

# Life-Cycle Evaluation of Coal Combustion Residues

**DOE Workshop**

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# Overview

- ✦ Objectives
- ✦ Technical Approach
- ✦ Findings to Date
- ✦ Research Priorities



# Objectives

- ✦ To collect and/or develop data needed to evaluate changes to coal combustion residues (CCRs) resulting from Hg control technology.
- ✦ To evaluate CCR management practices and identify any potential cross-media transfers from potential Hg control technology requirements.

# Approach

- ✦ Mass balance analysis over CCR life-cycle using:
  - ✦ Data on mercury content in coal
  - ✦ Power plant emissions data
  - ✦ Data on quantity of residues
- ✦ Gathering/developing data to refine mass balance analysis
- ✦ Initial focus is on high-temperature CCR applications (e.g., production of cement, asphalt, and wall board)



# Status

- ★ Formed stakeholder working group to provide input, data, and comments on interim draft documents
- ★ Developed report characterizing/evaluating CCRs and management practices. Expect it to be published in June 2002.
- ★ Have provided recommended protocol for characterizing/evaluating CCRs resulting from Hg control technology demonstrations.



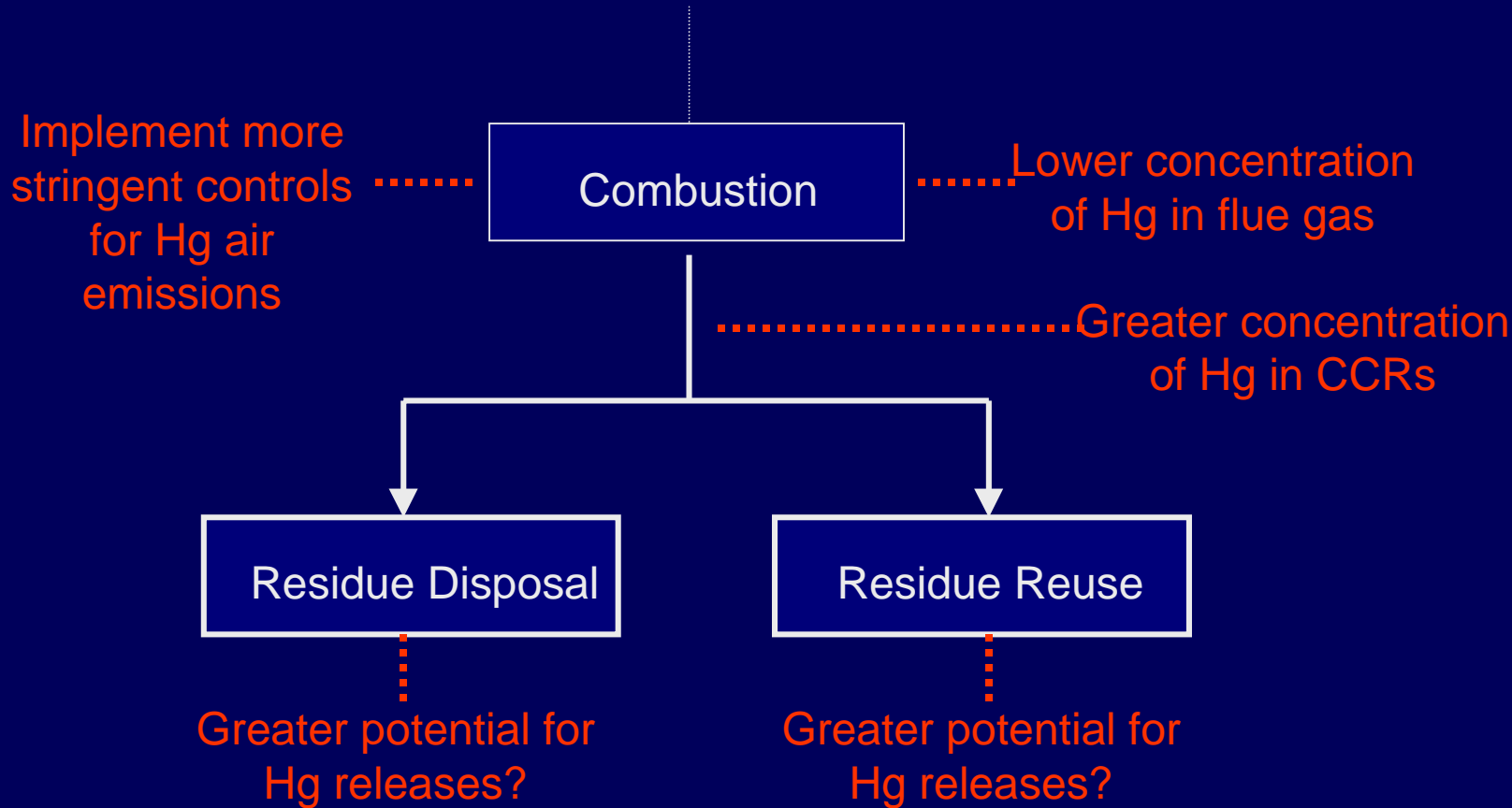
# Life-Cycle Approach

- ✱ Multi-media
- ✱ Multi-pollutant
- ✱ Multi-stage
  - ✱ Raw Materials
  - ✱ Production
  - ✱ Use
  - ✱ Disposal

**\*Goal is to Catch Surprises**



# Life-Cycle Evaluation of Tradeoffs For Potential Clean Air Act Regulations



# Current Industry Statistics

- ✦ Approximately 70% of CCRs end up in 600 land disposal facilities across the U.S.
- ✦ Inadequate data to characterize fate of Hg and other pollutants for potential “new” CCRs.







