

**FY99-XXXI-87**  
**BENCH-SCALE TESTS TO EVALUATE MERCURY FLY ASH**  
**INTERACTIONS**

**CONTRACTOR:** Energy & Environmental Research Center

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**PARTICIPANTS**

<u>Sponsor</u>	<u>Cost Share</u>
Electric Power Research Institute	\$240,000
Industrial Partners	\$75,000
DB Riley	
Energy & Environmental Strategies	
CONSOL R&D	
ABB Power Plant Laboratories	
Universities	\$270,641
University of Arizona	
University of Connecticut	
University of Kentucky	
University of Utah	
Massachusetts Institute of Technology	
U.S. Department of Energy	\$1,800,000
North Dakota Industrial Commission	\$40,000
Total	<hr/> <hr/> \$2,425,641

**Project Schedule - 30 Months**

Contract Date – 10/21/98  
Start Date – 10/21/98  
Completion Date – 3/30/01

**Project Deliverables**

Status Report – 9/1/99 ✓  
Status Report – 3/30/00 ✓  
Status Report – 3/1/01 ✓  
Final Report – 3/31/01 ✓

**OBJECTIVE / STATEMENT OF WORK**

The overall objective of this project is to determine the forms, reactions and fate of mercury and other trace elements in coal during combustion in coal-fired boilers. A specific objective of this study is to develop an engineering model to predict the fate of metals in coal-fired

boilers. A goal of this work is to provide key information necessary to predict emissions and to design control technologies to control emissions.

## **STATUS**

A number of bench-scale tests were completed to evaluate the effects of temperature, mercury species and ash source. Summary findings of the bench-scale mercury fly ash interactions are:

- There was no clear temperature effect between 250 and 350°F with elemental mercury.
- There was no clear temperature effect on elemental mercury oxidation as the concentration of oxidized mercury increased, decreased or was not affected by increasing temperature.
- There was a slight positive affect of elemental mercury capture that could be attributed to physisorption on the ash surfaces.
- There was an affect with oxidized mercury ( $\text{HgCl}_2$  injection) with mercury capture increasing with decreasing temperature.
- There was no optimum temperature for elemental or ionic mercury capture.

Testing was conducted with 17 different ash samples to identify reactive samples and correlations between reactions and capture. The summary findings of these tests are:

- There is a slight correlation between loss of ignition (LOI) and oxidation of elemental mercury across the fixed bed of ash, which was most evident with bituminous and subbituminous coal ashes.
- Generally, there is a slight increase in oxidation of elemental mercury with increasing surface area.
- There was no correlation between LOI, surface area, and capture of elemental mercury.

The results from this study were inconclusive and no conclusions could be drawn on the effects of ash type on oxidation of capture of elemental mercury.