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April 19, 2013

Mr. Alvaro Linero, P.E.
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL

SUBJ: Letter Report
Experience with the Sick Maihak MerCEM 300Z Continuous Mercury Analyzer
Hillsborough County Resource Recovery Facility - Unit No. 4

Specific Condition No. 35 of Permit No. PSD-FL-369C requires the installation of a continuous mercury emissions monitor on Unit No. 4 at the Hillsborough County Resource Recovery Facility (the "Facility"). In January of 2012, Hillsborough County, Florida (the Facility owner) and Covanta Hillsborough, Inc. (the Facility operator) purchased and installed a MerCEM 300Z instrument (the "instrument"), manufactured by Sick Maihak, to satisfy compliance with the permit condition. The purpose of this Letter Report is to describe the Facility's experience with the instrument over the first full year of its operation.

Background

At the time of issuance of PSD-FL-369C (circa 2006), the United States Environmental Protection Agency (USEPA) had recently promulgated the Clean Air Mercury Rule (CAMR). CAMR was intended to function as a "cap and trade" program for mercury emitted from coal-fired electric utilities. A critical aspect of any cap-and-trade program is the continuous monitoring of the pollutant which is being traded as a financial commodity. As such, traditional manufacturers of continuous emissions monitoring (CEM) equipment invested heavily in developing a viable mercury CEM.

While CAMR was applicable solely to coal-fired electric utilities, the Florida Department of Environmental Protection (FDEP) believed that the mercury CEM equipment being developed in response to CAMR could serve a useful purpose on a municipal waste combustor, such as Unit No. 4 at the Hillsborough County Resource Recovery Facility. In the absence of any regulatory requirement to do so, and following lengthy consultations with the FDEP, Hillsborough County agreed to Specific Condition No. 35, requiring the installation of a mercury CEM. However, because such equipment did not exist commercially at the time of the permit issuance, the permit condition allowed for a phased approach to its implementation.

In 2008, the United States Supreme Court ruled that the CAMR rule was unconstitutional and directed the USEPA to vacate it. In response to this action, most CEM equipment manufacturers abandoned their efforts to develop a mercury CEM. However, Specific Condition No. 35 remained unchanged by the vacatur of CAMR, leaving Hillsborough County with limited options for complying with the permit.

During this period, Sick Maihak continued its research and development activities on mercury CEMS. Sick Maihak approached Covanta in 2010 and offered to field test the MerCEM 300Z on Unit 4 with the understanding that should the field test prove unsuccessful, Hillsborough County would be refunded the purchase price of the instrument. The 1 year field test was recently concluded in February of 2013 and the results are addressed below.

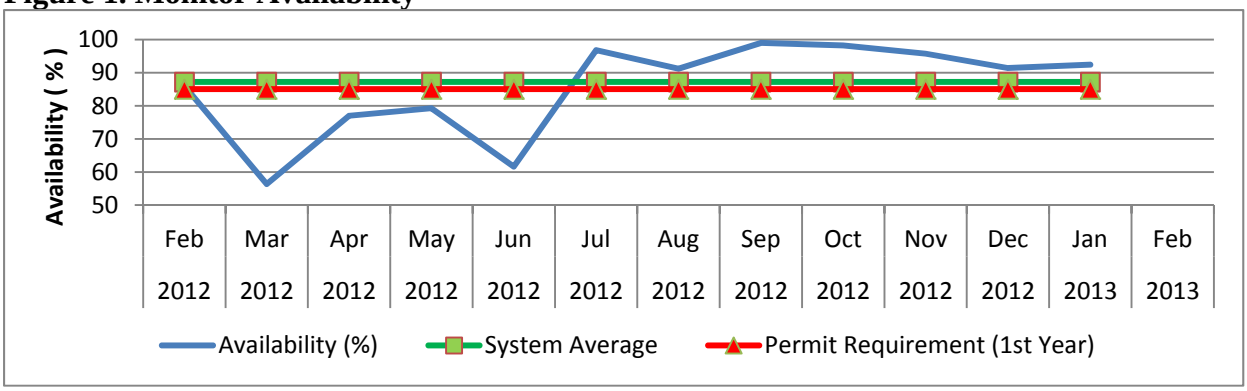
Data Accuracy

The USEPA has developed Performance Specifications to evaluate the acceptability of CEM equipment. Performance Specification 12A (PS-12A) is specific to mercury CEMS and was used by the Facility to assess the accuracy of the MerCEM 300Z. PS-12A specifies procedures for determining CEMS relative accuracy, linearity, and calibration drift. A Relative Accuracy Test Audit (RATA) was performed on the instrument in July 2012 which demonstrated that the instrument meets the relative accuracy criteria of PS-12A. Provided as **Attachment 1** to this Letter Report is a summary of the mechanisms built in to the instrument for assessing linearity and calibration drift. In summary, the instrument is currently meeting the requirements of PS-12A and the emissions data being collected is currently considered to be accurate.

