

# **FIELD RATA TESTING WITH THE MERCURY INSTRUMENTAL REFERENCE METHOD**

**Sharon Sjoström\*, Steve Modrak**

ADA-ES, Inc., 8100 SouthPark Way, Unit B, Littleton, CO 80120-4525

## **ABSTRACT**

In June 2007, the EPA released draft Method 30A – Determination of Total Vapor Phase Mercury Emissions from Stationary Sources. Coal-fired power generators installing mercury CEMs are required to complete certification testing under the Clean Air Mercury Rule (CAMR) prior to January 1, 2009, including relative accuracy test audits (RATAs). The issued draft M30A, a work-in-process document, is offered as an option for RATA testing.

ADA-ES, Inc. has developed a portable mercury CEM system for use as an Instrumental Reference Method (IRM) as described in Method 30A in response to industry needs. This effort was conducted through a DOE NETL Clean Coal Power Initiative (CCPI) at We Energies Presque Isle Power Plant. A Thermo mercury CEM has been installed and operating at Presque Isle since June 2005 on the combined flue gas from Units 7, 8, and 9. The IRM was tested at Presque Isle in June 2007 in conjunction with Ontario Hydro RATAs on the installed CEM. Sorbent Trap Method measurements (EPA draft Method 30B) were also collected. This paper provides a discussion of draft Method 30A illustrated with results from the IRM RATA testing at Presque Isle including traversing, system integrity testing, and dynamic spiking. Performance of the installed mercury CEM, Ontario Hydro RATA, and M30B RATA results will also be presented.

## **INTRODUCTION**

ADA-ES, Inc., and Thermo have been actively working together since 2003 through a DOE NETL Clean Coal Power Initiative at We Energies Presque Isle Power Plant to advance the mercury CEM state-of-the-art. A Thermo Mercury Freedom System has been installed and operating at Presque Isle since June 2005 on the combined flue gas exiting Units 7, 8, and 9.

Coal-fired power generators installing mercury CEMs are required to complete certification testing under the Clean Air Mercury Rule (CAMR) prior to January 1, 2009, including relative accuracy test audits (RATAs). Until recently the Ontario Hydro (OH) method has been the only valid reference method. This is a wet chemistry capture method that is very labor intensive, costly, and has a relatively high detection limit. The turnaround time for analysis with this method is several hours for on-site analysis or several days/weeks for off-site analysis. In June 2007, the EPA released draft Method 30A – Determination of Total Vapor Phase Mercury Emissions from Stationary Sources (Instrumental Analyzer Procedure).<sup>1</sup> The issued draft M30A was offered as an option for RATA testing. ADA-ES configured a portable Instrumental Reference Method (IRM) system as described in Method 30A (M30A) in response to industry needs using Thermo's 80i mercury analyzer and 81i mercury calibrator. This system was demonstrated at Presque Isle in June 2007.

## **BACKGROUND**

The ADA-ES IRM consists of a standard Thermo Model 80i mercury analyzer and model 81i mercury calibrator installed in a temperature-controlled enclosure. Probe control (temperature, flow, pressure) is achieved through analog controls installed in the environmental enclosure. A standard model 83i probe enclosure was modified by removing the mantle and stinger, connecting calibration gas to a port upstream of the sampling filter, and adding additional flow monitoring capabilities to allow dynamic spiking tests. A custom traversing probe connected to the 83i probe enclosure was fabricated to facilitate traversing.

M30A details both certification requirements for an IRM and requirements for conducting RATAs. These are summarized below with comments specific to the approach used by ADA-ES when designing their system.

### **Certification Testing**

Before measuring emissions, perform the following procedures:

