TOXECON™ RETROFIT FOR MERCURY AND MULTI-POLLUTANT CONTROL ON THREE 90-MW COAL-FIRED BOILERS

Quarterly Technical Progress Report
Reporting Period: April 1, 2007 – June 30, 2007
Report No. 41766R13

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July 27, 2007

DOE Cooperative Agreement No. DE-FC26-04NT41766

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DISCLAIMER

ABSTRACT

With the Nation's coal-burning utilities facing tighter controls on mercury pollutants, the U.S. Department of Energy is supporting projects that could offer power plant operators better ways to reduce these emissions at much lower costs. Sorbent injection technology represents one of the simplest and most mature approaches to controlling mercury emissions from coal-fired boilers. It involves injecting a solid material such as powdered activated carbon into the flue gas. The gas-phase mercury in the flue gas contacts the sorbent and attaches to its surface. The sorbent with the mercury attached is then collected by a particulate control device along with the other solid material, primarily fly ash.

We Energies has over 3,200 MW of coal-fired generating capacity and supports an integrated multi-emission control strategy for SO_2, NO_x, and mercury emissions while maintaining a varied fuel mix for electric supply. The primary goal of this project is to reduce mercury emissions from three 90-MW units that burn Powder River Basin coal at the We Energies Presque Isle Power Plant. Additional goals are to reduce nitrogen oxide (NO_x), sulfur dioxide (SO_2), and particulate matter (PM) emissions, allow for reuse and sale of fly ash, demonstrate a reliable mercury continuous emission monitor (CEM) suitable for use in the power plant environment, and demonstrate a process to recover mercury captured in the sorbent. To achieve these goals, We Energies (the Participant) will design, install, and operate a TOXECON™ system designed to clean the combined flue gases of Units 7, 8, and 9 at the Presque Isle Power Plant.

TOXECON™ is a patented process in which a fabric filter system (baghouse) installed downstream of an existing particulate control device is used in conjunction with sorbent injection for removal of pollutants from combustion flue gas. For this project, the flue gas emissions will be controlled from the three units using a single baghouse. Mercury will be controlled by injection of activated carbon or other novel sorbents, while NO_x and SO_2 will be controlled by injection of sodium-based or other novel sorbents. Addition of the TOXECON™ baghouse will provide enhanced particulate control. Sorbents will be injected downstream of the existing particulate control device to allow for continued sale and reuse of captured fly ash from the existing particulate control device, uncontaminated by activated carbon or sodium sorbents.

Methods for sorbent regeneration, i.e., mercury recovery from the sorbent, will be explored and evaluated. For mercury concentration monitoring in the flue gas streams, components available for use will be evaluated and the best available will be integrated into a mercury CEM suitable for use in the power plant environment. This project will provide for the use of a control system to reduce emissions of mercury while minimizing waste from a coal-fired power generation system.

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EXECUTIVE SUMMARY

Wisconsin Electric Power Company (We Energies) signed a Cooperative Agreement with the U.S. Department of Energy (DOE) in March 2004 to fully demonstrate TOXECON™ for mercury control at the We Energies Presque Isle Power Plant. The primary goal of this project is to reduce mercury emissions from three 90-MW units (Units 7, 8, and 9) that burn Powder River Basin (PRB) coal. Additional goals are to reduce nitrogen oxide (NO_x), sulfur dioxide (SO_2), and particulate matter (PM) emissions, allow for reuse and sale of fly ash, demonstrate a reliable mercury continuous emission monitor (CEM) suitable for use in the power plant environment, and demonstrate a process to recover mercury captured in the sorbent.

We Energies teamed with ADA-ES, Inc., (ADA-ES) and Cummins & Barnard, Inc., (C&B) to execute this project. ADA-ES is providing engineering and management on the mercury measurement and control systems. Cummins & Barnard is the engineer of record and will be responsible for construction, management, and startup of the TOXECON™ equipment.

This project was selected for negotiating an award in January 2003. Preliminary activities covered under the "Pre-Award" provision in the Cooperative Agreement began in March 2003. This Quarterly Technical Progress Report summarizes progress made on the project from April 1, 2007, through June 30, 2007. During this reporting period, work was conducted on the following tasks:

- Task 15. Operate, Test, Data Analysis, and Optimize TOXECON™ for Mercury Control
- Task 16. Operate, Test, Data Analysis, and Optimize TOXECON™ for SO_2/NO_x Control
- Task 17. Carbon-Ash Management System
- Task 19. Reporting, Management, Subcontracts, Technology Transfer

INTRODUCTION

DOE awarded Cooperative Agreement Number DE-FC26-04NT41766 to We Energies to demonstrate TOXECON™ for mercury and multi-pollutant control, a reliable mercury continuous emission monitor (CEM), and a process to recover mercury captured in the sorbent. Under this agreement, We Energies is working in partnership with the DOE.

Quarterly Technical Progress Reports will provide project progress, results from technology demonstrations, and technology transfer information.

Project Objectives

The specific objectives of this project are to demonstrate the operation of the TOXECON™ multi-pollutant control system and accessories, and

- Achieve 90% mercury removal from flue gas through activated carbon injection
- Evaluate the potential for 70% SO_2 control and trim control of NO_x from flue gas through sodium-based or other novel sorbent injection
- Reduce PM emission through collection by the TOXECON™ baghouse
- Recover 90% of the mercury captured in the sorbent
- Utilize 100% of fly ash collected in the existing electrostatic precipitator
- Demonstrate a reliable, accurate mercury CEM suitable for use in the power plant environment
- Successfully integrate and optimize TOXECON™ system operation for mercury and multi-pollutant control

Scope of Project

The "TOXECON™ Retrofit for Mercury and Multi-Pollutant Control on Three 90-MW Coal-Fired Boilers" project will be completed in two Budget Periods. These two Budget Periods are:

<u>Budget Period 1</u>: Project Definition, Design and Engineering, Prototype Testing, Major Equipment Procurement, and Foundation Installation. Budget Period 1 initiated the project with project definition activities including NEPA, followed by design, which included specification and procurement of long lead-time major equipment, and installation of foundations. In addition, testing of prototype mercury CEMs was conducted. Activities under Budget Period 1 were completed during 1Q05.

