ELECTRIC POWER RESEARCH INSTITUTE

From Demonstrating to Refining Mercury Controls

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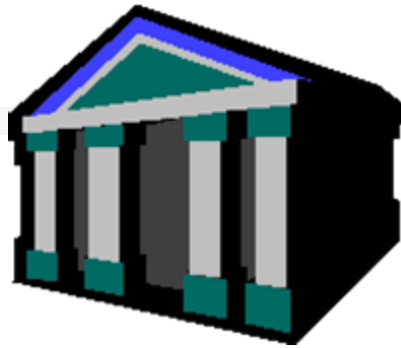
for

DOE/NETL's Mercury Control Technology R&D Program Review
Pittsburgh, PA
December 11-13, 2005

Regulatory Landscape Continues to Drive Need for Options



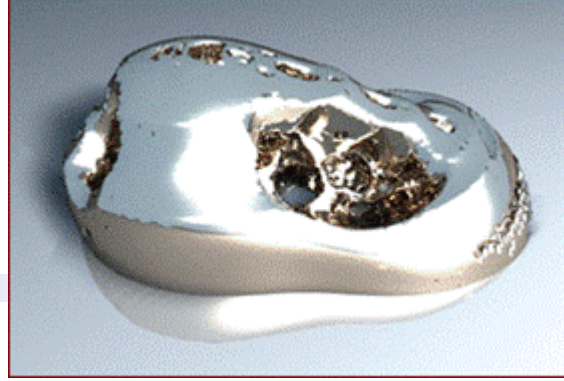
CAMR states offer flexibility

- High ΔHg controls – best doable is OK
- Moderate ΔHg controls at low cost
- Time to develop, test long-term, and learn

Non-CAMR states and consent decree companies face big challenge

- Compliance dates near-term
- Many limits are stringent and unforgiving
- We need to help
  - Adequately demonstrate (long-term) complying technologies
  - Inform regulatory/policy discussions with "credible" information

