

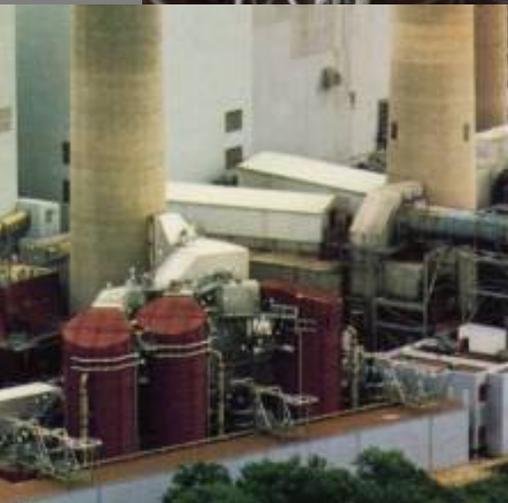


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# Readying Mercury Controls for Demonstrations

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*for*  
**DOE/NETL's Mercury Control**  
**Technology R&D Program Review**  
**Pittsburgh, PA**  
**July 12-14, 2005**



# OK, Now that the regs are in place, my compliance strategy is clear -- NOT

## Cap & Trade regulations could mean

- No Hg-specific controls for large E. Bit plants
- Very little else for 2010
- Whatever becomes available, low-cost for 2018

## **BUT**

- ~9 Attorney Generals sued EPA, also env. groups
- 32 Senators introduced Resolution of Disapproval under CRA to overturn EPA's delisting of Hg under 112(c) (6/29)
- Several states may opt-out, require greater reductions
- Pressure from proposed Canada-wide Standards

## **AND**

- What if co-benefits don't get 90%  $\Delta$ Hg?
- How does Hg fit in my environmental business strategy?



# Summary

80



201

- **There's hope**

- SCR/FGD co-benefits > 80% seem plausible for E. Bit; is there a ppm floor?
- Chemically-treated sorbents seem to provide high removals with western fuels
- Will have substantial data base by early/mid-07
- Measured progress with other technologies

- **There are also major uncertainties**

- Sustainable reductions under normal plant dispatch & operation
  - Consistent quality chemicals
  - Manage process variability/transients
- Extrapolation of test results to diverse fleet
- Catalyst/sorption surface lifetime
- Long-term impacts on plant operation, 2ry emissions, CCP use

# When Will Controls Be Ready?

## “Commercial availability”

- Is when Hg controls can first be procured with confidence across the industry
- “When” depends on consistency of ongoing field tests & some long-term experience
  - Do they replicate among similar plants?
  - Do they conform to our *ab initio* understanding of the process
- **Available vs affordable**



# Status of Mercury Controls on Technology Development Timeline

Stage*	Hg Control
1. Lab	Novel sorbents, FGD Hg chem.
2. Pilot scale	Novel sorbents, oxidation catalysts, boiler, SCR, FGD Hg chemistry
3. Full scale – determine capabilities/limits	Combustion mods, non-carbon sorbents, chemical additives, TOXECON™ II
4. Full scale @ multiple sites	ACI, CTCs, SCR/FGD (2004-2007)
5. Long-term (12-18 mos)	<i>TOXECON™ @ 6 mos (LSEB), 12-18 mos (PRB) start late '05</i>
6. Widespread implementation	---

\* Sequence of “stages” courtesy of ADA-ES (“Air Pollution Control Equipment New Technology Acceptance Process,” AWMA 2004)