<u>Budget Period 2</u>: CEM Demonstration, TOXECON™ Erection, TOXECON™ Operation, and Carbon Ash Management Demonstration. In Budget Period 2, the TOXECON™ system was constructed and will be operated. Operation will include optimization for mercury control, parametric testing for SO_2 and NO_x control, and long-term testing for mercury control. The mercury CEM and sorbent regeneration processes will be demonstrated in conjunction with the TOXECON™ system operation.

The project continues to move through Budget Period 2 as of the current reporting period. Each task is described in the Statement of Project Objectives (SOPO) that is part of the Cooperative Agreement.

EXPERIMENTAL

None to report.

RESULTS AND DISCUSSION

Following are descriptions of the work performed on project tasks during this reporting period.

Task 1 – Design Review Meeting

Work associated with this task was previously completed.

Task 2 – Project Management Plan

Work associated with this task was previously completed.

Task 3 – Provide NEPA Documentation, Environmental Approvals Documentation, and Regulatory Approval Documentation

Work associated with this task was previously completed.

Task 4 – Balance-of-Plant (BOP) Engineering

Work associated with this task was completed during 1Q05 in Budget Period 1.

Task 5 – Process Equipment Design and Major Equipment Procurement

Work associated with this task was completed during 1Q05 in Budget Period 1.

Task 6 – Prepare Construction Plan

Work associated with this task was completed during 1Q05 in Budget Period 1. The Construction Plan was issued on January 26, 2005.

Task 7 – Procure Mercury Continuous Emission Monitor (CEM) Package and Perform Engineering and Performance Assessment

The overall goal of this task was to have a compliance-grade, reliable, certified mercury CEM installed and operational for use in the TOXECON™ evaluation. Installation and checkout of two CEMs at the inlet and at the outlet of the baghouse was completed in 1Q06. The long-term evaluation of the mercury CEMs is described in Task 15 for the remainder of the project.

Task 8 – Mobilize Contractors

Contractor mobilization was completed in 2Q05. Jamar, Boldt, Northland Electric, United Anco, PCI, Wheelabrator, and CaTS demobilized from the site during 4Q05. CaTS personnel completed their assignments and CaTS Construction Management Team demobilized from the site during 1Q06.

Task 9 – Foundation Erection

All major foundation work by Boldt Construction Company was completed during 1Q05.

Task 10 – Erect Structural Steel, Baghouse, and Ductwork

Primary work associated with this task was completed in 4Q05.

Task 11 – Balance-of-Plant Mechanical and Civil/Structural Installations

Primary work associated with this task was completed in 4Q05.

Task 12 – Balance-of-Plant Electrical Installations

Primary work associated with this task was completed in 4Q05.

Task 13 – Equipment Pre-Operational Testing

Pre-operational testing was completed in 4Q05.

Task 14 – Startup and Operator Training

Startup of all major equipment was completed in 4Q05. Final O&M manuals were received for most major equipment in 2005. Startup of the PAC system occurred in 1Q06.

The operator-training program was completed during 4Q05 to train the plant operations personnel.

The baghouse was initially brought into operation on December 17, 2005, with flue gas from Unit 7. Initial operation with Unit 8 occurred on January 5, 2006, and Unit 9 on January 27, 2006.

Task 15 – Operate, Test, Data Analysis, and Optimize TOXECON™ for Mercury Control

CEM Update

During 2Q07, the CEMs located at the inlet and outlet of the baghouse were monitored for long-term operation. A summary of the operation of each system including maintenance operations performed is presented below:

Inlet

Daily zero and span checks on the inlet system indicate that the drift is higher than desirable. Critical calibration failures for total mercury occurred 12 of the 30 days in April, 12 of 31 days in May and 13 of the 30 days in June. Other than poor calibrations, the system was on-line and sampling most of the month (96.2% in April, 98.8% in May, and 97.9% in June). Accounting for time sampling with uncertain calibrations, the availability was 54.2% in April, 64.8% in May, and 57.2% in June. These systems are operated remotely and it is often several hours before a critical calibration failure is noticed and corrected. If a failure occurs on a Saturday, the system is out of "compliance" from the most recent successful calibration (typically Friday morning) until Monday. This significantly reduces the reported availability. It is further expected that the system operation will improve when upgrades are available from Thermo.

Maintenance:

- April: The Unit 9 eductor on the sampling probe had filled with ash. Cleaned.
- May: Updated software and performed routine maintenance.
- Pending maintenance: humidifier upgrade, nitrogen generator installation

Outlet

Daily zero and span checks on the outlet system from April through June show very good performance with no critical calibration failures in April and June, and 4 out of 31 days failed calibration in May. The availability of the system was 97.6% in April, 97.7% in May, and 98.8% in June.

Maintenance:

- Reinstalled the redundant optical filter on the outlet CEM during April due to indications the mercury measurement were biased high without the filter. The filter was removed in May after installation of a new lamp and mirror provided by Thermo.
- May: Installed nitrogen generator and prototype humidifier.
- May: Updated software and performed routine maintenance.
- June: Installed standard lamp temperature control upgrade
- Pending maintenance: humidifier upgrade, oxidized mercury calibration source installation.

CEM RATAs

A key task on this project is the advancement of the mercury CEM state-of-the-art. Significant improvements to the Thermo mercury CEM have been made since 2003. In addition to the improvements to the inlet and outlet CEMs currently installed at Presque Isle, ADA-ES has developed a portable mercury CEM system for use as an Instrumental Reference Method (IRM) in response to industry needs. Until recently the Ontario Hydro (OH) method has been the only valid test method for measuring mercury in flue gas. This is a wet chemistry capture method that is very labor intensive, costly, and has a relatively high detection limit. The turn around 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 two new draft methods for validating mercury CEM performance. The first is the Instrumental Reference Method (M30A) which uses a stand-alone, certified, CEM to perform RATAs (Relative Accuracy Test Audits) to verify plant measurement systems. This is a real time measurement method. In the case of Presque Isle, the plant measurement system is a Thermo CEM.