Data Availability

Specific Condition No. 35 requires a minimum data availability of 85% in year 2 of instrument operation (February 2013 - January 2014), and 90% in subsequent years of instrument operation. In the months immediately following installation of the instrument, the minimum data availability requirements of the instrument were not being met. Covanta and Sick technicians were able to make system modifications and successfully improved monitor availability over the course of several months. **Figure 1** depicts monitor availability from February 2012 through January 2013. Since approximately July of 2012 the instrument has successfully achieved the minimum monitor availability requirements of Specific Condition 35.

Figure 1. Monitor Availability

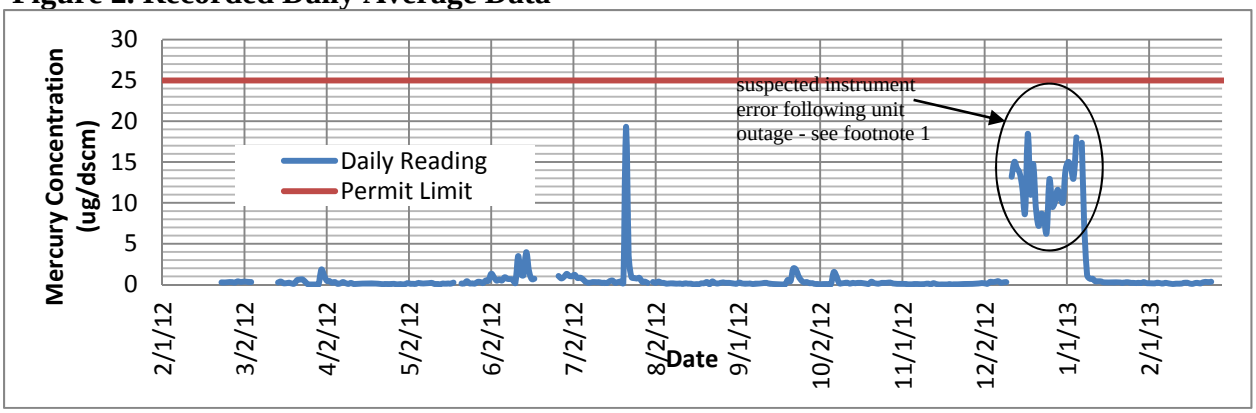


Data Collected

As of the writing of this Letter Report, the mercury emissions data recorded by the instrument have been consistently low[1]. Typical 24-hr averages are less than 2 ug/dscm. This is not surprising in as much as quarterly mercury stack tests preceding installation of the instrument using USEPA Reference Method 29 confirm that Unit No. 4 is a very low emitter of mercury. Consistently low stack emissions are the result of reduced usage of mercury in consumer products, community efforts to remove mercury from the waste stream, and highly effective air pollution control equipment. **Figure 2** depicts the 24-hr average mercury concentration recorded since February of 2012. A constant carbon usage rate was used throughout this monitoring period, demonstrating that this reagent, when combined with other facility operations, is providing consistent and effective abatement of Hg emissions. Aside from the anomalous data recorded following unit startups in July and December (see footnote 1), the mercury emissions from Unit No. 4 are consistently less than 2 ug/dscm.

[1] In December of 2012, the instrument recorded elevated readings for an approximate two week period immediately following a planned unit outage. Elevated readings immediately following unit outages have previously been observed, however, such readings returned to normal levels (< 2 ug/dscm) within 24 hours. In December of 2012, the elevated readings (~ 15 ug/dscm) persisted for a two week period before precipitously returning to normal. While it is expected that the elevated readings observed in December of 2012 are not accurate, no instrument malfunctions could be identified, therefore, the Facility is not dismissing the data.

Figure 2. Recorded Daily Average Data



Conclusions

The MerCEM 300Z is satisfying the requirements of PSD-FL-369C for the continuous monitoring of mercury. The data collected by the instrument is considered to be accurate as determined by PS-12A and the instrument is achieving an availability in excess of 90%. Most importantly, the instrument is demonstrating that mercury emissions from a modern municipal waste combustion unit are consistently less than 2 ug/dscm.

The capital cost of the MerCEM 300Z instrument to Hillsborough County was in excess of $175,000 and was artificially low due to a “market introduction discount” of $30,000. The range of capital costs for a single Hg CEM system is $200,000 to $250,000 with an additional installation cost of $50k. In addition, annual operating costs are anticipated to be approximately $50,000 per unit.

