Evaluation of Fuel Samples and Process Byproducts from Full-Scale Mercury Control Evaluations Conducted on Coal-Fired Boilers Burning PRB Fuel

Electric Utilities Environmental Conference

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DOE Cooperative Agreement DE-FC26-03NT41986

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Project Co-funders

- **AmerenUE***
- **American Electric Power***
- Associated Electric Coop
- City of Sikeston
- **DTE Energy***
- Dynegy Generation
- Empire District Electric Company
- Kansas City Board of Public Utilities
- Kansas City Power and Light
- MidAmerican
- **Missouri Basin Power Project***
- Nebraska Public Power District
- Ontario Power Generation
- Pacificorp
- Southern Minnesota Municipal Power Agency
- **Sunflower Electric Power Corporation***
- ADA-ES, Inc.
- Alstom
- Arch Coal
- EPRI
- Kennecott Coal
- NORIT Americas
- Peabody Coal
- Western Fuels Association
- Southern Company
- Tri-State
- TransAlta
- TVA
- Westar Energy
- Wisconsin Public Service

**** Host Sites***

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Test Sites

Test Site	Coal	Pollution Control
Sunflower Electric	**PRB**	SDA + FF
Holcomb	*PRB/Bit Blend*	
AmerenUE	**PRB**	Cold-Side ESP
Meramec		
Missouri Basin PP	**PRB**	SDA + ESP
Laramie River	*PRB/Bit Blend*	

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Collecting and Analyzing Samples QA/QC

- Careful sample collection, handling, and analysis are critical to obtaining quality results.
- Samples should be homogenized prior to analysis and quality control procedures should be in place in the field and lab.