- a. 3-Point System Elemental Mercury Calibration Error Test:  
Introduce the low-, mid-, and high-level calibration gases upstream of the sampling filter using Thermo's system calibration mode. During the system calibration, a valve automatically closes at the outlet of the sample extraction loop to isolate the system from flue gas and calibration gas is introduced upstream of the sampling filter to flood the sampling area with mercury calibration gas.
- b. Measurement System Response Time Test:  
The system response time is equal to the time, rounded to the nearest minute, that is required for the measured mercury concentration to increase from the stable low-level calibration gas concentration to a value within 5% of the high-level gas concentration. The response time test was done with elemental mercury and was done in conjunction with the calibration error test.
- c. 2-Point System Integrity Check using oxidized mercury:  
Zero gas and either the mid-level HgCl<sub>2</sub> calibration gas was used for the check. Thermo's oxidized mercury calibrator was used as the source of oxidized mercury. The system integrity check is functionally very similar to the calibration error test, but oxidized mercury is used instead of elemental mercury.
- d. Dynamic Spiking Test:  
Dynamic spiking is required to determine if anything in the flue gas affects the accuracy of the measurement system. M30A requires that one spike level of oxidized mercury calibration gas be added to the flue gas sample at a volumetric flow rate of  $\leq 20\%$  to achieve resulting mercury concentrations in the gas that is 150 to 200% of the native mercury concentration. If the native mercury concentration is  $< 1 \mu\text{g}/\text{m}^3$ , enough oxidized mercury should be added to increase the measured level by 1 to 4  $\mu\text{g}/\text{m}^3$ . The method requires that there are at least three separate spiking periods, and the native mercury concentration must be measured for at least 1 minute before and after each spiking period. The spike recovery must be  $100 \pm 10\%$  and the relative standard deviation of the three responses must be  $< 5\%$  or  $< 0.5 \mu\text{g}/\text{m}^3$ . This is a challenging standard because the calculated recovery can be affected by the flow measurement as well as the mercury concentration. Although the requirement has been waived until January 1, 2009, the procedure was conducted at Presque Isle to evaluate the capabilities of the equipment.

### **Stratification Testing**

Stratification testing must be conducted prior to relative accuracy testing. Mercury stratification testing is not required before January 1, 2009, and there is an exemption allowed if the mercury concentration in the stack gas is expected to be  $3 \mu\text{g}/\text{m}^3$  or less at the time of the mercury monitoring system RATA. A stratification test was scheduled at Presque Isle to test the procedure and the equipment.

Flue gas exiting the fabric filter at Presque Isle is split into three flues prior to entering the stack. These flues were originally the separate Unit 7, Unit 8, and Unit 9 flues prior to installation of the fabric filter. The inside diameter of each flue is 9' 6". Two 4-inch sampling ports positioned at 90 degrees are available on each flue for stratification testing. Stratification testing was conducted on a single flue, Unit 8. A 12-point per flue traverse specified by EPA Method 1 was conducted. The sampling time at each point was at least twice the system response time unless the probe was moved between ports when the sampling time was at least 4 times the response time to allow time for the system to flush. The minimum sampling time required for a single flue at Presque Isle is 12 times response time for sampling plus 2 times the response time to flush the system in each port, which equals 14 times response time. It is expected that 5 minutes will be required to change ports and it is estimated that the response time, rounded to the next highest minute, was 4 minutes. Thus, the minimum total time required for a stratification test at Presque Isle was approximately 61 minutes.

## Relative Accuracy Testing

During relative accuracy testing, a system integrity check was conducted by introducing both zero and oxidized mercury calibration gas before and after each run. M30A allows the operator to conduct multiple sampling runs without pre- and post-system integrity checks at the risk of invalidating any run that is not followed by a successful system integrity check. Following the pre-test system integrity check, the probe should be positioned at the first sampling point, and allowed to flush and equilibrate for at least two times the measurement system response time before recording any data for the first sampling point. If a traverse is required as a result of the stratification test, then, traverse and record measurements at all required sampling points. The minimum sampling time at each sampling point must be at least two times the system response time, but not less than 10 minutes. Each traverse point should be sampled for an equal length of time.

Note that for unstratified gas where a single sampling point is being used, the minimum total time will be four times the system response time (two to flush after the system integrity check and two to sample).

The zero and upscale drift is the absolute difference between the pre- and post-run system integrity check calibration error. The upscale drift must be  $\leq 3.0\%$  or  $\leq 0.3 \mu\text{g}/\text{m}^3$ .

