

FY02-XLIV-111
“Center for Air Toxic Metals Affiliates Program”

CONTRACTOR: Energy & Environmental Research Center

PRINCIPAL INVESTIGATORS:

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PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
Otter Tail Power Company	\$75,000
Tennessee Valley Authority	\$75,000
ND Industrial Commission	\$75,000
U.S. Environmental Protection Agency	<u>\$3,750,000 (projected)</u>
Total Project Costs	\$3,975,000

Project Schedule - 36 Months

Contract Date - 5/16/02
Start Date – (A continuation of Project 62)
Completion Date 5/16/05

Project Deliverables

2001 Annual Report – 4/1/2002 ✓
2002 Annual Report – 4/01/2003 ✓
2003 Annual Report – 3/01/2004 ✓
2004 Annual Report – No Payment

OBJECTIVE / STATEMENT OF WORK

CATM is a partnership among government, industry, and academia that is focused on pollution prevention and control technologies. As part of ongoing research activities at the EERC, CATM will provide critical data and predictive methodologies to the EPA in order to help define regulations and provide a forum for industry interaction. The CATM Affiliates Program allows industry to join and participate in discussions and meetings that identify and prioritize critical research needs, which guide the CATM research. The focus of CATM is on furthering the current understanding of the behavior of potentially toxic metals in coal-fired utilities, other fossil fuel systems, waste-to-energy systems, and waste incinerators. CATM goals are to develop methods to prevent or reduce air toxic metal emissions, predict the fate of metals, determine the effectiveness of control devices, and identify new control technologies.

STATUS

Ongoing research activities through CATM address several key issues related to trace element emissions. Key research activities are as follows:

- **Fundamental Mechanisms of Mercury Species Formation in Coal Combustion Flue Gas**

Bench-scale investigations are conducted to promote the conversion of gaseous elemental mercury (Hg^0) to gaseous oxidized mercury (Hg^{2+}) and/or particle-associated mercury ($\text{Hg}[p]$) in simulated coal combustion flue gases.

- **Development of Sampling and Analytical Tools for Oxidized Mercury Species**

This research is developing new analytical tools for the definitive determination of oxidized mercury species in a vapor phase, including the reactive and, therefore, challenging flue gas streams.

- **Development of Mercury Control Technologies**

Areas of interest for the Control Program Area included development of advanced test protocols for testing mercury sorbents, evaluating several new approaches for impregnating carbon based sorbents for enhanced mercury capture, evaluating catalysts for oxidizing elemental mercury to improve capture in a wet scrubber, and evaluating bioleaching as a pretreatment approach for removing mercury from coal.

- **Application of Database and Models to the Fundamental and Applied Study of Air Toxic Metals**

The theoretical modeling of mercury-sorbent interaction has focused on modeling of the gas-phase mass transfer to the sorbent. The empirical modeling of mercury speciation and transformations has focused developing a neural network to predict mercury emissions.

- **Stability of Mercury in Combustion By-Products**

The project was designed to determine the mechanisms of mercury release from coal combustion by-products (CCBs) and biomass materials.

- **Investigation of the Fate of Mercury in a Coal Combustion Plume Using a Static Plume Dilution Chamber**

This device provides a simple tool that can be used to study mercury transformations occurring just beyond energy conversion systems in the atmosphere in a simulated plume environment.

- **Mercury Release from Crude Oil**

The project focuses on gathering reliable data on the mercury concentrations of domestic and foreign crude oils, with documented procedures followed for sampling and analysis.

- **Technology Commercialization, Education, and Publication**

To facilitate the transfer of technical information produced by CATM, several communication vehicles are used, including participation in conferences, symposia, workshops, and other educational programs; annual meetings and peer review; and the publication of a semiannual newsletter.