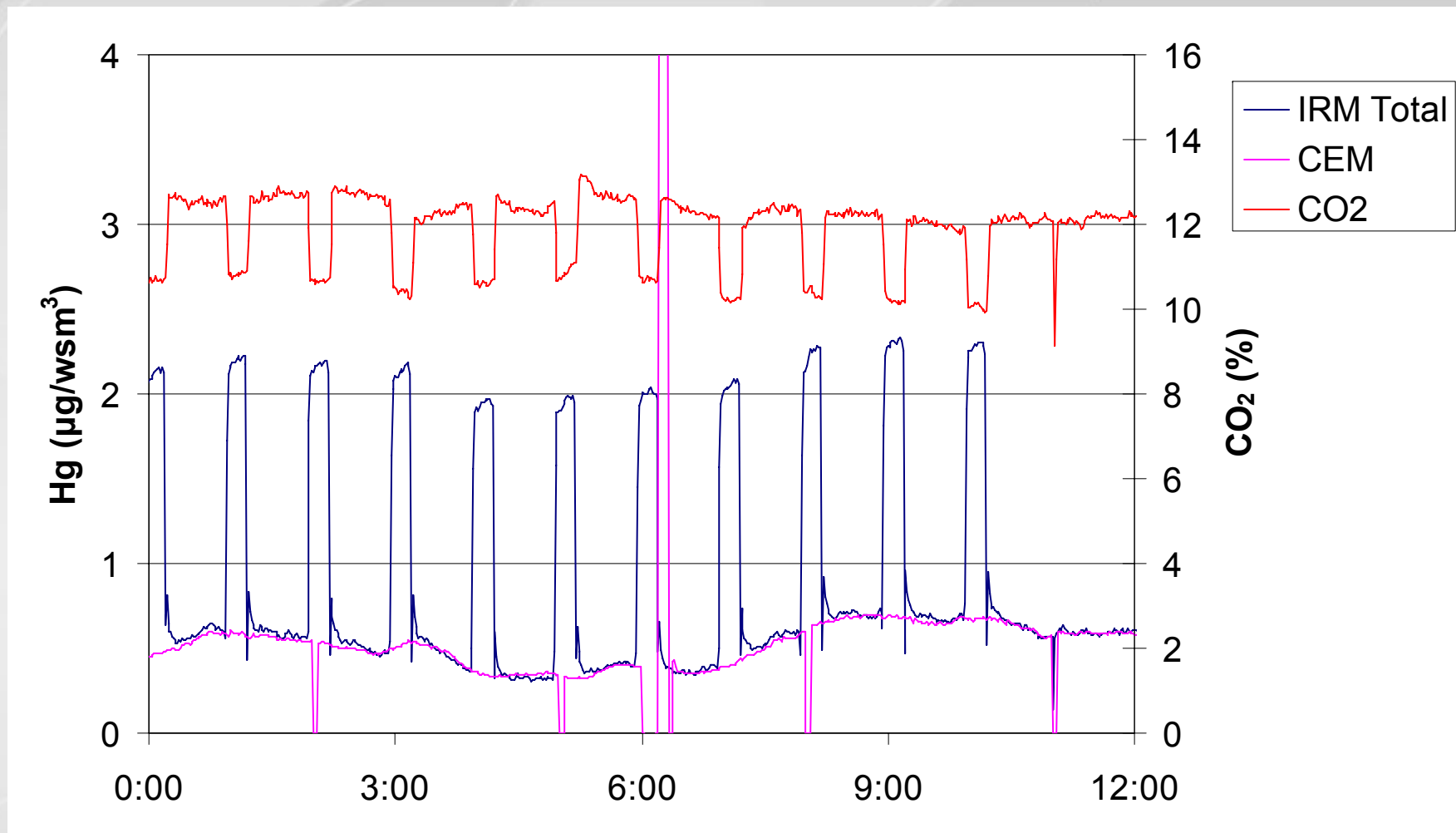
Calibration Source

- M30A Requires NIST traceable mercury source
 - EPA is preparing an interim protocol until NIST traceable source is available (within the month??)
- 2007 Tests: measured IRM generator output with sorbent traps
- Compared compliance CEM Hg generator against IRM “standard”

IRM Certification Testing

- 3-Point Hg⁰ System Calibration Error Test
Pass
- Measurement System Response Time Test
4 min.
- 2-Point Hg²⁺ System Integrity Check
Pass
- Dynamic Spiking Test (not required until 1/1/09)
99% recovery with elemental Hg
71% recovery with oxidized Hg } **≥90% HgCl₂ required**