## RESULTS

### Initial Testing

The performance of the IRM during the initial checkout was disappointing. The IRM measurement appeared biased high and the signal was noisy. A trend of some initial data is presented in Figure 1. The Thermo system is designed to be installed in an environmental enclosure with fairly tight temperature control. It is difficult to design a portable system with comparable controls. However, fine tuning of the enclosure and minor modifications to the analyzer can be made to minimize the effects of temperature fluctuations. The trend shown in Figure 1 represents data collected after standard system upgrades were made to the 80i, but before any custom upgrades. Several modifications were made to improve system performance to the extent necessary for an effective IRM. These included:

- 1) Receiving replacement optics from Thermo based on their recommendations. This eliminated the high bias observed.
- 2) Modifying the air conditioner to reduce temperature fluctuations.
- 3) Modifying the 80i thermal controls to maintain more consistent temperatures.

Following these modifications, the IRM was steady and tracked well with the CEM installed at the site.

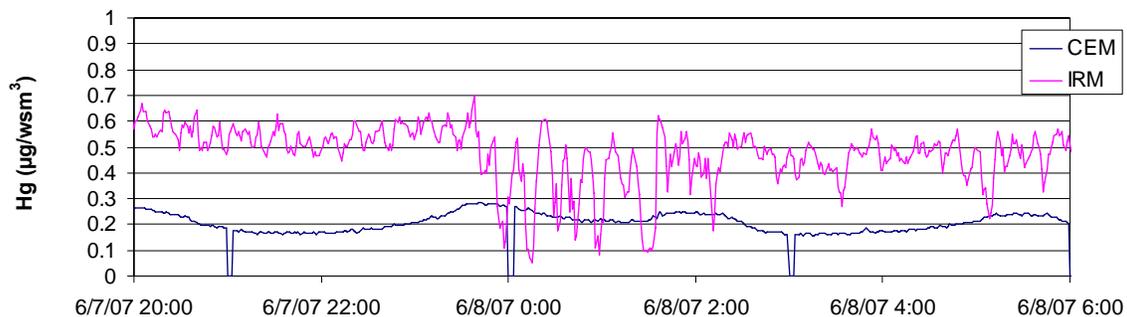


Fig. 1. Trend graph of initial IRM performance.

## Certification Testing

The first test of the IRM equipment was a system calibration error test. The standard Thermo 80i and 81i controls allow the user to conduct a system zero followed by a system calibration to flood the area upstream of the sampling filter with calibration gas. The IRM equipment at Presque Isle responded well to the calibration error test. A trend graph of the IRM equipment response is shown in Figure 2.

### System Calibration Error Testing

According to M30A, the system calibration error (SCE) must be within  $\pm 5\%$ .

$$SCE = \frac{C_s - C_v}{CS} \times 100$$

Where  $C_s$  = measured response

$C_v$  = the calibration value, and

CS = the Calibration Span =  $9 \mu\text{g}/\text{sm}^3$

As an alternative, the absolute difference in the calibration value and the measured value must be  $\pm 0.5 \mu\text{g}/\text{m}^3$ . The calibration error response is shown graphically in Figure 2 and the EPA SCE evaluation is included in Table 1.

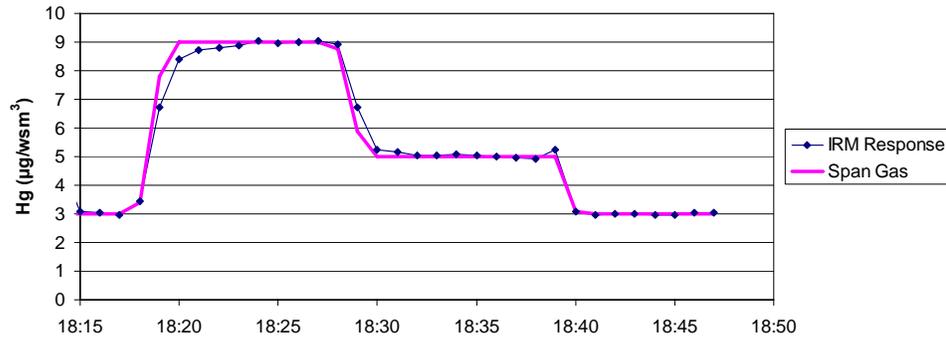


Fig. 2. Calibration error test response.

