FY05-LII(52)-136

"Center for Air Toxic Metals Affiliates Program"

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

PARTICIPANTS

Sponsor	Cost Share
EPA	$ 3,000,000
Basin Electric Power Cooperative	$ 45,000
Ottertail Power Company	$ 45,000
Tennessee Valley Authority	$ 45,000
Mitsui Babock	$ 18,000
NDIC	$ 45,000
Total Cost	$ 3,198,000

Project Schedule - 36 Months

Contract Date – June 7-2005
Start Date – June 14, 2005
Completion Date – December, 2007

Project Deliverables

Contract Signed: ✓
Annual Reports:
2004 Annual Report 12/31/04 (✓);
2005 Annual Report 12/31/05 (✓);
2006 Annual Report 12/31/06 (✓);

OBJECTIVE / STATEMENT OF WORK:
To further the understanding of the behavior of potential toxic metals in coal-fired utilities, other fossil fuel systems, waste-to-energy systems and waste incinerators. A specific objective of the CATM program is the study of the fate and control of mercury emissions from coal-fired systems. This project is a continuation of Project FY95-XX-62, FY99-XXXII-89 and FY02-XLIV-111.

STATUS
Year 2004 Highlights.

- Unburned carbon was evaluated for mercury capture.
- Basic studies of heterogeneous & homogeneous transformations are providing insights on impacts of flue gas components on mercury, with sulfur demonstrating a dominant role.
- Bench-scale tests are continuing to evaluate & aid in the development of Hg sorbents.
- A model to explain the interactions between flue gas constituents & activated carbon has been further refined.
- Bench-scale test have been initiated to identify & evaluate SCR catalysts that would promote mercury oxidation.

- Studies on interactions between dietary mercury & selenium seem to underscore the importance of diets that are rich in selenium as a means of offsetting the effects that occur with ingestion of mercury.

Year 2005 Highlights

- Studies to convert elemental mercury to the oxidized form in order to promote capture
- Continued to evaluate unburned carbon for its benefits as a mercury sorbent
- Continued to evaluate improved methods for evaluating the effects of halogens on the conversion of elemental mercury to inorganic and organic compounds with coal combustion flue gas
- Development of a laser-based method for measuring elemental mercury
- Methods to improve measurement of mercury and chlorine in combustion flue gases
- Evaluation of mercury-selenium interactions in aquatic ecosystems
- Evaluation of the stability of mercury and air toxic elements associated with coal combustion byproduct management

Year 2006 Annual Report/Final Report

Progress has been made:

- Evaluating multiple interactions between mercury species, other flue gas components, fly ash, and unburned carbon to better understand transformation mechanisms so that the mercury interaction sorbent model can be improved.
- Developing a continuous emission monitor that can determine chlorine species in coal combustion flue gases with reliable results.
- Evaluating various chemical additives to determine their effect on mercury sorption and oxidation. Development and testing are being conducted to develop more efficient carbon-based mercury sorbents that will prove effective for low-chlorine coals such as lignite.
- Developing an economical means of regenerating spent sorbents.
- Understanding the ways selenium influences mercury toxicity in animals.
- Understanding bioaccumulation of mercury and selenium in plants.
- Understanding the stability of trace metals, including mercury and arsenic, in coal combustion byproducts (CCBs). Leachability and vapor release of mercury and other air toxic elements from CCBs were studied.

Presentations of information to the public and stakeholders were provided via the MEGA conference, the 8th International Conference on Mercury as a Global Pollutant, the Western Fuels Symposium, and through the CATM Web site, CATM newsletter, participation on a mercury experts committee, and informal exchanges at regional workshops. The work conducted pursuant to this project will help the lignite industry address air toxic metals concerns derived from emissions of air toxic metals from the combustion of lignite.