The second EPA method (M30B) uses the Sorbent Trap Method (STM) to verify plant measurement systems. The turn around time for this method using on-site analysis is several hours. Both of these draft methods have been developed in response to industry needs for faster, less expensive mercury validation methods that can also measure mercury at very low levels.

Per the test plan, a RATA was scheduled for the compliance (outlet) mercury CEM. According to EPA guidelines, the RATA can be performed using the OH method, and most recently, the draft IRM and STM methods. The RATA on the outlet CEM at Presque Isle has been delayed until the two new draft methods were released because they can measure mercury at the very low levels at the outlet of the baghouse.

During June, the test plan included the following:

- Demonstrate the compliance CEM can pass CAMR certification tests using the OH method as a reference.
- Demonstrate that an IRM can achieve the performance requirements identified in draft M30A, compare well with the OH method and be used for a RATA on the compliance CEM.
- Demonstrate that the STM can achieve the performance requirements identified in draft M30B, compare well with the OH method and be used for a RATA on the compliance CEM.

During June testing the compliance CEM was located at the baghouse outlet, which is the same location as all earlier tests. The IRM, OH, and STM tests were set up at the 200’ level in the stack. Figure 1 shows the IRM set up at the 200’ level in the stack for Units 7-9. The calibrator and analyzer are contained in a temperature controlled box.

Figure 1. Portable IRM Installed at 200' Level in the Stack

Traverses of the flue were performed with the IRM to determine stratification. The outlet CEM was used as a reference during these tests (Figure 2). If there was insignificant stratification, the tests could be performed using single point sampling. The required level to show insignificant stratification was a variation <5% or 0.2 μg/m^3 from point to point. This figure shows insignificant stratification in the flue.

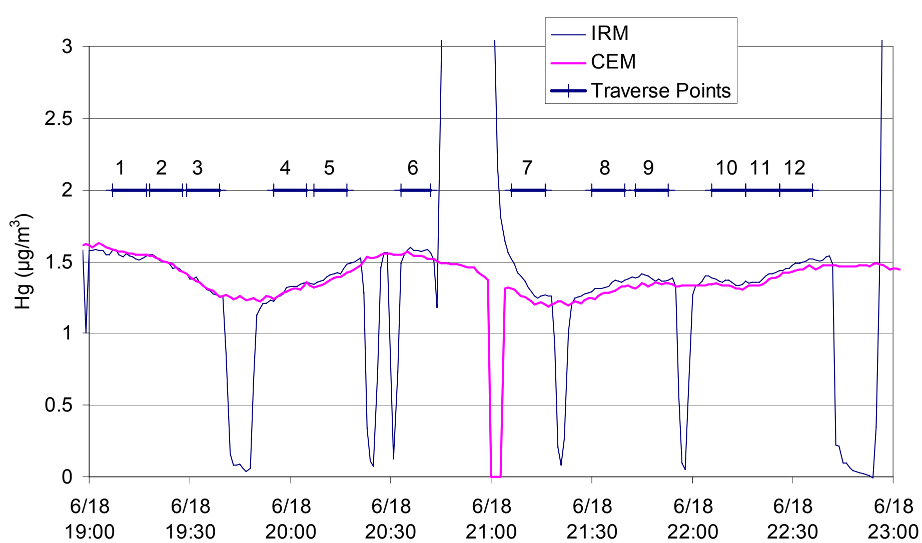

Figure 2. Data from IRM Traverse of Unit 8 Flue

The first test series was at “elevated” Hg (inject PAC to get ~1.2-3 µg/m^3 at outlet). All methods (OH, IRM, and STM) were performed at the stack simultaneously and compared to the outlet CEM. The second test series was at a mercury level of ~0.5-1 µg/m^3 and only the IRM and STM was performed at this level and compared to the outlet CEM.

The IRM was sampling gas from the Unit 8 flue. The OH tests were performed on the Unit 9 flue while the STM tests were performed on Unit 7 flue. Details of this testing and final data will be presented next quarter. The following are the results from the two weeks of testing:

- Passed “high” mercury level (1.5-3.2 µg/m^3)
  - OH to CEM
  - STM to CEM
  - IRM to CEM
- Passed low mercury level (0.48-0.93 µg/m^3)
  - STM to CEM
  - IRM to CEM

Some of the key aspects of the IRM developed by ADA-ES on this project are the following:

- Uses ThermoFisher analyzer and calibrator
- Configured for rapid installation
- 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
- Set-up time and installation of the IRM is expected to be about 4 hours at a typical site

Test Bags

Preliminary results from the analysis of the bags removed during the 1Q07 outage showed that the PPS lost about 50% of the original strength, which is considered typical behavior. The P84 material lost 12% of the original strength and had the least dust penetration into the material. The three high-perm bags showed significant dust penetration in the material and were bleeding through. A new set of test swatches were installed in compartment #8 to replace the failed Kermel swatches.

During 2Q07 the plant noticed that there were spikes in opacity when compartment #8 was being cleaned. Manual actuation of the pulse pipes for each row showed that the three rows containing the high-perm test bags were the source of the spikes. The compartment was taken off line and the three types of test bags (25 total) were removed and replaced with standard PPS bags.

Ash Silo

During 2Q07 there were still some problems with excessive dusting during unloading of the ash silo using the wet unloader, primarily during startup of the pin mixer. United Conveyer Corporation (UCC) and We Energies continued to work on optimizing the mixer operation to reduce dusting. UCC installed atomizing nozzles and is planning to install a variable speed drive for the pin mixer.

A vacuum line was installed on the end of the pin mixer to catch the dust prior to the wetted material moving out of the mixer and into the truck. The dust from this will be routed back to the top of the ash silo. This system will be tested early next quarter.

The filter separator in the ash silo consists of two modules with 14 polyester bags in each. This is used to filter the air leaving the ash silo during removal of ash from the hoppers. During 2Q07 PAC and ash was bleeding through the fabric resulting in dust emissions into the air. The bags in each module had to be changed every month to keep emissions under control. Two sets of bags were ordered; one consisting of a PTFE membrane coated polyester bags and one consisting of P84 fabric. The PTFE membrane bags were installed and immediately blinded over, causing the system to trip due to pressure overload. The bags were removed and replaced with the polyester bags. The P84 bags were installed near the end of the quarter and are working well. The life of these bags compared to the polyester will be determined next quarter.