Key Changes Since 2005 Conference

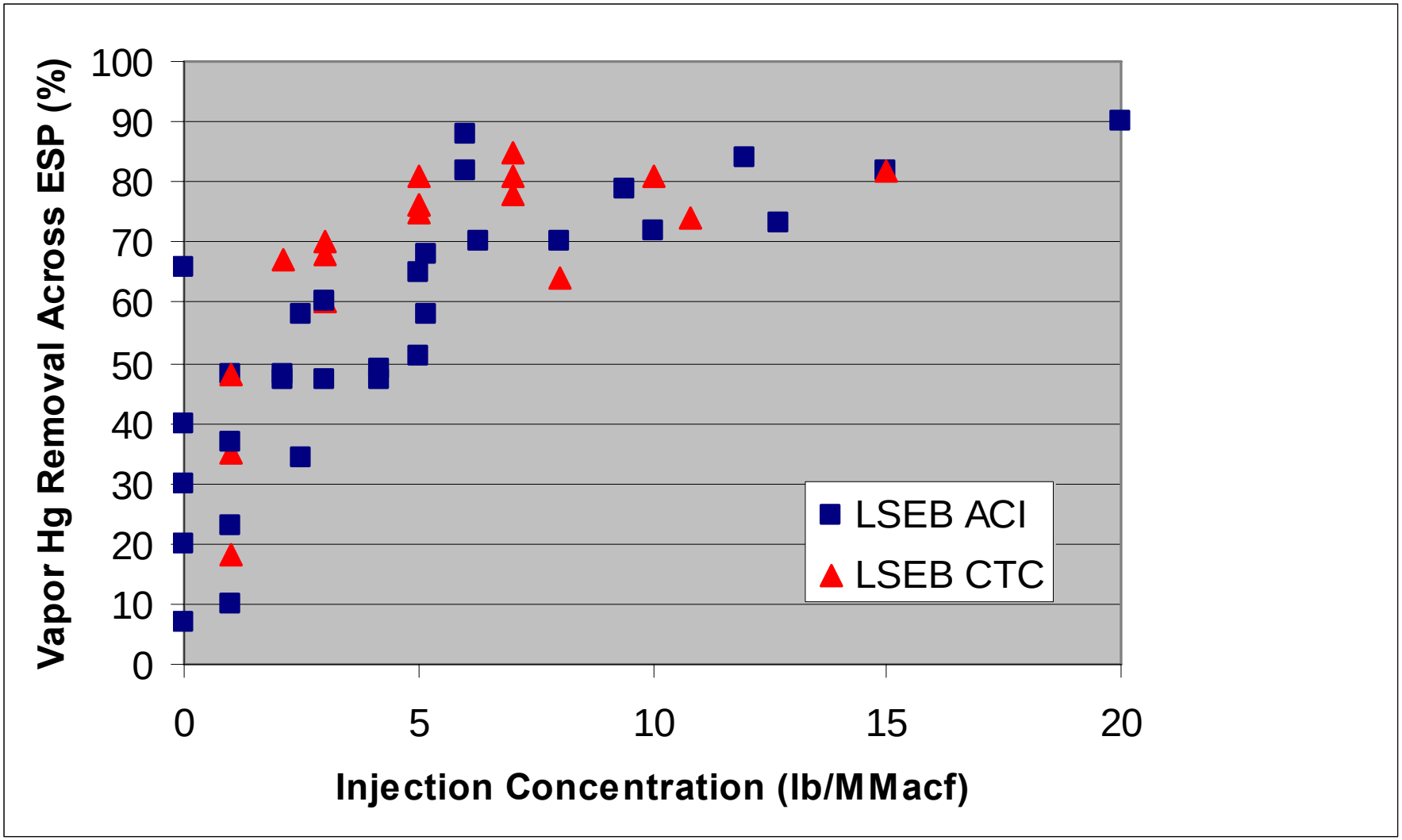


- SCR/FGD co-benefits
  - Suppliers developing catalysts for high Hg^0 oxidation under all conditions
  - First test of regenerated catalyst ➔ concern
- Significant interest (and data) in boiler bromide addition
  - Impacts on scrubber, effluent discharge?
- > 40 inj. field tests (15 last year) with EPRI involvement
  - *Successes and new issues – incl. NSR*
- New sorbents – improved PAC, high-T, non-carbon
- Better understanding of injection distribution
- Models improving
  - Most pre-2006 DOE sites modeled
  - Mostly close predictions
- Several new concepts to reduce costs, provide options

Recent Issues Experienced

- Sorbent distribution
  - TOXECON II , long lances, short ducts, low turbulence
- SO_3 impact on "ACI"
  - Solvable by alkali injection?
- Temperature sensitivity of halogenated sorbents
- Hopper fires and fugitive dust in TOXECON demo
- Eastern bituminous plant with unusually low Hg^{++}
- Halogen injection at PRB unit doesn't produce Hg capture by SD/BH
  - May with SCR?
- Field sorbent tests often $\neq$ lab tests
- Normal variations mask/confuse analyses
  - E.g., normal PM variations $\geq$ increase by ACI

Example of Challenges – Performance Variations in ΔHg Across ESP (LSEB)



Focus of EPRI Research
(w/DOE, EPA, Members, Contractor/Supplier Partners)

- **Address issues**
  - **SO_3, temperature variations, coal variations, hopper fires and evacuation**
  - **PM emission increases – quantify, understand, mitigate**
  - **Confidence in technology – expand experience base to increase**
- **Improve process, reduce impacts, lower costs**
  - **Upper sorbent limit for ash use in concrete**
  - **Novel sorbents – high T, SO_3, low ash impact or easily separable from ash**
  - **Novel technologies – Staged coal firing, PEESP, reactive membranes, MercScreen, PM-Screen**

