## FY08-LXII(62)-160

# "Center for Air Toxic Metals Affiliates Program – Membership for the North Dakota Industrial Commission"

Contractor: Energy & Environmental Research Center
Principal Investigator: John Pavlish

### PARTICIPANTS

| Sponsor | Cost Share |
|---|---|
| EPA | $ 1,000,000 |
| Basin Electric Power Cooperative | $ 45,000 |
| Ottertail Power Company | $ 45,000 |
| Tennessee Valley Authority | $ 45,000 |
| Doosan-Babcock | $ 45,000 |
| TransAlta Corporation | $ 45,000 |
| NDIC | $ 45,000 |
| Total Cost | $ 1,270,000 |

**Project Schedule - 36 Months**
Contract Date – 2/20/08
Start Date – 11/07
Completion Date – 2/1/10

**Project Deliverables**
Annual Reports:
2007 Annual Report 2/1/08 (✓);
2008 Annual Report 2/1/09 ( );
2009 Annual Report 2/1/10 ( )

**OBJECTIVE / STATEMENT OF WORK:**
Develop key information on the behavior of air toxic substances that allows for the prediction of the fate of air toxic metals, the enhancement of existing control technologies, the identification of new control technologies, the demonstration of advanced control technologies, the optimization of utilization and disposal of residuals, and pollution prevention. The mission of CATM is to provide a nationally coordinated and practically oriented multidisciplinary research and development and training program on the prevention, formation, behavior, and control of toxic metal emissions and on preventing and minimizing the effect of these metals on public health and the environment through partnerships developed with industry, academia, and government. This project is a continuation of Project FY95-XX-62, FY99-XXXII-89, FY02-XLIV-111 and FY05-LII-136

**STATUS**
Year 2007 Highlights.

- CATM researchers, through additional bench- and pilot-scale tests, have gained a more in-depth knowledge of how $SO_3$, in particular, affects mercury–flue gas interactions on the surface of an activated carbon. Additional testing has confirmed the poisoning effect of sulfur compounds.

- CATM researchers were able to show that, at high-temperatures, reactions between halogens (Br and Cl) and other trace metals lead to changes in the kinetics and enhances control under some conditions. This will support further development of trace metal control technologies in the future.

- CATM researchers showed, through experimentation, that using sorbent-based mercury control technologies (particularly activated carbon) has the potential to enrich some trace metals in very fine particulate matter. Since this was a project with a limited data set, further evaluations are needed in this area.

- Evaluations into the safety and commercial usability of combustion by-products seem to show very little release for most trace metals. An important outcome is data that show that the standard 18-hour synthetic groundwater leaching protocol that is often used may actually over-report mercury releases and that longer-term leaching protocols are necessary to gain an accurate picture of mercury releases.

- CATM health researchers have successfully demonstrated a method that provides reliable results for Cd and Se in very small amounts of biological tissues (<10 mg) using microdigestion/inductively coupled plasma–mass spectrometry (ICP–MS).

- A refinement of a two-photon laser-based method for measuring elemental mercury has been proven successful in measuring mercury in air instead of an inert gas (like most laser applications). This could lead to development of a method with lower method detection limits that does not rely on wet-chemistry methods.

- Results from a comparison between several established methods used in traditional coal combustion for application in warm reducing environments (such as that for gasification) showed some promise for the dry sorbent trap method, also called EPA Method 30B. This may provide a low-cost method with good reliability for measuring some trace metals in this difficult environment.

- Various chemical additives have been tested, and some have been shown to provide an effective way to cost-effectively sorb or oxidize mercury and, possibly, some other trace metals.

- Various mercury oxidation techniques showed the ability to increase the particulate-bound mercury for later capture by particulate control devices such as wet scrubbers and SCR systems.

- CATM researchers fostered relationships with commercial vendors and developers to assess newly developed sorbents and other technologies against commercially available technologies for cost and performance.

- CATM has communicated its trace metal research findings to the research community through various venues: the Air Quality Conference, the Canadian Institute’s Mercury Conference, the Electric Utility Environmental Conference, the Conference on Mercury as a Global Pollutant, and the Western Fuels Symposium.