**Table 1. Calibration Error for IRM equipment.**

Date/Time	Calibration Gas Level	Calibration* Gas Concentration ( $\mu\text{g}/\text{m}^3$ )	System Response ( $\mu\text{g}/\text{m}^3$ )	Absolute Difference	Calibration Error
		$C_v$	$C_s$	$ C_v - C_s $	$[ C_v - C_s ] * 100 / CS$
6/13/07 18:39	Low	3.00	3.00	0.00	0.00%
6/13/07 18:27	Mid	5.00	5.016	0.02	0.16%
6/13/07 18:17	High	9.00	9.00	0.00	0.00%

\*Certified mercury generators were not available for this test. Calibrator output was sampled with sorbent traps and analyzed to assure accurate concentration.

### System Response Time Evaluation

The system response time can be calculated using the system calibration error test shown in Figure 2. The response time, rounded to the nearest minute, was 4 minutes. This was used to determine the appropriate sampling times for the remaining tests.

### System Integrity Check

The system integrity check was conducted immediately prior to beginning the relative accuracy test and is presented with the RATA discussion below.

### Dynamic Spike Testing

During the dynamic spiking phase of testing, the sample conditioning enclosure was configured so that the output of Thermo's oxidized mercury calibration source was connected to a port upstream of the sampling filter. The flow rate of the calibration gas was monitored using Thermo's 81i calibrator with internal mass flow controllers. The calibrator was modified so that all the calibration gas was directed to the spiking port and none was bypassed to the calibrator exhaust. A CO<sub>2</sub> analyzer was used to measure the extent of dilution resulting from introducing the dynamic spike into the sampling probe. Since nitrogen is used as the carrier gas for the mercury from the calibrator, the ratio of CO<sub>2</sub> during the baseline measurement to the change in CO<sub>2</sub> from baseline to spiking indicates the dilution, where the dilution factor, DF is calculated by:

$$DF = \frac{Q_{probe}}{Q_{spike}} = \frac{C_{CO_2base}}{C_{CO_2base} - C_{CO_2spike}}$$

Q<sub>probe</sub> = probe flow

Q<sub>spike</sub> = calibration spike gas flow

C<sub>CO<sub>2</sub>base</sub> = Baseline CO<sub>2</sub> concentration

C<sub>CO<sub>2</sub>spike</sub> = CO<sub>2</sub> concentration measured during spiking period

To facilitate the M30A requirement to conduct three independent spiking tests, the spiking test procedure was automated. During the first spiking event, the dilution factor was calculated to assure that the spike flow was less than 20% of the probe flow, as required by the method. Because the dynamic spiking process was automated, several events could easily be repeated to determine the response of the equipment. A trend of several repeat tests is shown in Figure 3 with both the CO<sub>2</sub> and mercury measurements.

M30A allows multiple repeat tests to achieve the quality criteria specified. During the evaluation at Presque Isle, the system recovery was below the specified criteria for all runs with oxidized mercury calibration gas. Therefore, only the final three runs used to calculate the recovery and relative standard deviation are shown in Table 2 as an example. The dynamic spiking efforts with oxidized mercury failed according to both criteria identified in M30A. The spike recovery was 71%, which is outside the range specified (100±10%). The relative standard deviation (RSD) was 9.3%, compared to the method criteria of 5%. The response of the system is believed to be a result of the placement of the oxidized mercury calibration source and losses between the source and the extraction location, rather than a true measurement bias. A second test was conducted with elemental mercury to evaluate whether the poor recovery was specific to oxidized mercury or to the system. These results are presented in Table 3. As shown, the spike recovery with elemental mercury ranged from 94 to 103% with an RSD of 4.6%. This is within the criteria specified in M30A.

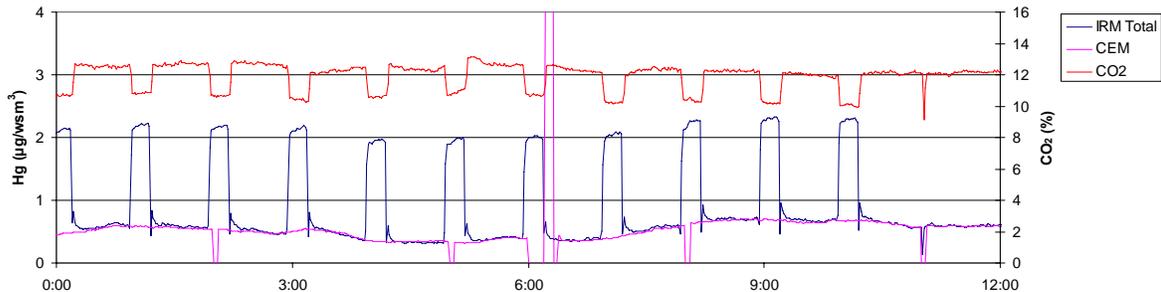


Fig. 3. Mercury and CO<sub>2</sub> concentrations during repeated dynamic spiking periods.