Dynamic Spiking (3 Cycles Required)



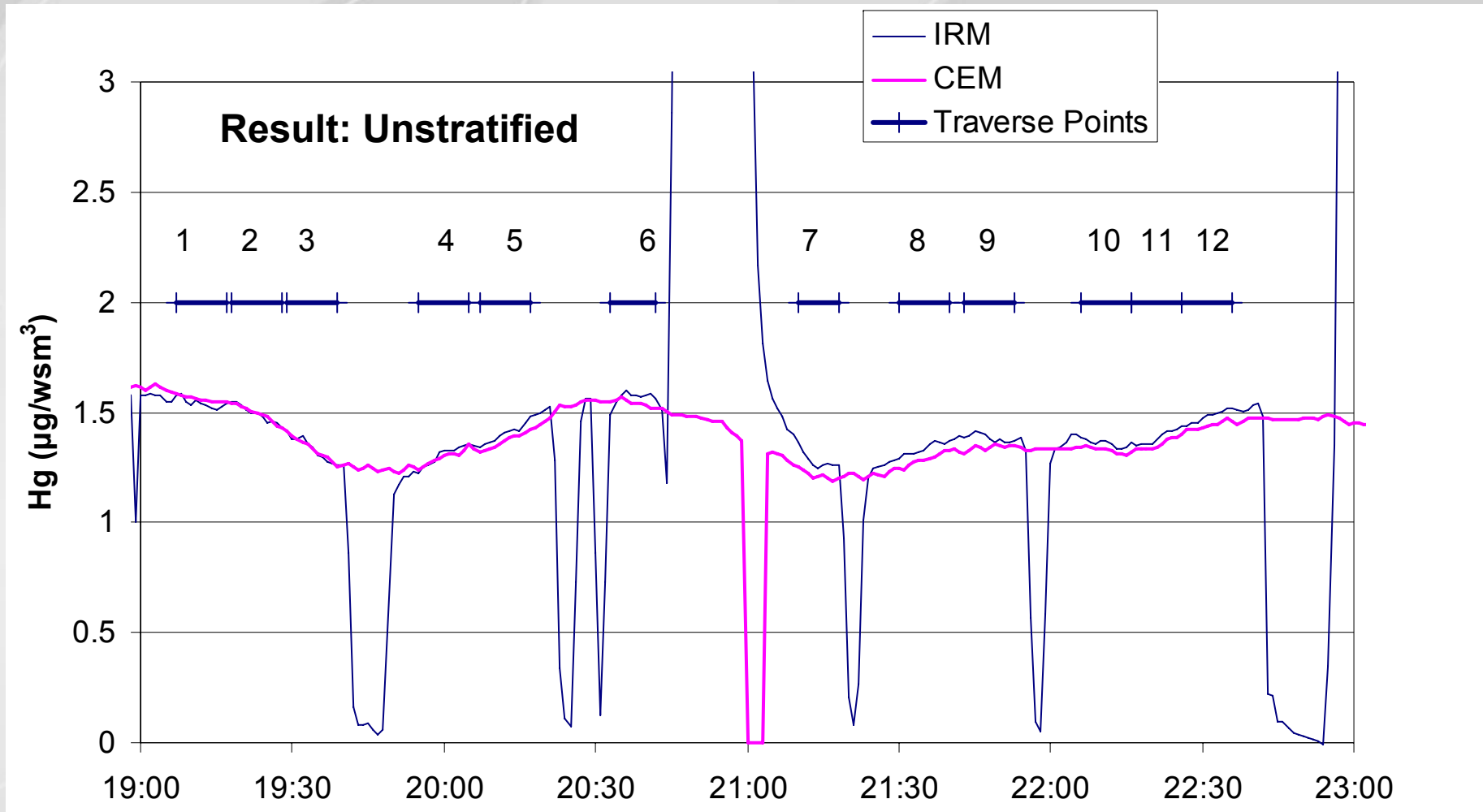
Automated for convenience and consistency
96 minutes required for 3 points



