MERCURY MONITORING AT NORTH DAKOTA POWER PLANTS

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Project Description

As part of North Dakota's overall mercury reduction strategy, the EERC collected mercury speciation and emission data for several power plant configurations within North Dakota. A large part of the effort was directed toward expanding this data set by performing long-term mercury monitoring at two North Dakota power plants using continuous mercury monitors (CMMs). The information gained through this project will provide data and insight necessary to identify, evaluate, and demonstrate the technologies that are most appropriate and specific to North Dakota power plants. This approach will help maintain the viability of lignite-fired energy production by providing North Dakota utilities with baseline mercury emission data and leading toward lower-cost control options for meeting future mercury regulations.

Goal

The overall goal of the project is to compile key information on the abundance and variability of mercury species in flue gases from North Dakota power plants before and after air pollution control systems. Specific objectives include determination of emission levels of mercury; the distribution of oxidized versus elemental mercury; and variability of mercury emissions with respect to plant configuration, operational variations, and coal chemistry variability.

Rationale

Recent findings indicate that several factors impact mercury control. Understanding the quantity and species of mercury is critical to determining appropriate control levels and applying appropriate control technologies.

Mercury is an immediate concern for the U.S. electric power industry because of the U.S. Environmental Protection Agency's (EPA's) December 2000 decision that regulation of mercury from coal-fired electric utility steam-generating units is appropriate and necessary under Section 112 of the Clean Air Act. EPA determined that mercury emissions from power plants pose significant hazards to public health and must be reduced. The EPA *Mercury Study Report to Congress* (1997) [1] and the *Utility Air Toxics Study Report to Congress* (1998) [2] both identified coal-fired boilers as the largest single category of atmospheric mercury emissions in the United States, accounting for about one-third of the total anthropogenic emissions.

EPA is scheduled to propose regulations by December 2003 and promulgate them by December 2004, with full compliance expected by 2007. The exact form of regulation is uncertain at this time. While EPA is developing a regulation based on a maximum achievable control technology approach, Congress is discussing multipollutant (SO_x, NO_x, and Hg) approaches such as the Jeffords Bill and the Bush Clear Skies Initiative. All of the regulatory approaches currently under discussion will likely require between 70% and 90% reduction. Given that a variety of environmental controls and combustion systems are used by North Dakota utilities, it is very important that a clear picture of mercury emissions be established statewide.

Approach

Data were collected over approximately a 20-day period using CMMs to obtain near-real-time mercury levels in flue gases at two North Dakota power plants burning North Dakota lignites. Figures 1 and 2 show the operational and mercury data for these plants. Monitoring was performed to address emission levels, speciation, and variability of mercury in the respective flue gases.

In addition to CMMs, sampling was performed using the Ontario Hydro mercury speciation method at the inlet and outlet of the pollution control devices. These samples provide accurate speciated mercury data as well as a comparison to the results generated by the CMMs.

During this project, coal, fly ash, and scrubber sludge samples were taken daily for subsequent chemical analysis. These samples allow an approximate mercury balance to be determined for quality assurance/quality control (QA/QC) purposes.

The EERC will use mercury-monitoring data obtained from select North Dakota utilities for review and evaluation, and if these data meet EERC data quality review, they will be incorporated into the overall data set of mercury for North Dakota. The other results available for North Dakota include roughly 30 days of baseline emission data for two additional North Dakota plants. The final set of data will be compared to data collected under EPA's information collection request.

Progress

Sampling has been completed at both plants. At this time, select coal, ash, and sludge samples are being analyzed for chemical characterization. The EERC is also beginning the process of analyzing the CMM data generated during these tests and applying QA/QC standards prior to examining variability and other measures.

Preliminary results indicate that the data quality objectives for the sampling were met. The data necessary for evaluation of speciated emissions and variability were collected.

It is expected that a report will be finalized in 2003.