Modifications minimizing losses between the oxidized mercury calibration source and the injection port were made to the system following the test that should remedy the poor oxidized mercury recovery problem. M30A does not require dynamic spiking until January 1, 2009, and it is believed that improved recovery with oxidized mercury will be demonstrated long before this date.

**Table 2. Results of Dynamic Spiking Tests with Oxidized Mercury (Spike = 14.25 µg/sm<sup>3</sup>).**

Time	Mercury		CO <sub>2</sub>		DF	Spike Recovery (R) <sup>1</sup>	RSD <sup>1</sup>
	Baseline (C <sub>native</sub> )	Spike (C <sub>spike</sub> )	Baseline (C <sub>CO2base</sub> )	Spike (C <sub>CO2spike</sub> )			
6/23/07 7:54	0.56	2.09	12.33%	10.31%	6.50	79%	
6/23/07 8:54	0.70	2.19	12.25%	10.29%	6.23	68%	
6/23/07 9:54	0.68	2.13	12.00%	10.12%	6.07	67%	
					Mean ( $\bar{R}$ )	71%	9.3

<sup>1</sup>R ≥ 90% required and RSD <5%.

**Table 3. Results of Dynamic Spiking Tests with Elemental Mercury (Spike = 15.5 µg/sm<sup>3</sup>).**

Time	Mercury		CO <sub>2</sub>		DF	Spike Recovery (R)	RSD
	Baseline (C <sub>native</sub> )	Spike (C <sub>spike</sub> )	Baseline (C <sub>CO2base</sub> )	Spike (C <sub>CO2spike</sub> )			
6/14/07 7:12	0.92	2.70	12.08%	10.61%	8.21	100%	
6/14/07 8:12	0.80	2.04	12.21%	11.11%	11.09	94%	
6/14/07 9:12	0.78	2.14	12.25%	11.15%	11.21	103%	
					Mean ( $\bar{R}$ )	99%	4.6

### Stratification Testing

The mercury concentration in the stack gas at Presque Isle was below the required 3 µg/m<sup>3</sup> both when the traverse was conducted and when the RATA tests were conducted. However, stratification tests were completed to evaluate both M30A and the IRM equipment.

To determine the extent of stratification, measurements were normalized to the compliance CEM to remove temporal variation. The normalization was conducted by multiplying the concentration at each traverse point by the ratio C<sub>Favg</sub>/C<sub>F</sub>, where C<sub>F</sub> was the mercury concentration measured at a fixed point (the compliance CEM measurement) while IRM probe was at the traverse point, and C<sub>Favg</sub> was the average fixed point concentration corresponding to all traverse points. The flue gas is unstratified if the normalized concentration at any point is within ± 5% of the average normalized concentration or the difference in each normalized concentration and the average normalized concentration is ± 0.2 µg/m<sup>3</sup> (whichever is less restrictive).

A trace of the mercury concentrations measured using the IRM equipment during a 12-point traverse of the Unit 8 stack is compared to the CEM in Figure 4. The times for each traverse point are superimposed on the figure. As shown, the two instruments compared very well. Analysis of the data, included in Table 4, indicates that the flue gas is unstratified.