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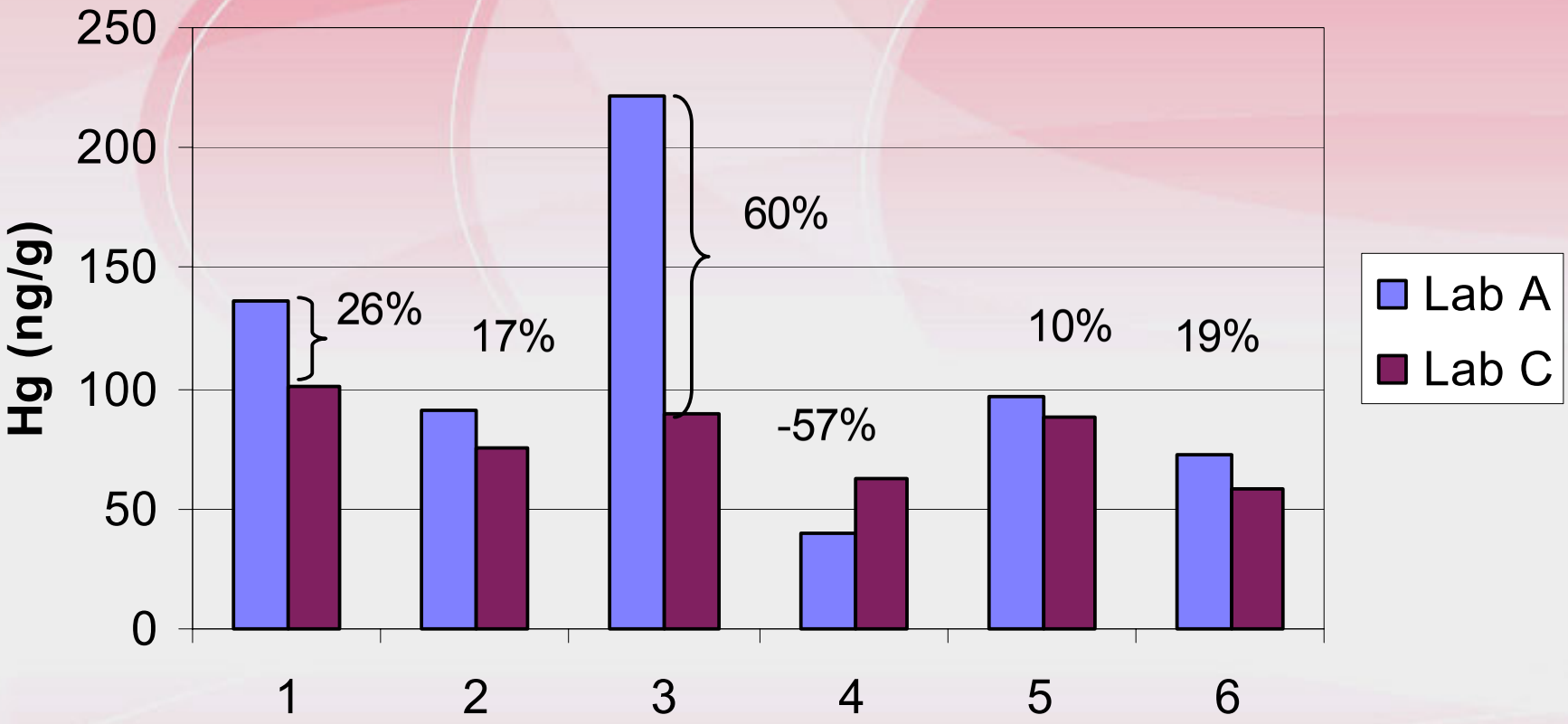