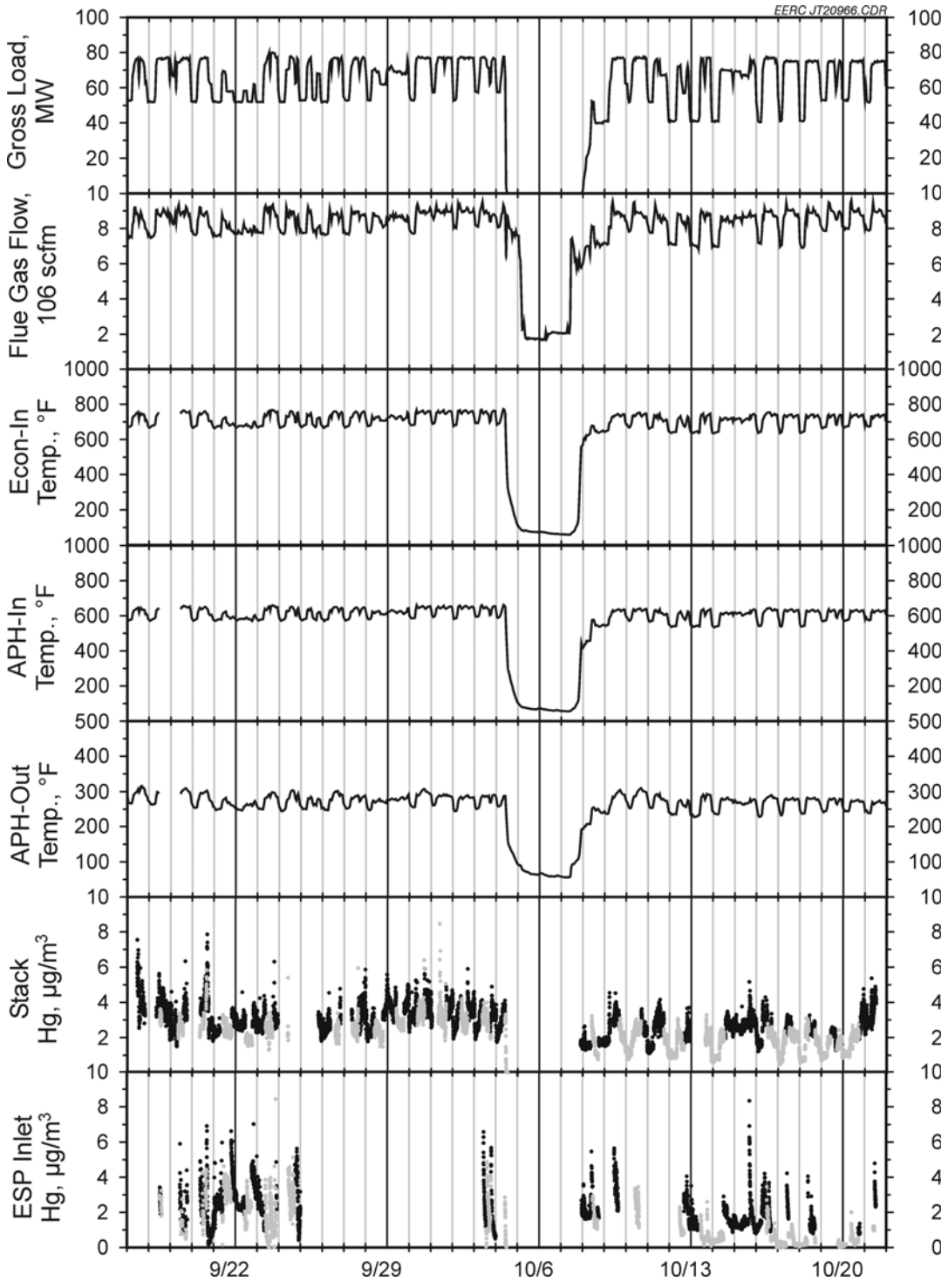

Figure 1. Operational and Hg Data as a Function of Time for North Dakota Plant 1

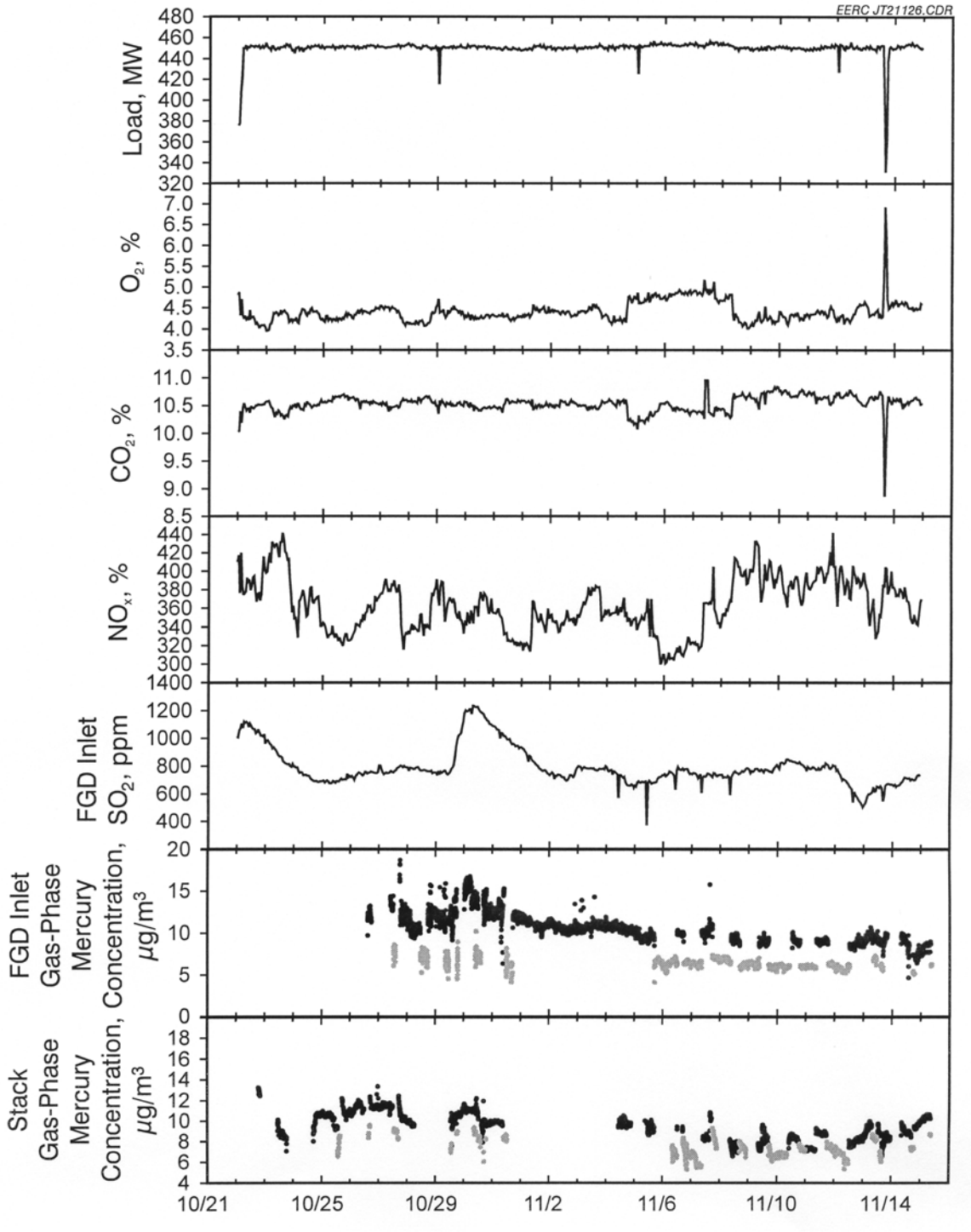

Figure 2. Operational and Hg Data as a Function of Time for North Dakota Plant 2

Potential Users/Technology Transfer

In meeting the objectives, the proposed work will provide inputs required for effectively defining field demonstration needs. The ultimate goal of the efforts in North Dakota mercury measurement and control is to prepare the industry to meet future mercury regulations in a more cost-effective manner.

References

1. U.S. Environmental Protection Agency. *Mercury Study Report to Congress Volume I: Executive Summary*; Office of Air Quality Planning and Standards and Office of Research and Development, Dec 1997.

2. U.S. Environmental Protection Agency. *Utility Air Toxics Study Report to Congress: Executive Summary*; Office of Air Quality Planning and Standards, Feb 1998.