# Evaluation of All Pathways

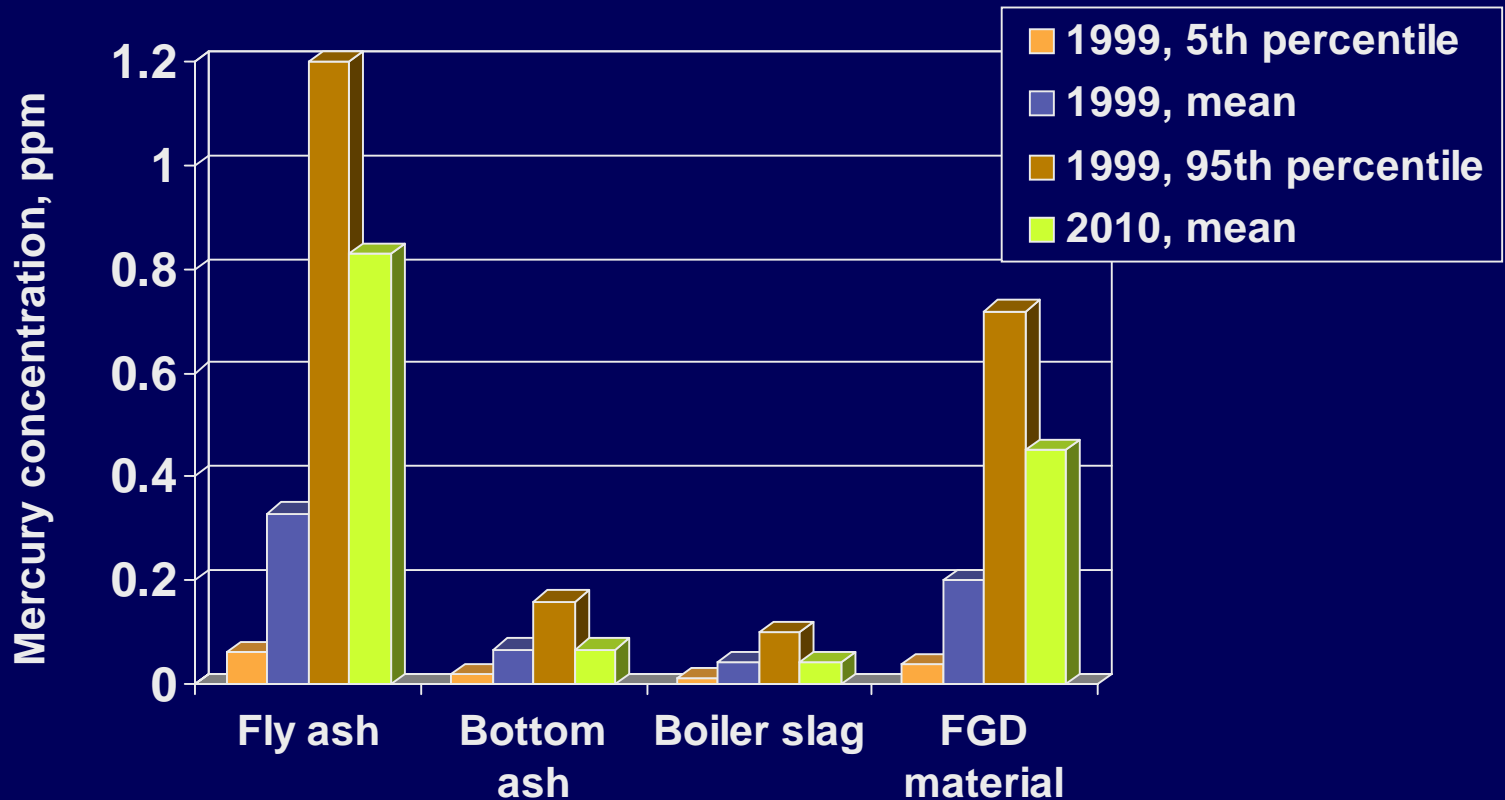
- ✦ Any increased risk of environmental release as a result of
  - ✦ Leaching
  - ✦ Volatilization
  - ✦ Biological activity/Volatilization of Organo-Hg
- ✦ Also evaluating changes to CCRs such as pH which could increase mobility of Hg and other metals

# Mass Balance Results\*

Year	Disposition	Mass of CCRs (10 <sup>6</sup> tons)	Mercury (tons)
1999	Disposal	74	21
1999	Commercial Application	33	8.3
2010	Disposal	64	39
2010	Commercial Application	53	31

\*This is documented in EPA report to be released in June to help illustrate potential mass flows resulting from increased coal usage, CCR utilization, and Hg control.

# Mass Balance Results: Mercury Concentration in Residues





# High Priority Research Areas

- Evaluating changes to CCRs resulting from Hg control technology (will also span different coal and boiler types).
- Application of recommended testing protocol for characterizing/evaluating CCRs and mgmt practices.
- Evaluating Hg emissions from high-temperature processes and tracking fate of Hg (and other pollutants) through product life-cycle including final disposal.

# Lower Priority Research Areas

- Evaluating potential environmental releases from
  - land disposal (impoundments, landfills, mines) – (1)  
Leaching, (2) Volatilization, and (3) biological transformation/volatilization as organo-Hg when anaerobic conditions occur
  - land application (i.e, soil amendment) ; and
  - use of products made from residues (e.g., snow and ice control, highways, fill)
- Data on the fate of Hg (and other pollutants) associated with coal cleaning (taking into account energy balance)
- Pollution/energy use associated with using virgin materials versus using CCRs in commercial applications



# For Further Information....

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