A regulator in the pulse air line of the filter separator was installed to reduce the air pulse pressure from 100 psi to 80 psi. Investigations into the pulse timer on the filter separator showed that the pressure set points were incorrect, resulting in over-pulsing of the filters.

Other Operational Issues

During 1Q07 there was an internal inspection of the ductwork which discovered problems with corrosion in the area of the expansion joints associated with Unit-7. During 2Q07 an external inspection of these expansion joints was conducted. It was determined that the joints were functioning properly. Insulation was added during this inspection in order to reduce the possibility for flue gas condensation and subsequent corrosion.

A continuing problem is high temperatures in the fan building. An engineering study was ongoing during 2Q07 to determine possible solutions. Data was gathered at a variety of operating conditions and ambient temperatures.

During 2Q07 the solution for the leaking baghouse compartment covers was completed. This involved installing a new gasket material which was done under warranty. Also, some minor rain leaks were also fixed under warranty.

During 2Q07 some minor electrical work associated with fixing and relocating unit heaters was done.

Mercury removal efficiency is impacted by high flue gas temperatures. The project has addressed this issue by adding sootblowers to the outlet of the air heaters which improved their cleanliness and efficiency. During the spring scheduled outages, units 8 and 9 had high pressure water washes done on their air heaters. This was found to provide a significant reduction in the outlet flue gas temperatures from both units. However, the outage plans did not include a high pressure water wash for unit 7. It was decided that the benefit to the TOXECON™ project in reduced carbon costs would justify funding the air heater wash. This was done and subsequent operation of the unit verified the expected lower inlet temperatures to the baghouse.

In addition to reduced mercury removal efficiency, high flue gas temperatures can negatively impact bag life. To protect the bags, control logic was originally set to automatically bypass the baghouse if flue gas temperature exceeded 375 °F for one hour. Automatic bypass would also occur immediately if flue gas temperature exceeded 400 °F. On 6/22/07 the control logic was changed to automatically bypass the baghouse if flue gas temperature exceeded 385 °F for 30 minutes. This change was made to give operations more flexibility while still providing protection for the bags.

Long Term Mercury Control Results

DARCO® Hg carbon was injected for the majority of 2Q07. As the weather warmed, the carbon was switched to DARCO® Hg-LH at the beginning of June. PAC injection was controlled off of coal feed and the trim control was based on a mercury removal of 91% for the majority of the quarter. During RATA testing the trim control was set to obtain a specific outlet mercury value.

Figure 3 shows the baghouse data for April 2007. Mercury removal was over 90% for the majority of the month. During the middle of the month, PAC injection was stopped due to dusting problems with the ash silo filter separator. As expected, mercury removal declined rapidly during that period.

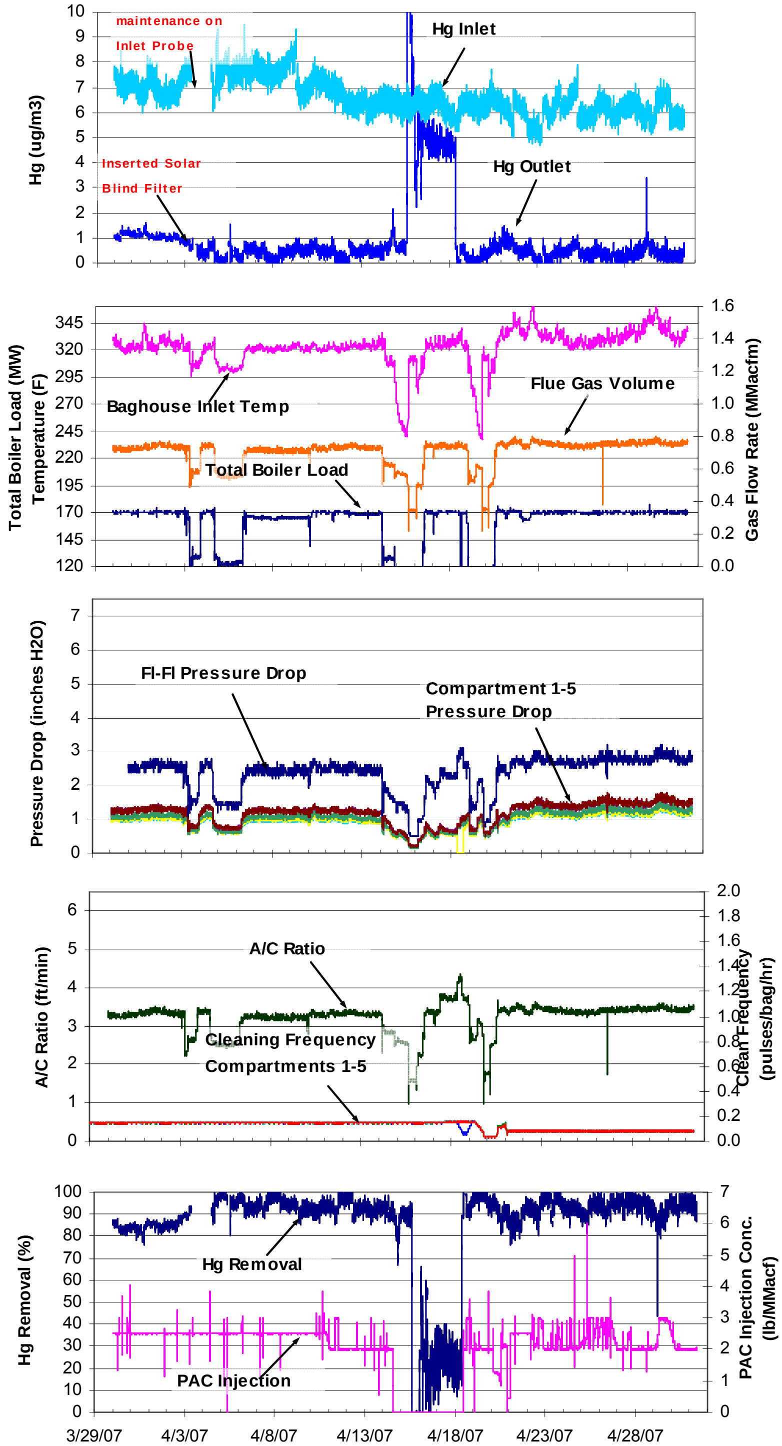

Figure 3. TOXECON™ Performance Data for April 2007

Figure 4 shows TOXECON data for May 2007. This figure shows where the new lamp, mirror, and nitrogen generator were installed on the outlet CEM. The data noise was reduced dramatically due to these changes. Mercury removal on average was over 90% for the majority of the month unless there were upset conditions present.