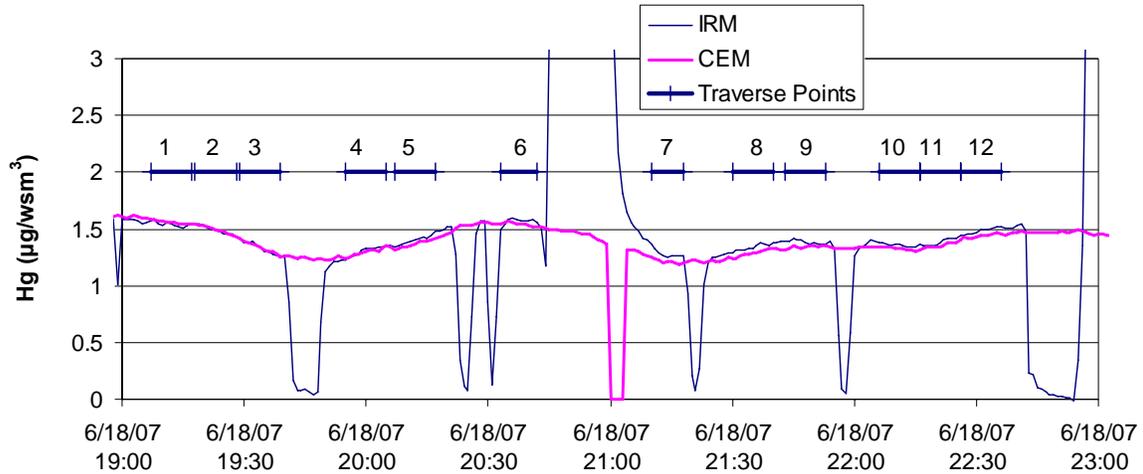


Fig. 4. Results of mercury traverse tests on Unit 8.

**Table 4. Results of Mercury Traverse on Unit 8.**

Sample Pt	CEM ( $\mu\text{g}/\text{sm}^3$ ) $C_F$	IRM ( $\mu\text{g}/\text{sm}^3$ ) $I_x$	Normalized IRM ( $\mu\text{g}/\text{sm}^3$ ) $I_{N_x}$	Stratification <sup>1</sup> ( $\mu\text{g}/\text{sm}^3$ ) ( $I_{N_x} - \text{Avg } I_N$ )	Stratification <sup>1</sup> (%) ( $I_{N_x} - \text{Avg } I_N$ ) / Avg $I_N$
1	1.93	1.87	1.37	-0.05	3.2
2	1.69	1.15	1.38	-0.03	2.2
3	1.61	1.52	1.38	-0.03	2.4
4	1.56	1.54	1.40	-0.02	1.3
5	1.50	1.50	1.42	0.00	0.1
6	1.34	1.34	1.41	0.00	0.0
7	1.29	1.30	1.48	0.06	4.4
8	1.36	1.39	1.45	0.03	2.4
9	1.54	1.58	1.43	0.02	1.4
10	1.23	1.31	1.42	0.00	0.1
11	1.33	1.39	1.42	0.00	0.1
12	1.34	1.39	1.42	0.01	0.6
	1.34	1.37	1.41		

<sup>1</sup>|Stratification| < 0.1  $\mu\text{g}/\text{sm}^3$  or < 5% for “Unstratified” classification

A traverse of the Unit 7 flue using an SO<sub>2</sub> monitor was conducted one week earlier. No adjustments for temporal variation were made. Without temporal adjustments, the data indicates that the stratification exceeded the allowed 5% for 3 of the 12 traverse points, but was <10%, so the duct would need to be considered minimally stratified.

**Table 5. Results of SO<sub>2</sub> Traverse on Unit 7.**

Sample Pt	Port	Point	SO <sub>2</sub> (ppm)	Stratification (ppm) (SO <sub>2</sub> – Avg SO <sub>2</sub> )	Stratification (%) (SO <sub>2</sub> – Avg SO <sub>2</sub> )/ Avg SO <sub>2</sub>
1	1	1	196.8	-5.8	3.0%
2	1	2	196.3	-5.3	2.8%
3	1	2	190.8	0.2	0.1%
4	1	4	188.6	2.4	1.3%
5	1	5	193.7	-2.7	1.4%
6	1	6	195.5	-4.5	2.3%
7	2	6	177.9	13.1	6.9%
8	2	5	193.6	-2.6	1.3%
9	2	4	202.7	-11.7	6.1%
10	2	3	191.5	-0.5	0.2%
11	2	2	187.3	3.7	2.0%
12	2	1	177.8	13.2	6.9%
	Avg		191.0		

**Relative Accuracy Testing**

The initial set of relative accuracy tests were conducted with simultaneous OH, M30B, and M30A measurements. The baghouse at Presque Isle treats the gas from three separate boilers and splits into three separate flues in the stack. Each method sampled gas from a separate flue with OH on Unit 9, M30B on Unit 7, and M30A on Unit 8. Stack CEM measurements indicate that the flue gas from all three flues is homogeneous. The mercury CEM is installed on the combined duct.