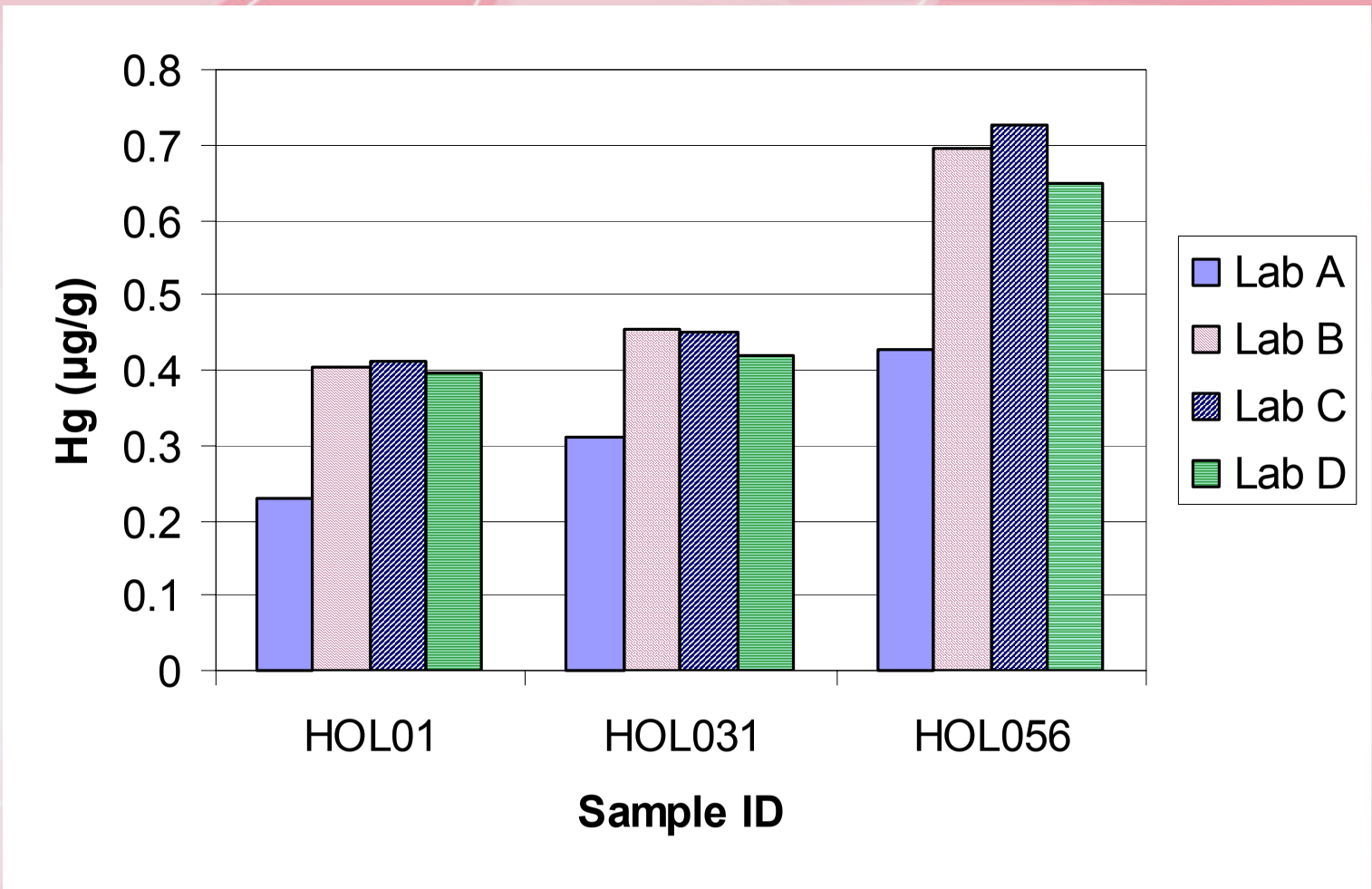
Coal Mercury: Laboratory Variability