**EPRI**

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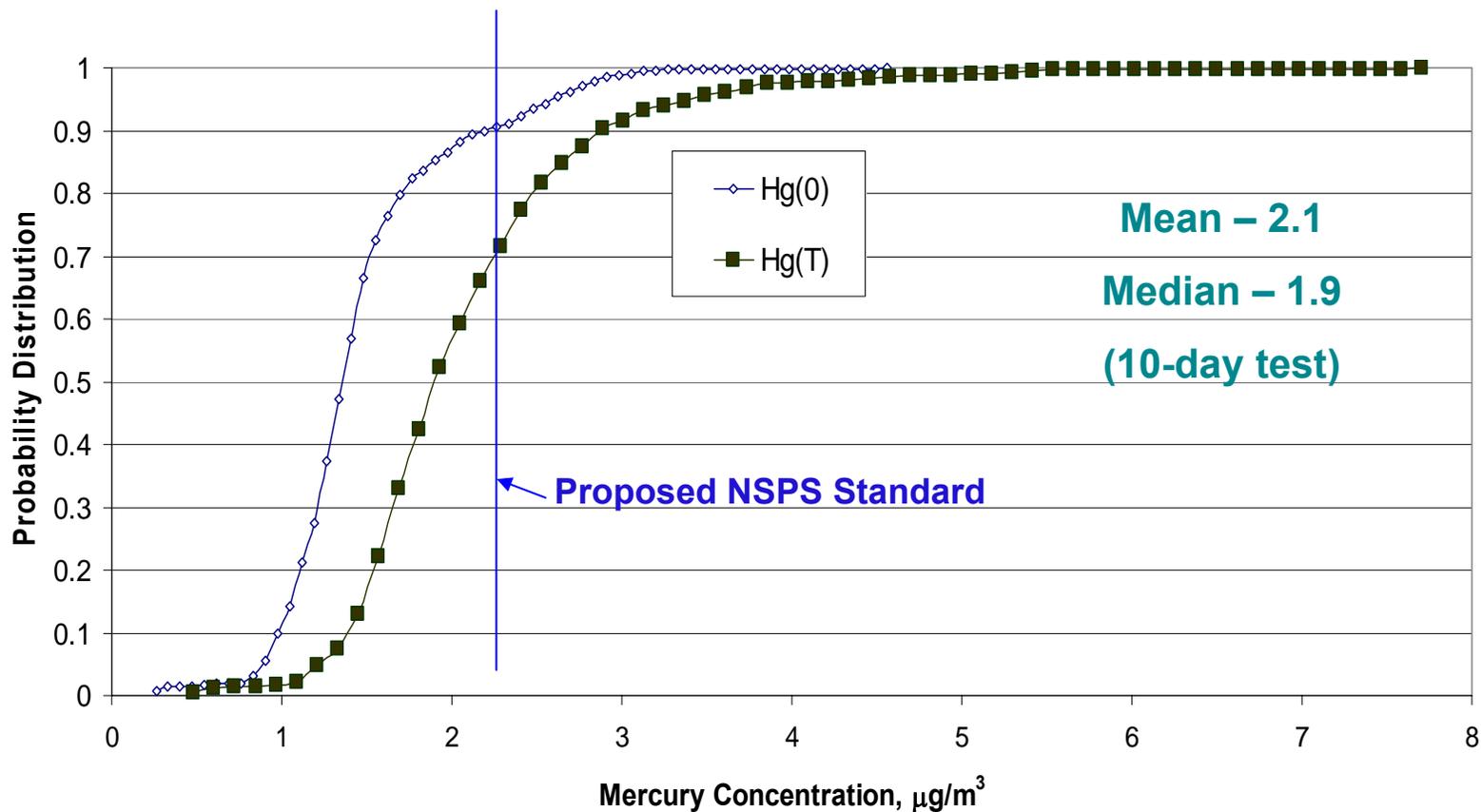
# Recent EPRI Results