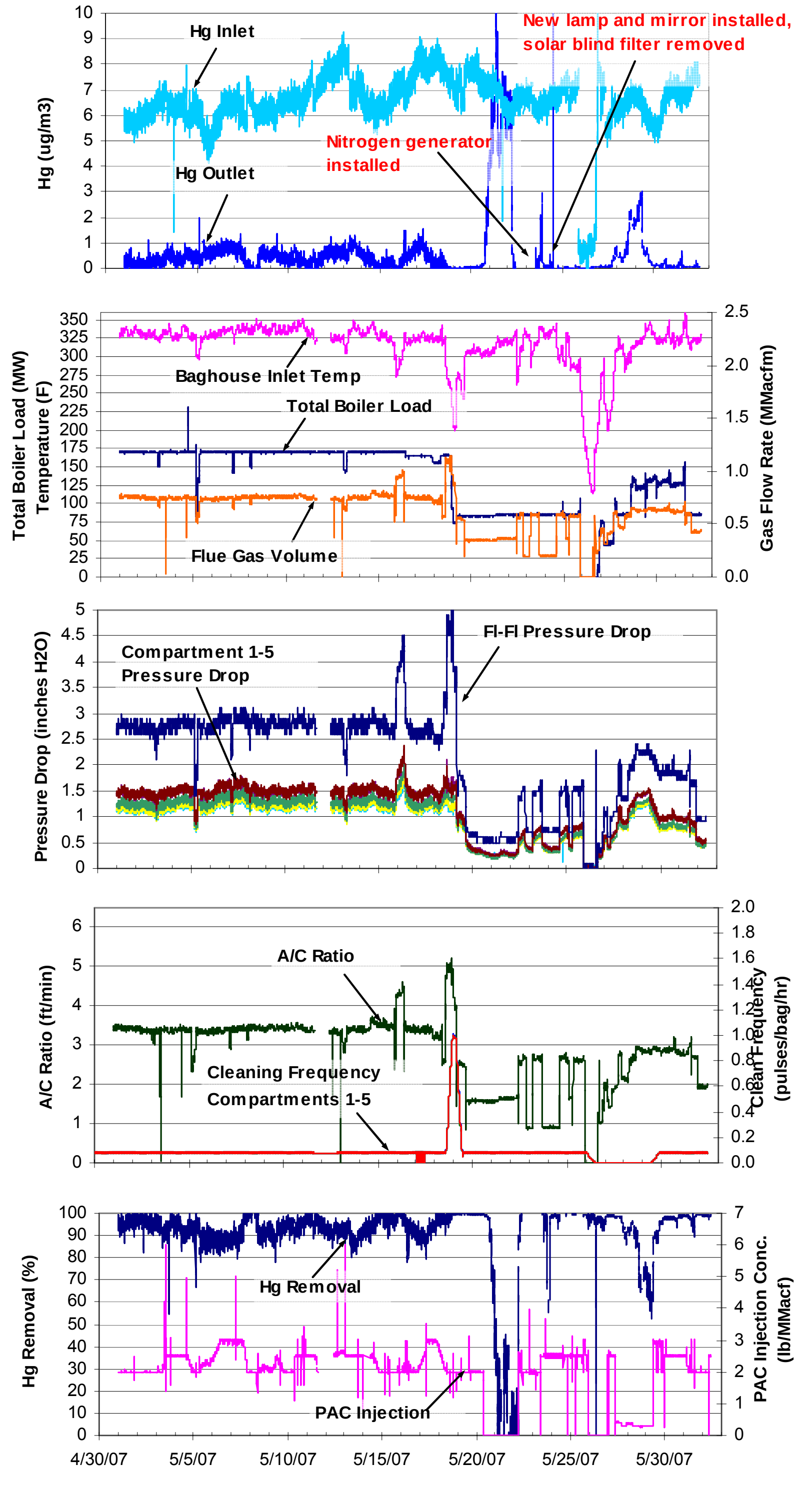

Figure 4. TOXECON Performance Data for May 2007.

Figure 5 shows TOXECON data for June 2007. The first two weeks in June were preparation for the RATA testing. There was maintenance performed on the CEMs during the first week. During the following three weeks, up to June 22, the PAC feed was changed as needed for testing. After June 22 the mercury trim control logic was set back to the 91% removal value.