Given the extremely low emissions data recorded by the instrument and the lack of variability, the available evidence does not demonstrate the value in collecting mercury emissions data on a continuous basis. The existing compliance standards that require continuous monitoring of carbon usage with periodic stack testing provide reasonable assurance of compliance with the mercury emission limit, and can be implemented at a much lower cost to Hillsborough County taxpayers. Nonetheless, it is Hillsborough County's intention to continue utilizing the MerCEM 300Z instrument until such time as the costs associated with the instrument's upkeep become unreasonable and/or the emissions profile exhibits greater variability that can be reduced through operational practices.

ATTACHMENT 1

SICK

February 18, 2013

Hillsborough County
Solid Waste Management Group
Public Utilities Department
Hillsborough County BOCC

Attn: Nate Johnson, Disposal Process Management Section Manager

Dear Mr. Johnson,

Attached you will find our statement of how the MerCEM 300Z meets the EPA PS 12A requirements. Should you have any further questions, please feel free to contact me.

Sincerely,

Randy Young, Director of Operations
SICK Maihak, Inc.

Cc Jason Gorrie, Covanta Energy

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SICK

PS12A/EPA – Mercury System Performance,

Certification, Calibration and QA/QC Summary

6.0: Equipment and Supplies

6.1 – CEM must provide for Calibration Drift and Measurement Error Test

- ☑ Zero value – 0-20% of full scale
- ☑ Span value – 50-100% of full scale
- ☑ Injection before the probe filter
- ☑ Ability to inject Hg and HgCl2 standards

The MERCEM300Z fulfills this by using an integrated HgCl2 Span Gas Generator for daily calibrations that meets the "Interim EPA Traceability Protocol forQualification and Certification of Oxidized Mercury Gas Generators", and quarterly Hg_0 checks using standards that meet the "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards". Verified as acceptable by the EPA.

6.2 – Reference gas delivery system

- ☑ Must be designed so that the flow rate exceeds the sample system flow requirements for the CEM and that the gas is delivered at atmospheric pressure.

The MERCEM300Z fulfills this by injection of the cal gas standard before the sample probes fine filter, at a flow rate higher than the sample draw of the eductor pump.

7.0 Reagents and Standards

- ☑ Must be NIST traceable per Interim Traceability Protocol
- ☑ Zero – 0-20%
- ☑ Mid – 50-60%
- ☑ High – 80-100%

The MERCEM300Z fulfills this by documenting traceability via required calibration certificate that accompanies each MERCEM300Z calibrator and Hg_0 standard. The calibrator is capable of producing span points within the required ranges, and is adjustable by the customer.

8.0 Test Procedures

8.2 Measurement Error (ME) Test (Quarterly)

- ☑ Sequentially inject each of at least 3 reference gas values, as defined in 7.0, 3 times
- ☑ System passes if ME < 5% for Hg^0 and <10 for $HgCl_2$.

The MERCEM300Z fulfills this by use of an EPA approved Hg_0 calibration standard as defined by the "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards"; i.e NIST traceable cylinder gas.

8.3 – Calibration Drift (CD) Test Procedure (Daily)

- ☑ While the facility is operating, determine the magnitude of the CD once each day (at 24 hr interval as practical).
- ☑ Use Hg^0 or $HgCl_2$ for this test
- ☑ If periodic automatic or manual adjustments are made to the CEM zero and span response settings, conduct the CD test just prior to this adjustment, or conduct the adjustment in such a way that the CD can be determined. Conduct the test using the zero point, and either the mid or high point defined in 7.0
- ☑ Must be injected prior to the sample filter in the probe
- ☑ Use same equation as for the ME to calculate the CD each day.
- ☑ The absolute value of the Calibration Drift (CD) must not exceed 5% of the span value.

The MERCEM300Z fulfills this by using an integrated HgCl2 Span Gas Generator for daily calibrations that meets the "Interim EPA Traceability Protocol forQualification and Certification of Oxidized Mercury Gas Generators", and Hg_0 checks using standards that meet the "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards". Verified as acceptable by the EPA.

12.0 Calculations and Data Analysis

12.1 – Consistent Basis

- ☑ All Data from a Reference Method test and CEM must be compared in units of micrograms per standard cubic meter (ug/scfm), on a consistent and identified moisture basis. The values must be standardized to 20° C and 760 mm Hg.

The MERCEM300Z fulfills this by correction to standardized values in the system control unit. All values output by the MERCEM300Z are on a wet basis.