A trend graph showing IRM readings and CEM readings with results from M30B and OH measurements is shown in Figure 5. The spikes on the IRM response before and after each run are the system integrity checks.

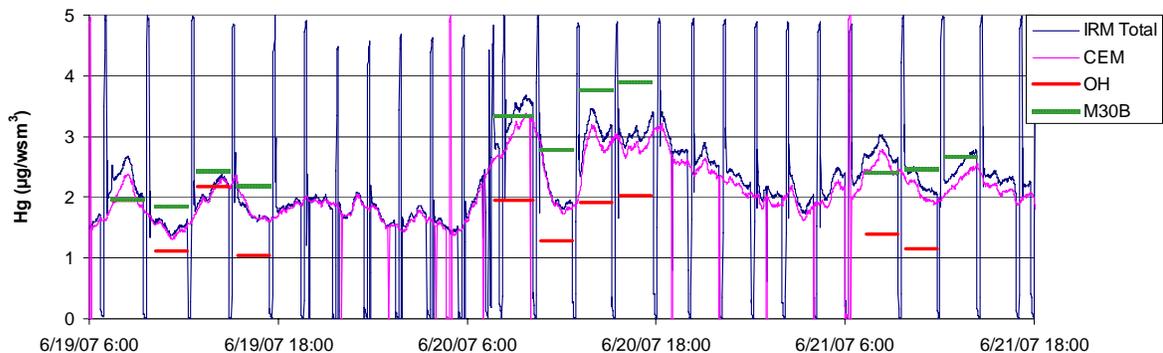


Fig. 5. Mercury trends during high-level RATA.

The IRM performed well during the RATA testing period. The relative accuracy of the three different reference methods and the maximum relative difference between the reference method and the CEM are summarized in Table 6. Relative Accuracy specifications for mercury monitors are contained in section 3.3.8 of Appendix A to 40 CFR Part 75.<sup>2</sup> All three methods indicate that the CEM passed the RATA based upon the relative difference criteria of  $\leq 1 \mu\text{g}/\text{m}^3$ . However, the data also indicate that the CEM exceeded a relative accuracy of 20% when compared to the OH and M30B and that both the M30A and M30B failed the relative accuracy criteria when compared to the OH. This is an indication that it is difficult to obtain successful relative accuracy test results with the manual methods. This comparison data between each reference method and the CEM as well as the OH and the other reference methods are summarized in Table 7.

System integrity checks were conducted on the IRM before and after each sampling run. The IRM passed the system calibration error requirement of  $<5\%$  for all periods and the maximum drift between any two sampling periods was  $0.23 \mu\text{g}/\text{m}^3$ , which is below the maximum allowable drift of  $0.3 \mu\text{g}/\text{m}^3$ . These data are summarized in Table 8.

**Table 6. Method Comparison Summary.**

Reference Method	Test Method	Maximum Relative Difference (RM – Test Method, $\mu\text{g}/\text{m}^3$ )	RA	
OH	CEM	-0.93	56.6%	PASS
M30B	CEM	0.93	23.0%	PASS
M30A (IRM)	CEM	0.23	8.6%	PASS
OH	IRM (M30A)	-1.17	64.9%	FAIL
OH	M30B	1.51	90.7%	FAIL

**Table 7. Comparison of Measurement Methods.**

Point	M30A ( $\mu\text{g}/\text{m}^3$ )	M30B ( $\mu\text{g}/\text{m}^3$ )	OH ( $\mu\text{g}/\text{m}^3$ )	CEM ( $\mu\text{g}/\text{m}^3$ )
1	2.36	1.97	1.95	2.02
2	1.51	1.86	1.12	1.46
3	2.13	2.43	2.18	2.07
4	1.63	2.2	1.05	1.79
5	3.15	3.34	1.95	2.92
6	2.07	2.79	1.28	2.02
7	3.09	3.78	1.92	2.85
8	2.92	3.91	2.03	2.81
9	2.77	2.42	1.4	2.55
10	2.25	2.47	1.15	2.08
11	2.51	2.68	1.12	2.29
12	2.32	2.46	1.3	2.13