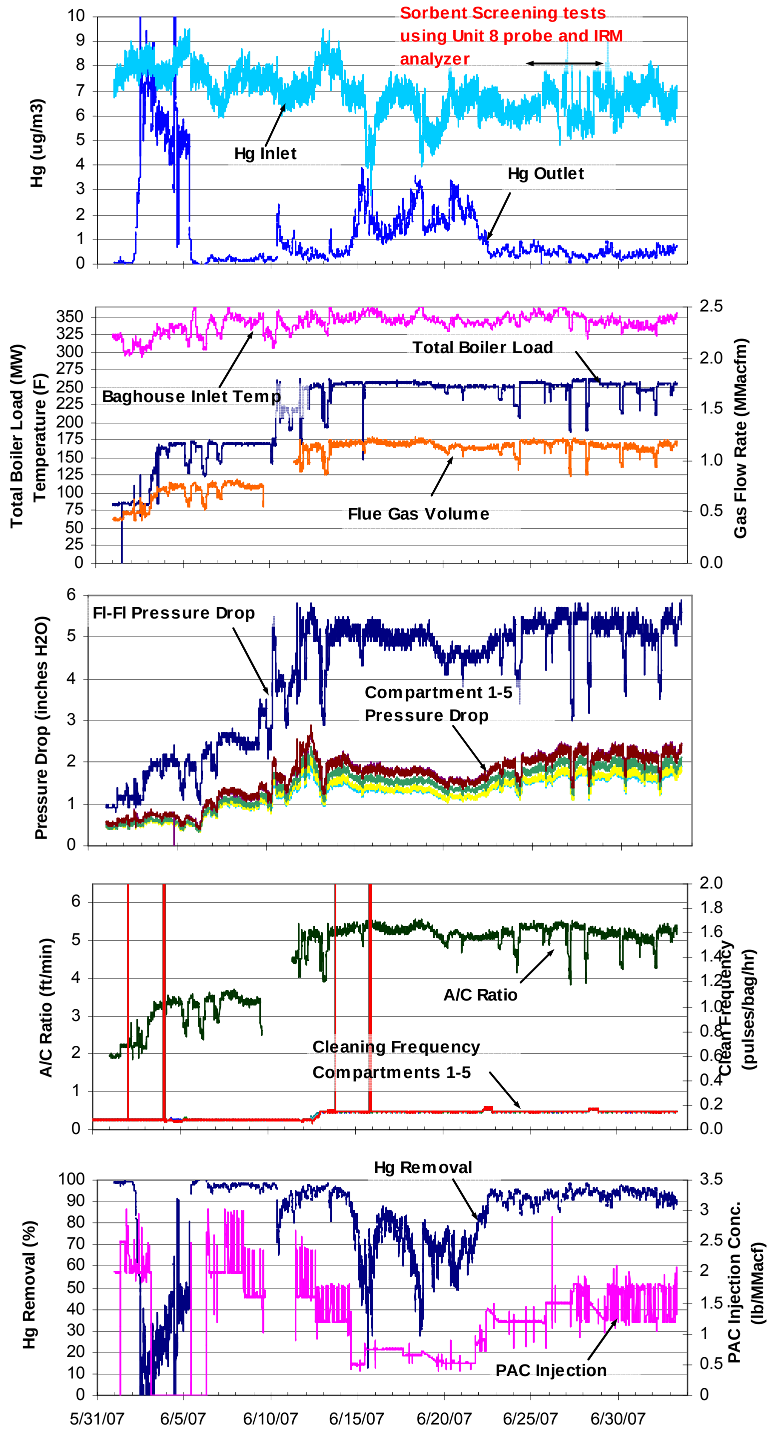

Figure 5. TOXECON Performance Data for June 2007

Mercury Loading on PAC/Ash Mixtures

Additional samples of PAC/ash mixture from the baghouse were analyzed this quarter for mercury content and Loss on Ignition (LOI). The ash at Presque Isle has a measured LOI of less than 1%, so the LOI in the PAC/ash mixture from the baghouse hoppers is primarily due to the PAC contribution. Figure 6 shows the mercury loading in the mixture during several injection periods over the last year. The mercury loading increased as the LOI (PAC fraction) increased, which is expected. The loading stabilized around 35-60 ppm.

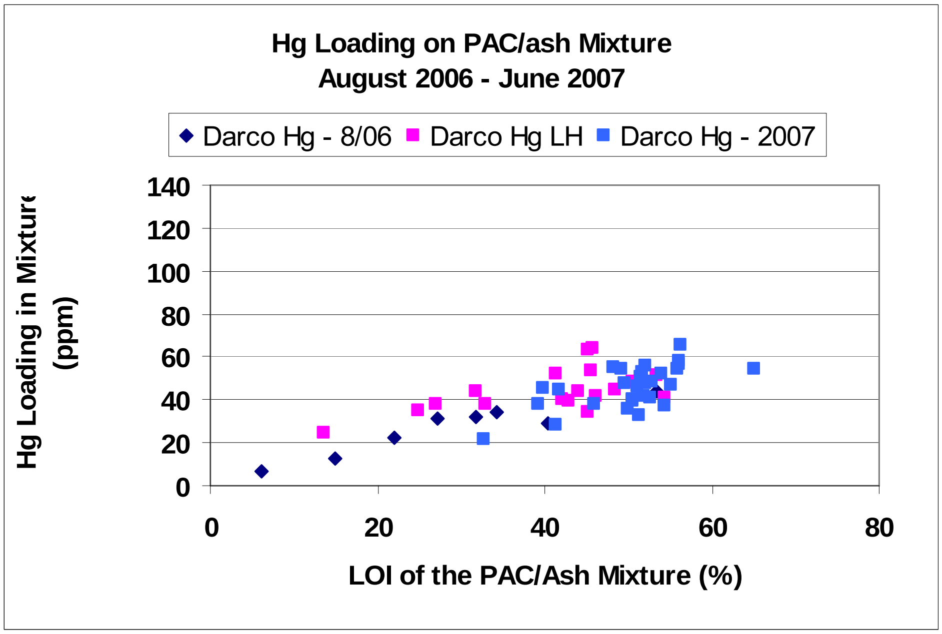

Figure 6. Mercury Loading on the PAC/Ash Mixture

Figure 7 shows the mercury loading on just the PAC fraction in the mixture. This was calculated from a PAC LOI of 69% (measured) and assuming that the ash contribution to the LOI was nominal. At low injection rates, the loading on the halogenated carbon was higher than the non-halogenated, although except for one data point, this was not a large difference. At higher injection rates, the loading for all of the test periods was similar, with the halogenated averaging slightly higher.