# Significant Variability Even with FGD

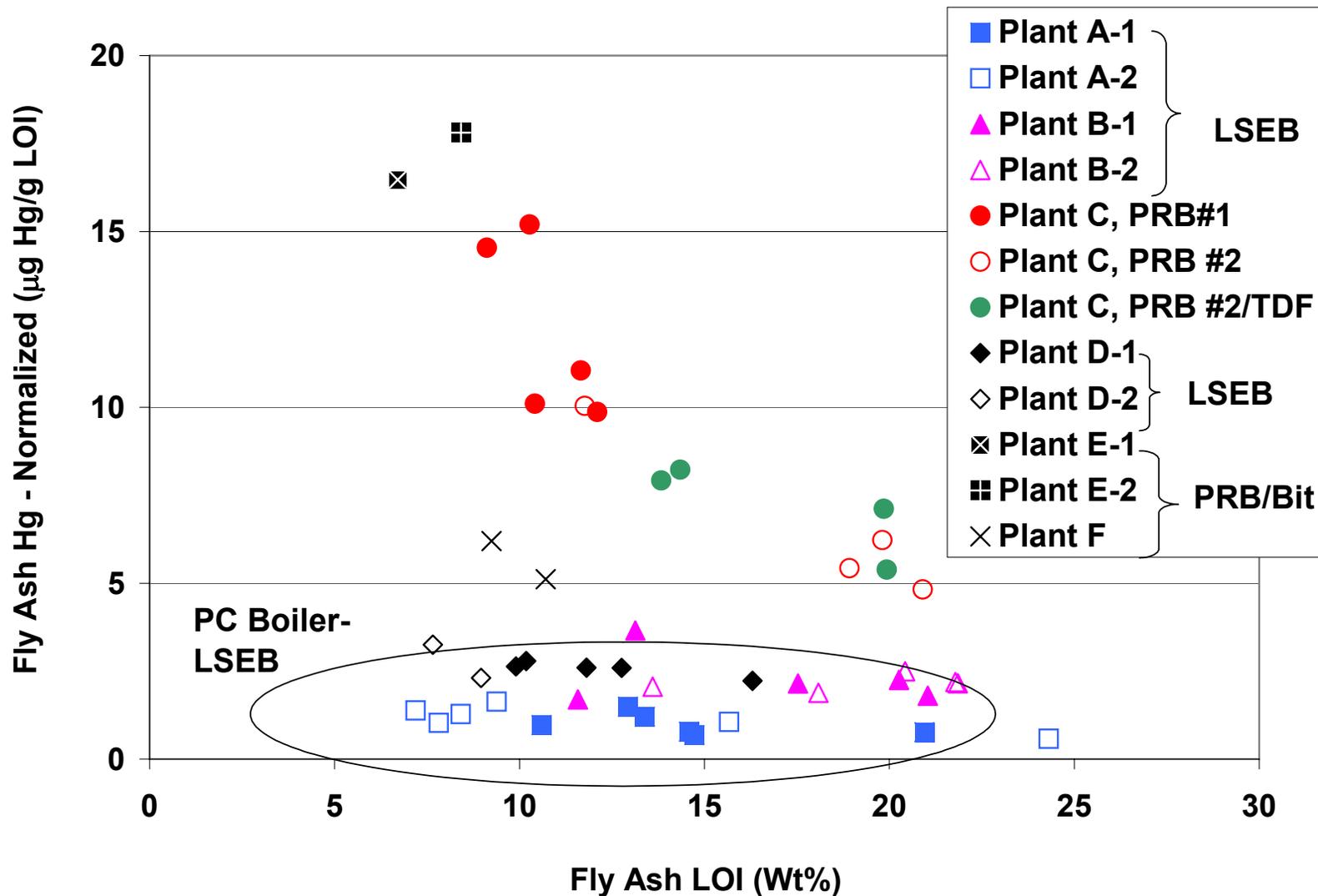
*Avg. ~ NSPS*

*Instantaneous > NSPS ~30% of Time*

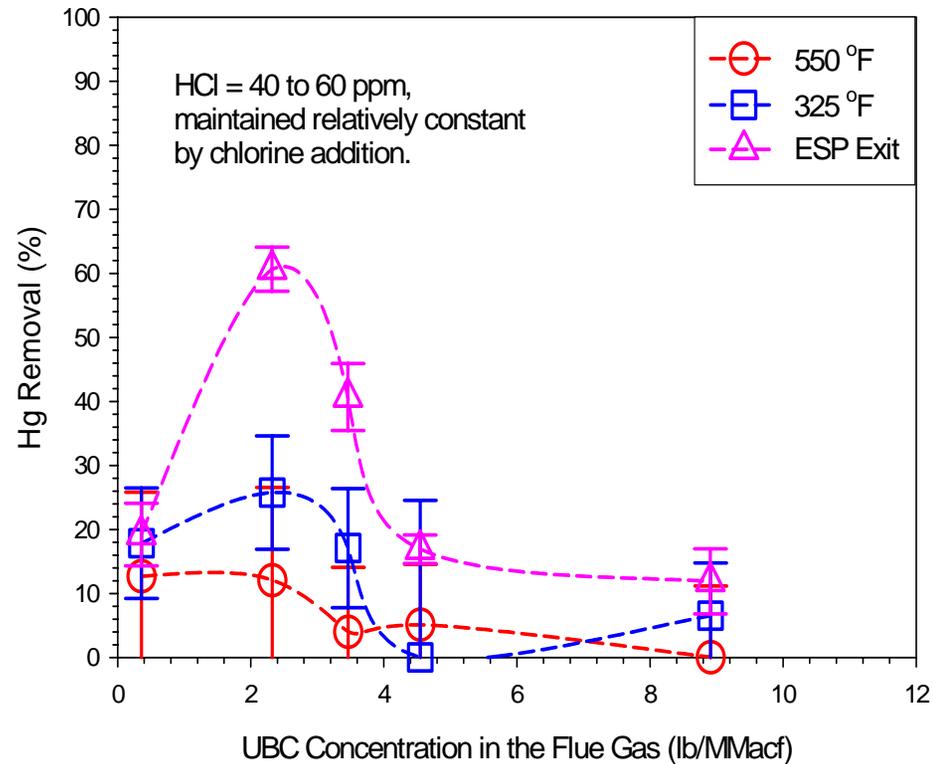
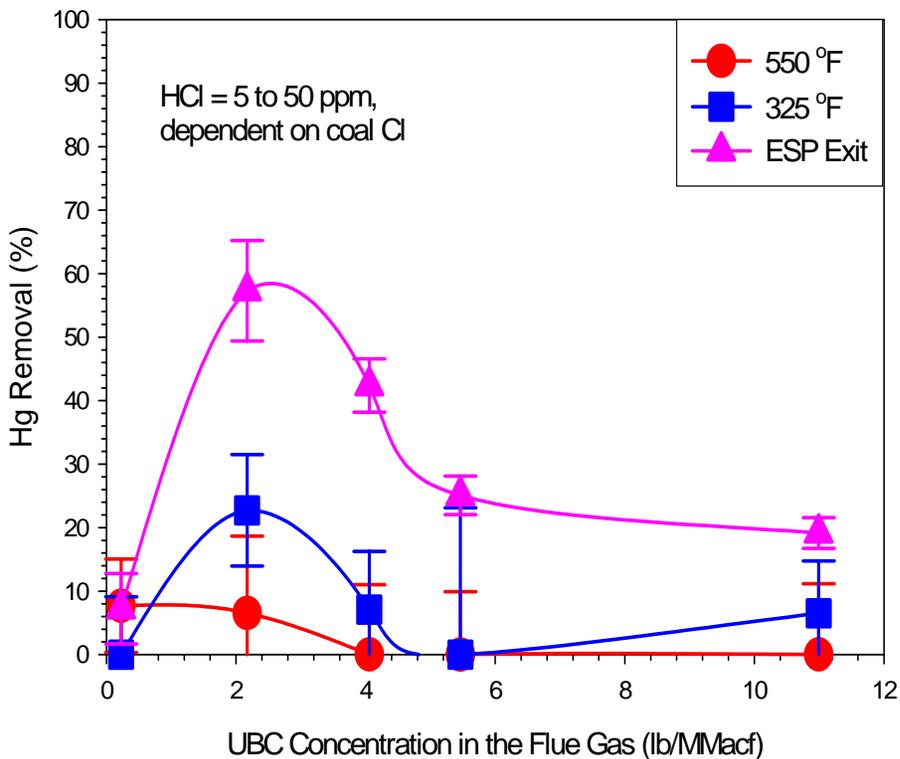


# Mercury Capture by Fly Ash Carbon Depends on Coal, Not Fully Understood

(Hg in ash normalized on ash LOI)



# Hg Removal vs UBC – PRB/Blacksville Blend



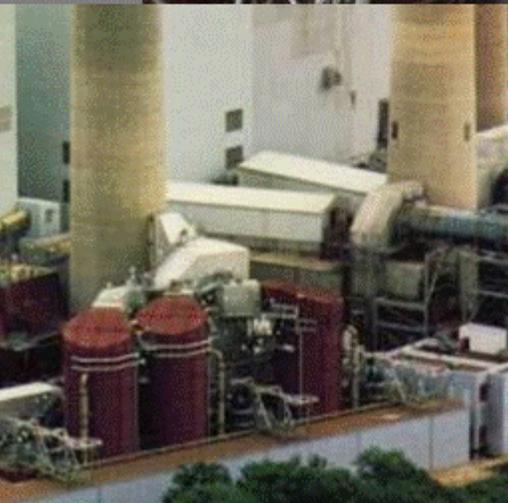


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# Directions of EPRI Research