Traversing

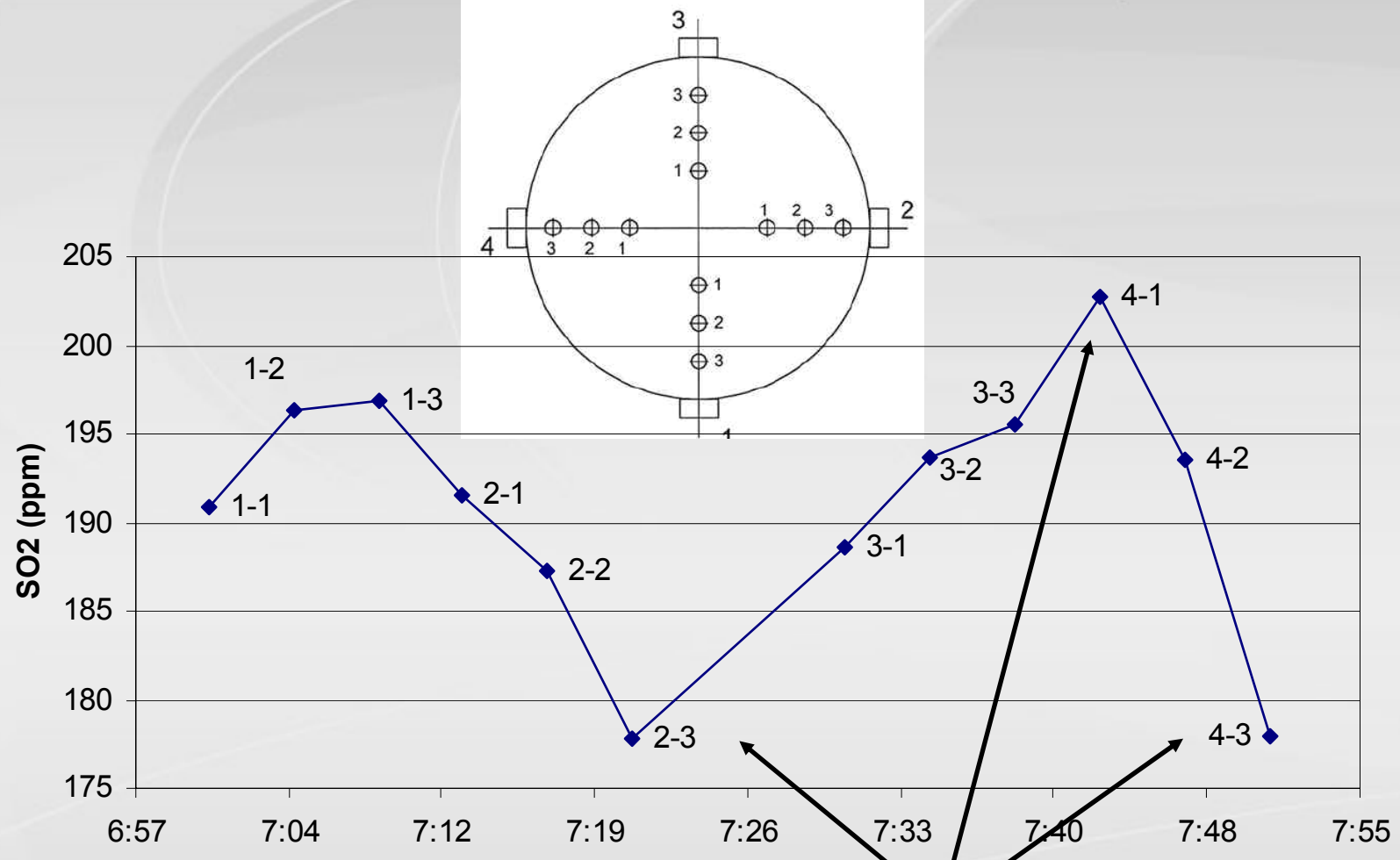
- SO₂ can be used until 1/1/10
- Exemption allowed if Hg < 3 µg/m³
- SO₂ and Hg traverse conducted at PIPP to test equipment and method