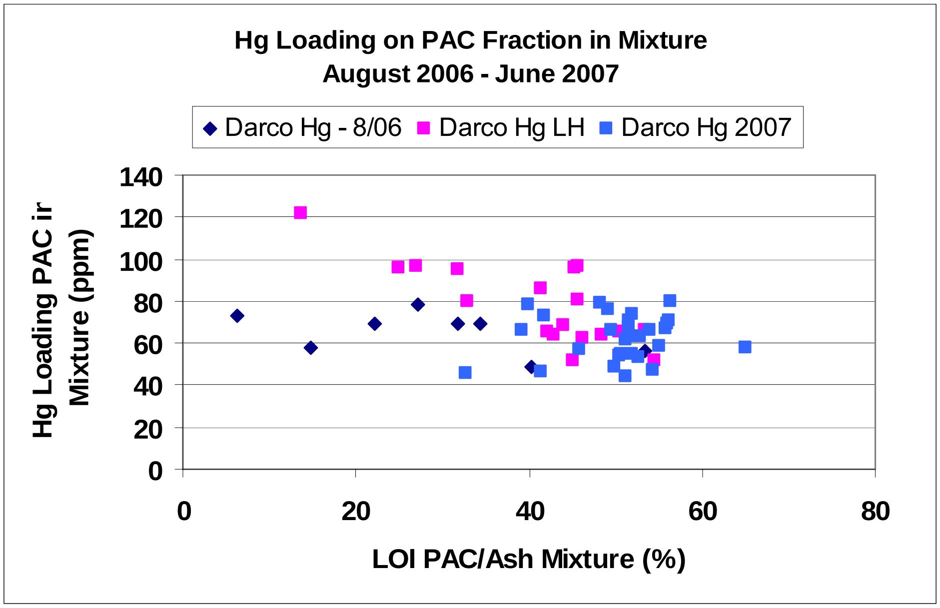

Figure 7. Mercury Loading on the PAC Fraction of the Baghouse Mixture

Overheating of PAC/Ash

Investigations continued this quarter into the development of a model describing the factors that contribute to auto-ignition and resulting overheating of the ash mixture in the baghouse hoppers. Tests were conducted in the laboratory to determine the effect of bed size, PAC fraction, and ambient temperature on overheating.

During this quarter, laboratory oven tests continued using square containers filled with DARCO Hg PAC and PAC/ash mixtures. Thermocouples were placed in the oven and inserted into the center of the bed of material at different levels to track temperature profiles over time.

The Frank-Kamenetskii model predicts that larger bed sizes require lower temperatures and longer times to ignite when compared to smaller bed sizes. Laboratory results confirm this behavior. Figure 8 shows results to date for PAC only and PAC/ash mixtures. Larger beds auto-ignite at lower temperatures for all mixtures. Also the effect of LOI or PAC fraction in the bed has an effect on auto-ignition temperatures. These data indicate that lower LOI requires higher temperatures to auto-ignite. There is no data point for the 4 inch bed of 20% LOI mixture due to the temperature limitations of the oven used for the tests.

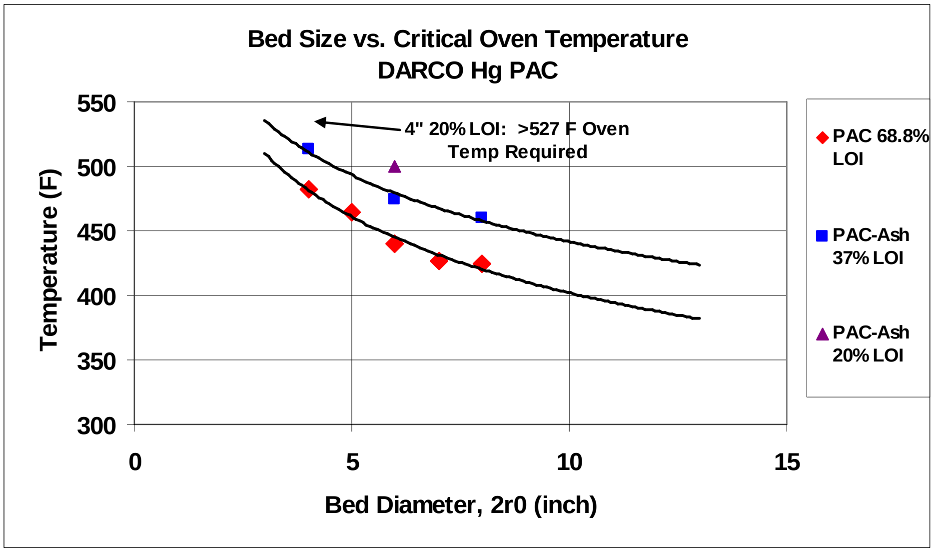

Figure 8. Correlation Between Bed Size and Critical Oven Temperature Required for Auto-Ignition.

When the critical temperature and bed dimensions are used in the model calculations, the result should be a linear correlation. Figure 9 shows the results of this correlation.

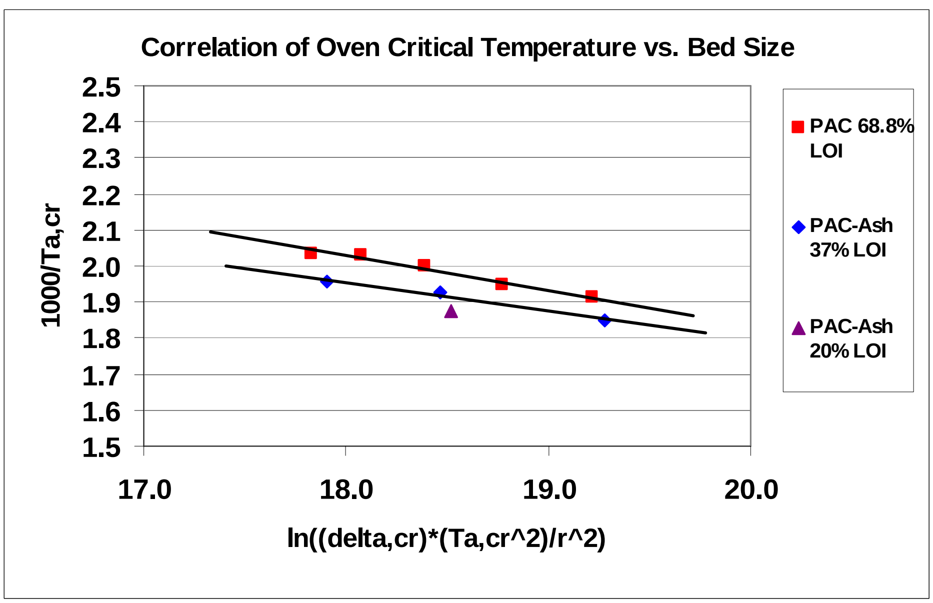

Figure 9. Auto-Ignition Correlation using DARCO Hg PAC and PAC Mixtures.