**Table 8. System Integrity Checks and Drift.**

Pt	IRM Hg ( $\mu\text{g}/\text{m}^3$ )	System Int. Check		SCE <sup>1</sup> (%)	$\Delta$   SCE <sup>2</sup> ( $\mu\text{g}/\text{m}^3$ )	Drift <sup>3</sup> (%)	$\Delta$   Drift <sup>4</sup> ( $\mu\text{g}/\text{m}^3$ )
		Zero ( $\mu\text{g}/\text{m}^3$ )	Calibration Response (C <sub>s</sub> ) ( $\mu\text{g}/\text{m}^3$ )				
Pre		0.04	4.99				
1	2.36	-0.01	4.91	-1.8	0.09	1.78	0.08
2	1.51	0.00	4.96	-0.9	0.04	0.92	0.05
3	2.13	0.00	4.83	-3.5	0.17	2.63	0.13
4	1.63	0.01	5.05	1.1	0.05	4.55	0.23
Pre		0.07	4.97				
5	3.15	0.01	4.99	-0.3	0.01	0.28	0.01
6	2.07	-0.03	4.87	-2.6	0.13	2.33	0.12
7	3.09	0.02	4.85	-3.0	0.15	0.38	0.02
8	2.92	0.01	4.91	-1.7	0.09	1.28	0.06
Pre		0.00	4.86				
9	2.77	-0.02	5.03	0.5	0.03	0.51	0.17
10	2.25	0.02	4.98	-0.4	0.02	0.90	0.05
11	2.51	0.02	5.02	0.4	0.02	0.82	0.04
12	2.32	-0.01	4.91	-1.8	0.09	2.22	0.11

<sup>1</sup> SCE  $\leq$  5% OR<sup>2</sup> Absolute difference SCE  $\leq$  0.5  $\mu\text{g}/\text{m}^3$ <sup>3</sup> Drift must be  $\leq$  3% OR<sup>4</sup> Absolute difference Drift  $<$  0.3  $\mu\text{g}/\text{m}^3$

Two additional RATA tests were conducted using the IRM to assess the performance of the CEM at lower mercury concentrations at 1 to 1.5 ug/m<sup>3</sup> and at nominally 0.5 ug/m<sup>3</sup>. The resulting RA between the IRM and the CEM for these two ranges was 10.1% and 11.7% respectively.

## CONCLUSIONS

RATA testing at Presque Isle indicated that M30A and M30B are viable methods that can be successfully achieved according to the pre-January 1, 2009, criteria. General observations from testing include:

- M30A provides an alternate reference method to the Ontario Hydro that will become more important to the industry as more units install mercury control and require accurate measurements at low concentrations.
- NIST Certified calibration sources are not yet available. These are required by M30A and no provisions are currently in the method to allow alternate validation of the calibration sources, such as measuring the output with sorbent traps or the Ontario Hydro method.
- A properly operating IRM can provide significant cost savings through both real-time feedback to assess compliance and automated RATA testing in unstratified ducts.
- Although the manual reference methods used at Presque Isle indicated the compliance CEM passed the RATA, the two methods did not pass a RATA when compared against each other.
- It is important to note that only one IRM of the design described in this paper exists and that custom modifications were made to production equipment to assure optimal performance. ADA-ES is working with an equipment manufacturer to accelerate the availability of IRM equipment to the industry in the near future. Unless fabrication can be implemented quickly, the industry as a whole will not benefit from IRM RATA testing prior to the January 1, 2009, certification testing deadline.

## REFERENCES

1. Method 30A – Determination of Total Vapor Phase Mercury Emissions from Stationary Sources (Instrumental Analyzer Procedure). <http://www.epa.gov/ttn/emc/prelim.html>
2. Code of Federal Registers, Title 40: Protection of Environment, Part 75—Continuous Emission Monitoring, Subpart I—Hg Mass Emission Provisions, Appendix A to Part 75—Specifications and Test Procedures.

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