Mercury Stratification Testing Results



Target: $< 5\%$ difference or $< \pm 0.2 \mu\text{g}/\text{m}^3$

SO₂ Stratification Testing Results



Result: Minimally Stratified

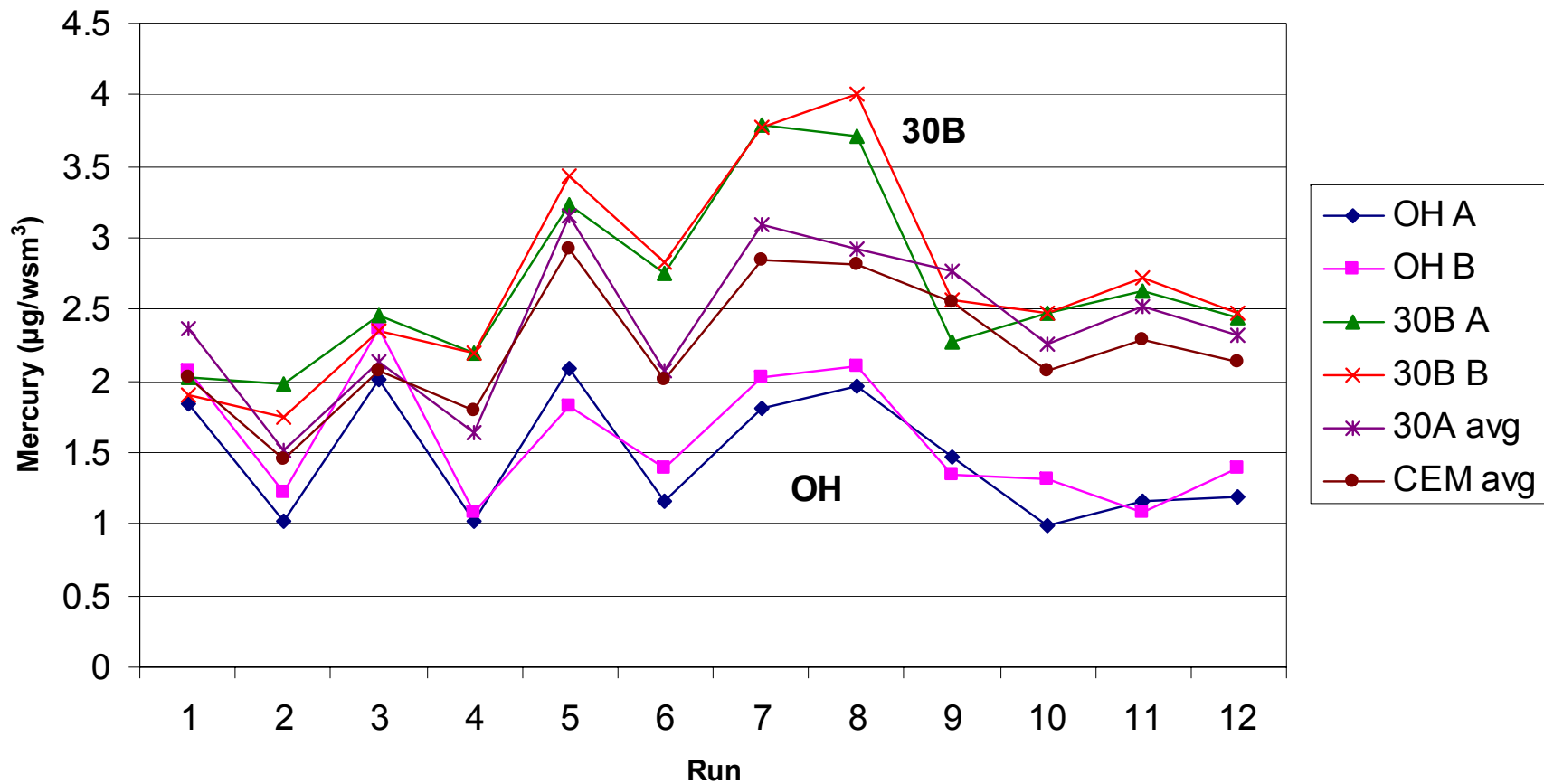
> 5% of average value



Estimated Time required for M30A

- Calibration Error: 36 minutes
 - Dynamic Spike: 96 minutes
 - Traverse: 130 minutes
 - RATA: 450 minutes (7.5 hours)
 - *Includes zero and HgCl₂ span between each run*
- TOTAL: 712 minutes
= ~ 12 hours