Ash Mercury: Laboratory Variability



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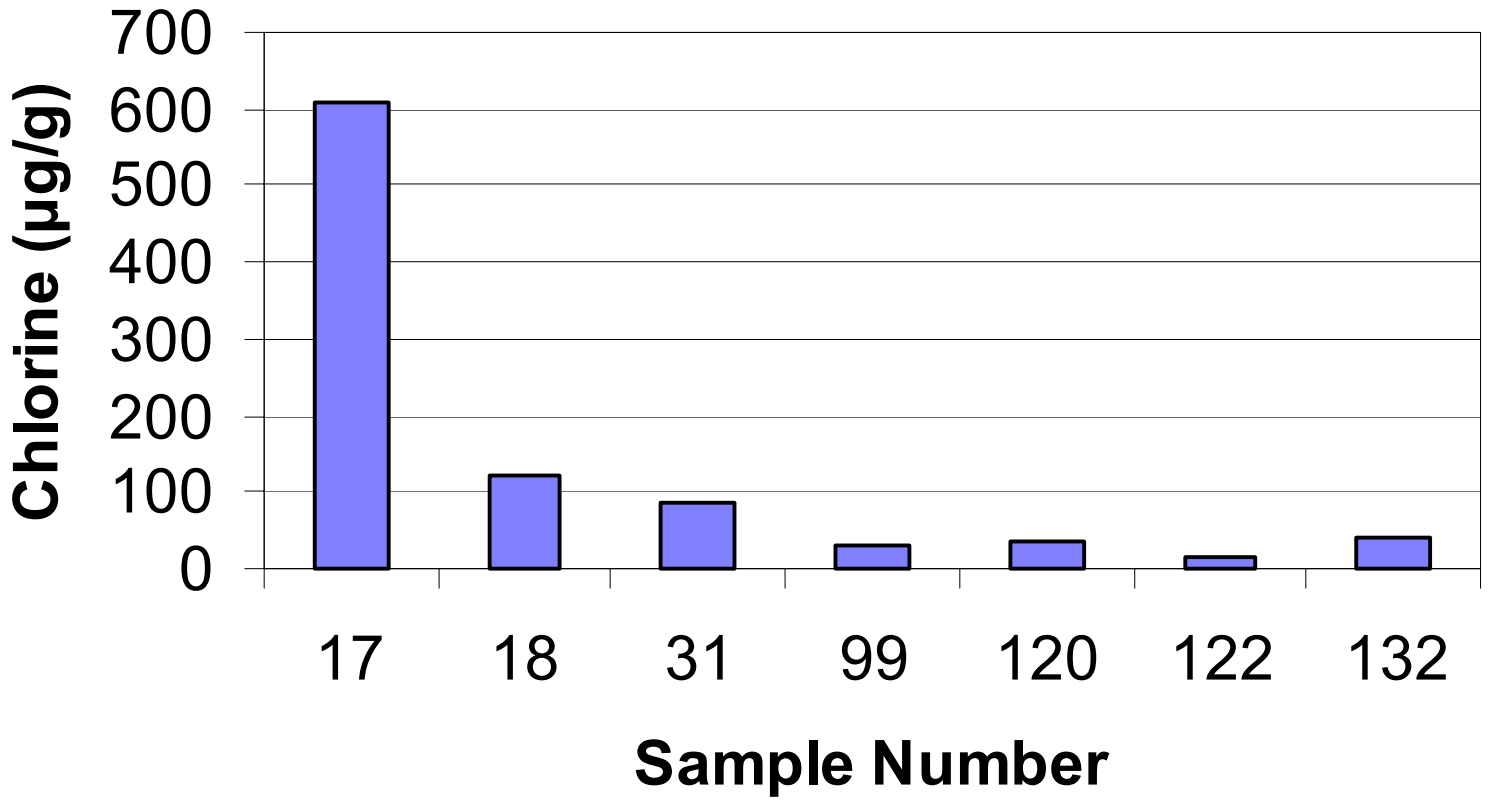
Chlorine: Possible Contamination