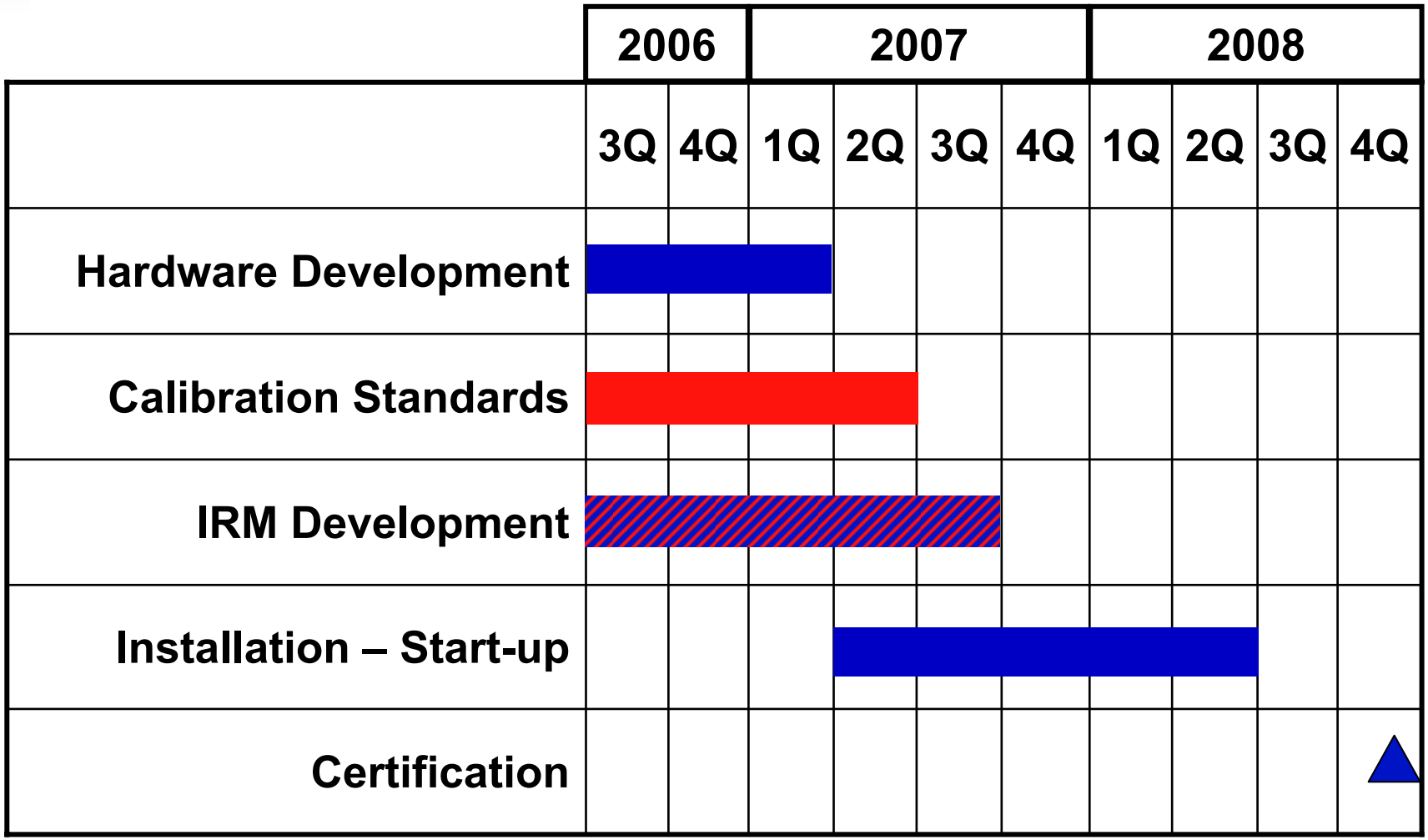
User Challenges for Commercial, Compliant Application

- Limits set at level of best performers
  - Data show range of performance
  - Reasons for site-to-site differences often not understood or predictable
- Guarantees appear to be site specific
  - Not consistent with meeting *one-size-fits-all* limit
- Unclear how to assess Hg control capabilities under conditions not yet tested – e.g., for TX lignite
- High ΔHg requirements ➔very low Hg emissions. Can we measure these accurately?
- Hopper fires weren't expected; what else might happen?

Expediting Solutions to Mercury Measurement Issues

- **Equipment issues**
  - ✓ Probe pluggage
  - – "Hg Hideout"/ probe calibrations
  - – Integrated Hg^{+2} calibration
  - – Maintainability of software
  - ✓ Long sample lines
- **RATA issues – alternatives to OHM**
  - – Development & validation of IRM
  - – IRM-capable test contractors
  - – Alternative RM sorbent traps
  - – Stratification
- **Calibration standards**
  - – NIST / EPA traceability
  - – Cylinder stability
  - – Hg gas generators
  - – Vapor pressure equilibrium equation
  - – Hg^{+2} calibration standards

Implementation Schedule



Questions