Tests will continue in the next quarter to determine the effect of the following on auto-ignition:

- LOI: Low LOI samples did not ignite at the same temperature as higher LOI
- Carbon type: High natural LOI does not seem to ignite at the same temperature as high surface area carbon
- PAC Type: PAC from different sources may have different auto-ignition properties

Mercury Quality Index Test

Background and Objective

The standard tests used for quality assurance testing of activated carbon (iodine number, etc.) are not specific to mercury. Work began in 1Q06 to develop a test method for mercury uptake in sorbents, referred to as the “Mercury Quality Index,” or MQI.

Work to Date

Fabrication of the second-generation MQI apparatus neared completion in this quarter. This design was based upon lessons learned from the original laboratory MQI.

Task 16 – Operate, Test, Data Analysis, and Optimize TOXECON™ for NO_x and SO_2 Control

SO_2/NO_x Control Test Plan

An updated draft test plan for controlling SO_2 and NO_x was distributed to the project team. An equipment vendor for sorbent injection was obtained this quarter. The plant began the installation of SO_2 and NO_x analyzers at each of the three ducts upstream of the sorbent injection point. These analyzers will provide data on untreated SO_2 and NO_x levels for both baseline and injection testing.

The tests for SO_2/NO_x control will be conducted in three phases as shown in Table 1. The first priority will be to conduct measurements necessary to establish Baseline conditions. The second phase will determine the performance of the SO_2/NO_x sorbent across a range of injection concentrations. A decision will then be made to conduct more extensive testing which would broaden the general understanding of the process. The third phase will be to conduct a Continuous test. The following sections outline the phases of the test program, including the specific tests and objectives.

Table 1. Updated Schedule of Activities for SO_2/NO_x Control Testing

SO_2-NO_x Control Activity	Duration (Days)	Start Date	Boiler Load
Baseline Testing	21	07/09/2007	Normal Operation
Equipment Installation and Shakedown	2	07/30/2007	Normal Operation
Parametric Testing	6	08/01/2007	Full Load 6AM-6PM
Continuous Test Parameter Decision	1	08/07/2007	NA
Continuous Testing	5	08/08/2007	Normal Operation

Task 17 – Carbon/Ash Management System

Work on this task was limited to preliminary investigations on current technologies related to carbon recycling and mercury recovery.

Task 18 – Revise Design Specifications, Prepare O&M Manuals

Minor work was done to update the database with as-built drawings for the project.

Task 19 – Reporting, Management, Subcontracts, Technology Transfer

Reports as required in the Financial Assistance Reporting Requirements Checklist and the Statement of Project Objectives are prepared and submitted under this task. Subcontract management, communications, outreach, and technology transfer functions are also performed under this task.

Activity during this Reporting Quarter:

- Quarterly Technical Progress Report delivered
- Quarterly Financial Status Report delivered
- Quarterly Federal Assistance Program/Project Status Report delivered
- Gave a tour of the facility to representatives from the following:
    - Marquette Range Engineers
    - Michigan DNR
    - Michigan DEQ
    - Basin Electric Power Cooperative
- Presented at the Electric Power Conference, EPRI CEM Users Group, and Air and Waste Management Association Conference in May
- Presented at the UARG-EPRI Meeting in April
- Submitted a paper to Coal Gen Conference in August 2007
- Technical papers and presentations for future meetings include:
    - Coal Gen (August 2007)
    - AQVI Conference (September 2007)

CONCLUSION

This is the thirteenth Quarterly Technical Progress Report under Cooperative Agreement Number DE-FC26-04NT41766. All major construction efforts were completed during 4Q05, and only punch list items remained during the current quarter. Work performed on punch list items included minor work on sealing compartment covers and repairing roof leaks. Operational issues that were addressed included inspections of the exterior expansion joints, evaluating options to the HVAC system in the fan building, and modifying the ash silo wet unloading system to prevent dusting. Efforts were made to reduce flue gas temperatures, including a high pressure water wash of unit 7 air heater.

Software upgrades were made to the CEMs along with routine maintenance. The redundant PMT redundant optical filter at the outlet CEM was replaced in April, and then removed in May after installation of a new lamp and mirror removed the bias from the data. A nitrogen generator was installed in May on the outlet CEM. The installation of the new lamp, mirror and the nitrogen generator resulted in a dramatic decrease in data noise.

Several mercury RATAs were performed this quarter. The Instrumental Reference Method (IRM) CEM developed on the project and the Sorbent Trap Method (STM) were tested against the Ontario Hydro Method using draft EPA Methods 30A and 30B, respectively at 2-3 $\mu g/m^3$. Both draft methods passed the required criteria and were then successfully demonstrated against the outlet "compliance" CEM at 0.5 $\mu g/m^3$. The compliance CEM also passed the RATA at the 2-3 $\mu g/m^3$ range.

An updated test plan for the SO_2/NO_x control task was issued this quarter. An equipment vendor was identified for sorbent injection. The plant installed SO_2 and NO_x analyzers upstream of the sorbent injection point.

Laboratory tests on PAC auto-ignition continued this quarter, and a good correlation between bed size and ignition temperature using the Frank-Kamenetskii Model was completed. An effect on the level of LOI in the PAC/ash mixture was measured for all bed sizes tested. Lower LOI mixtures required higher temperatures for auto-ignition. Next quarter tests will continue to study the effect of LOI on ignition temperature.

A Mercury Quality Index apparatus was designed and fabricated in 1Q06. Lessons learned from this first prototype were used to fabricate a second-generation unit that will be tested next quarter.

The project team is actively involved in a number of reporting and technology transfer activities, including tours of the facility at Presque Isle.