RATA Results



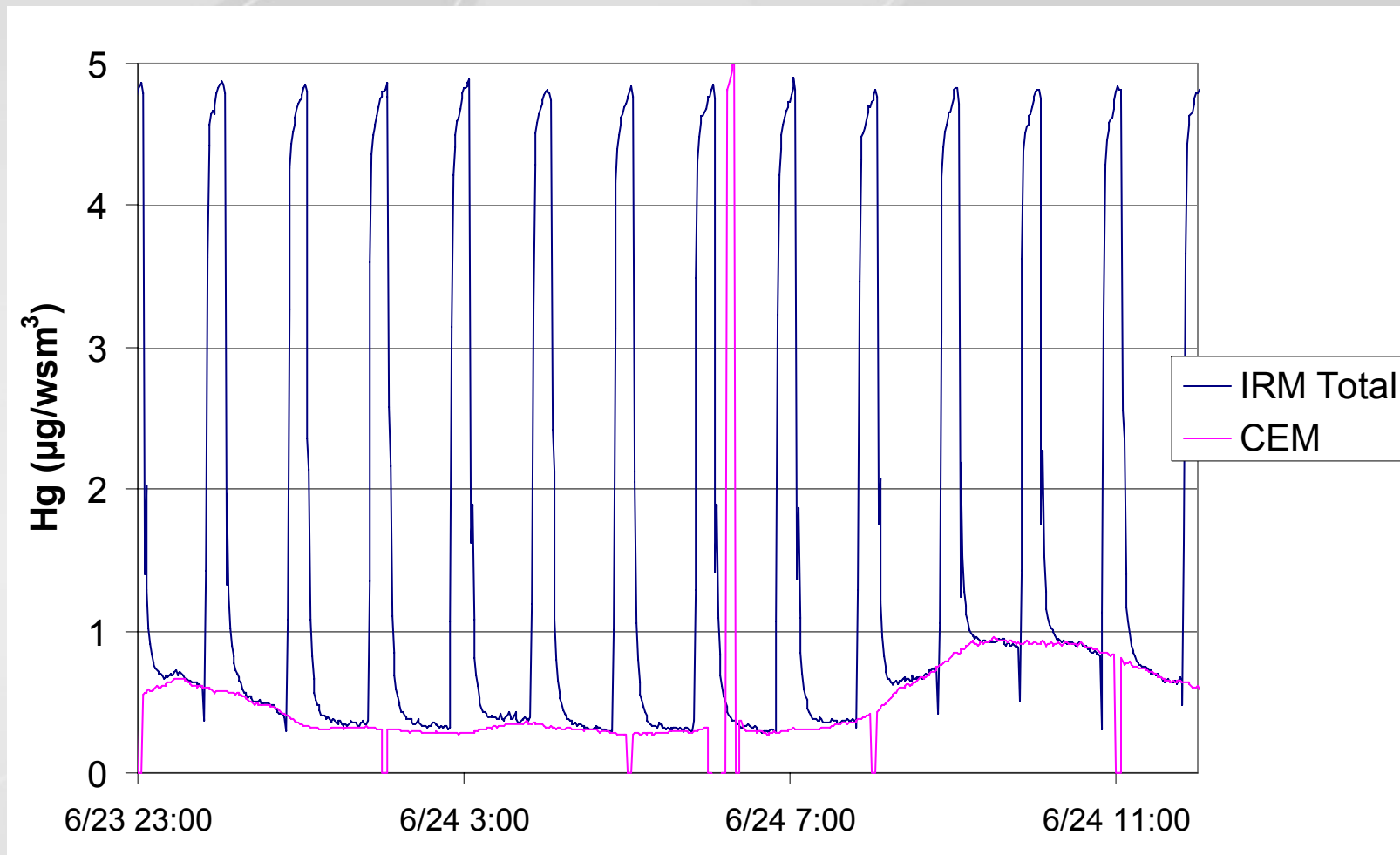
OH typically lower than CEM
30B typically higher than CEM

RATA Results

Ref. Method	Test Method	Max Diff ($\mu\text{g}/\text{m}^3$)	RA		
OH	CEM	0.93	56.6		Pass
OH	30A	1.10	64.9		Fail
OH	30B	1.51	90.7		Fail
30A	CEM	0.23	8.6		Pass
30B	CEM	0.93	23.0		Pass

RA \leq 20.0% OR $1.0 \mu\text{g}/\text{m}^3$ if average $< 5 \mu\text{g}/\text{m}^3$

Lower-Level RATA



Method 30A – Where are we?

- Successful Method 30A test completed
- Scheduling additional tests as soon as EPA interim protocol for 30A calibration source available
- Expect 30A system can also be used for annual compliance calibrator certification
- System can be used for stratification testing
 - Planning tests with EPA and EPRI to evaluate potential of stratification at site(s) with PAC injection
- Equipment availability
 - Three ADA-ES IRM systems currently operational
 - Plan to collaborate with source testing firm(s)
 - Plan to partner with equipment manufacturer

More Information



Hg CEM Support
or IRM (Method 30A)
Sharon Sjostrom, ADA-ES
sharons@adaes.com
(303) 734-1727