# Understanding Hg Chemistry



- **Initial approach = large pilot combustor tests**
- **Significant advances in parallel work by modelers**
- **Timely to switch to modeling – refine & validate**
- **Issued RFP early June to 4 firms**
  - **Predict speciation and adsorption on ash at particulate control outlet with no other APCD**
  - **Option = oxidation and/or capture by any/every other process**
- **Received proposals from all 4**
  - **8 - 12 month duration**
  - **All have models at some level for speciation/sorption in flue gas**
  - **Some also have models for APCDs, injection, etc.**

# Industry/DOE/EPRI Investing Heavily in Development & Demonstration – 2005 Tests

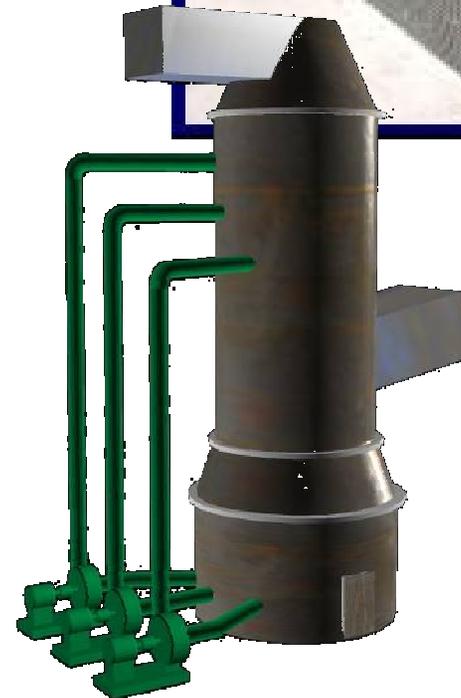


**EPRI continues to seek novel sorbents, other ideas @ <\$s**

- **15 sites**
  - **14 ESP, 1 SD/BH**
- **All coal types, some blends**
- **SCA = 150 – 620 ft<sup>2</sup>/kacfm**
  - **5 very small or small**
- **Most injection options**
  - **AC, CTC, Hi-T**
  - **Na<sub>2</sub>S<sub>4</sub>, AMS**
  - **Boiler chemical additives**
  - **TOXECON™ II**

# Other Technologies Being Tested by Industry/DOE/EPRI in 2005

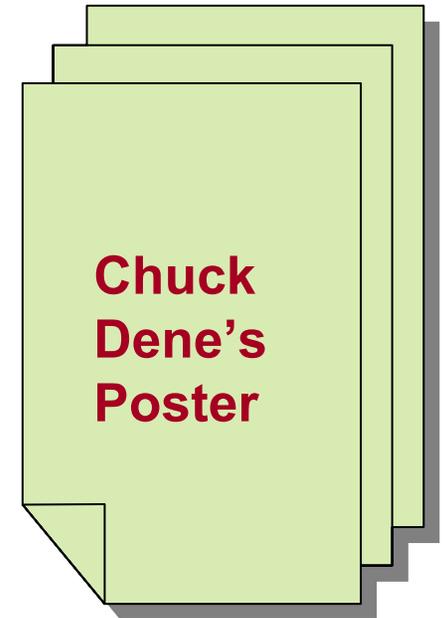
- SCR/FGD co-benefits for range of coals, catalysts, age, regeneration status, scrubber types, flue gas additives, etc.
  - Bench → full-scale SCR
- Low-T Hg oxidation catalysts
- FGD issues
  - Re-emissions
  - Sequestering Hg from gypsum
- Sorptive structures
- Methods to protect CCP use



**Value of coal cleaning in multi-pollutant world?**

# Measurements for Profit or Prudence

- **C&T = Allowances = \$s → \$ value in options**
- **In C&T, “CEMS measure \$s, not emissions<sup>1</sup>”**
- **CEMS not ready for prime time**
- **Measurements very challenging**
  - **Very low concentrations**
  - **Interferences by other flue gas species**
- **Addressing via**
  - **Field tests of “commercially offered” CEMS (w/EPA)**
  - **Lab tests to assess interferences**
  - **Development of sorbent trap method**



<sup>1</sup>R. McRanie, RMB, at 2005 CEMS Users Group meeting

# *Questions*

