FY95-XX-62
CENTER FOR AIR TOXIC METALS AFFILIATES PROGRAM

CONTRACTOR: Energy & Environmental Research Center

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PARTICIPANTS

Sponsor	Cost Share
US Environmental Protection Agency	$3,400,000
Electric Power Research Institute	$20,000
Empire State Electric Energy Research Corporation	$20,000
Mitsubishi Heavy Industries (Japan)	$20,000
Otter Tail Power Company	$20,000
Northern States Power Company	$20,000
ND Industrial Commission	$ 80,000
Total	$3,580,000

Project Schedule -
Contract Date – 11/7/95
Start Date – 11/7/95
Completion Date – 2/1/98

Project Deliverables
Annual Report - 2/1/96 ✓
Annual Report - 2/1/97 ✓
Annual Report - 2/1/98 ✓
Final Report – 2/1/99 ✓

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 focus 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

CATM focuses on the following five research areas:
Program Area 1 - Air Toxic Metals Transformation Mechanisms
Program Area 2 - Analytical Methods Development
Program Area 3 - Control Technologies
Program Area 4 - Computer Modeling and Database
Program Area 5 - Technology Commercialization and Education

Accomplishments of CATM include:

- Bench and pilot scale coal combustion testing and analysis of air toxics including arsenic (As), nickel (Ni), lead (Pb), selenium (Se) and mercury (Hg).
- A thorough review of mercury species formed during combustion and predictive modeling to estimate thermodynamically stable forms.
- Construction and testing of a unique, state-of-the-art combustion system (referred to as the conversion and environmental process simulator [CEPS]). The CEPS has been used to study the partitioning of As, Ni, Pb, Hg, and Se during combustion of North Dakota lignite.
- CATM serves as a centralized repository of integrated information related to air toxics.

Conclusions and observation from CATM research and study are:

- During coal combustion As, Ni and Pb are nearly completely partitioned into the ash and particulate matter.
- During coal combustion Se is partitioned between the ash and the gaseous fraction.
- During coal combustion Hg is partitioned nearly completely in the gaseous fraction. Subsequent reaction of gaseous Hg occurs resulting in species which can be captured and removed.
- Zeolite and kaolinite as precombustion sorbents are only marginally effective for controlling air toxic metal emissions.
- Activated carbon can be an effective sorbent for control of Hg and Se emissions from some coals.
- Some coal ashes can effectively collect up to 98% of the Hg released from the coal during combustion. Coal combustion fly ash from the North Dakota Falkirk Mine is an effective sorbent for Hg (See Project FY94-XV-51).