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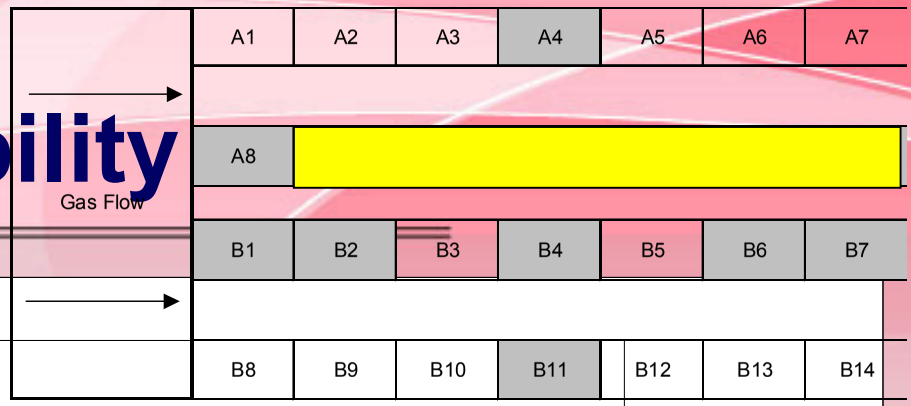
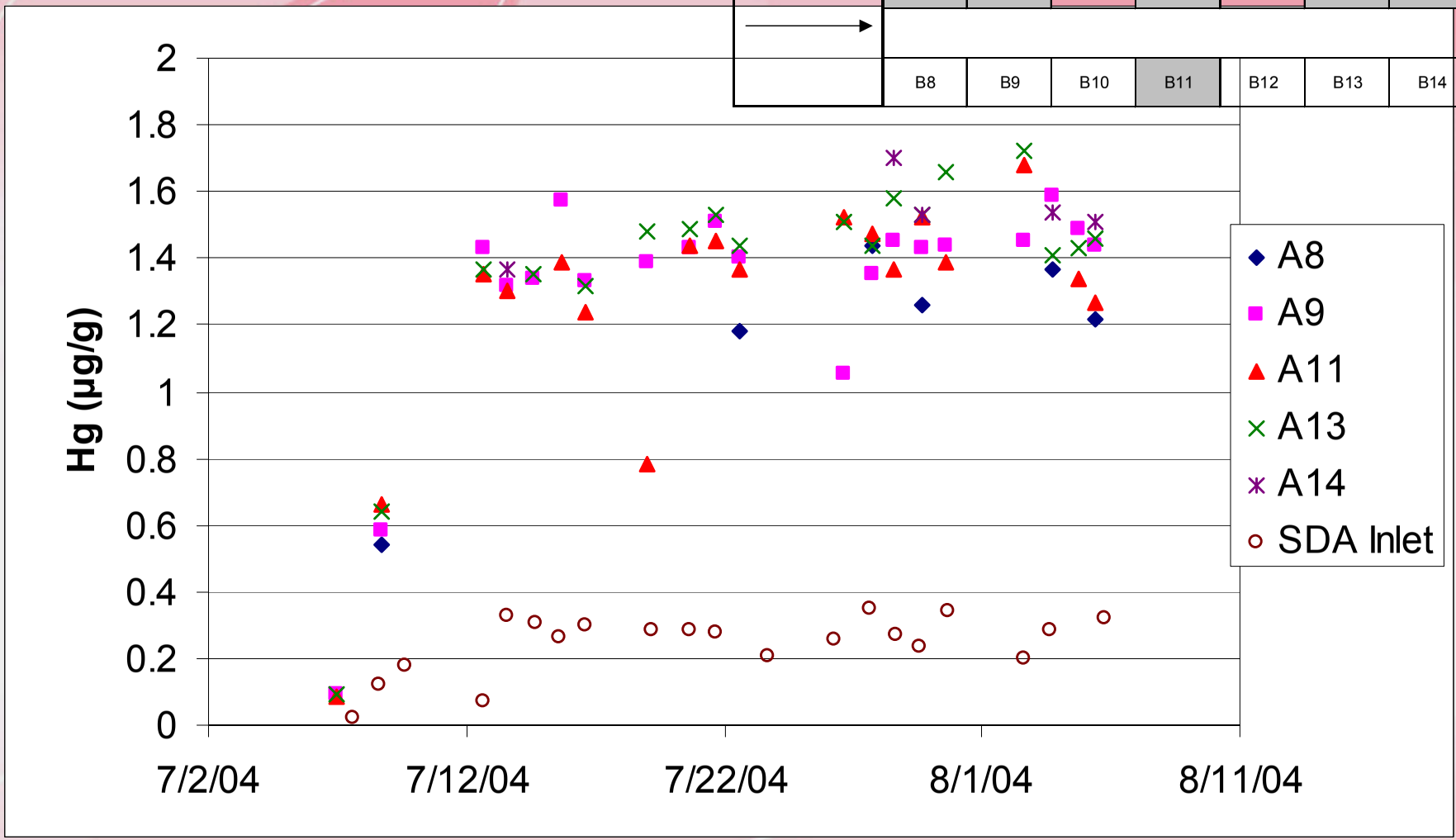
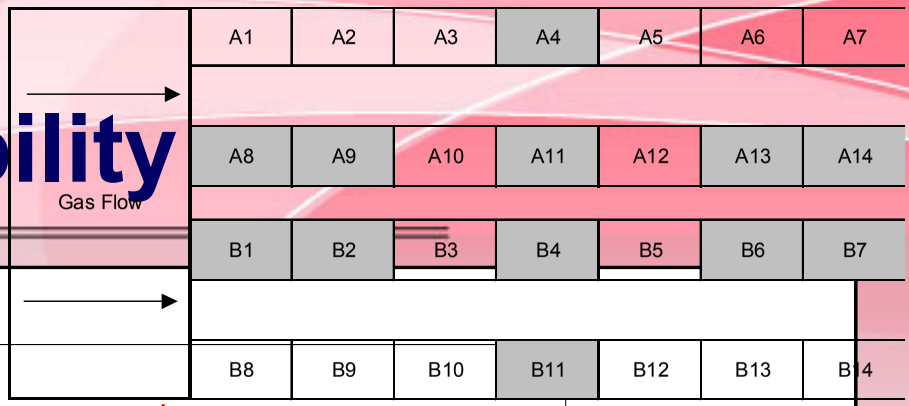
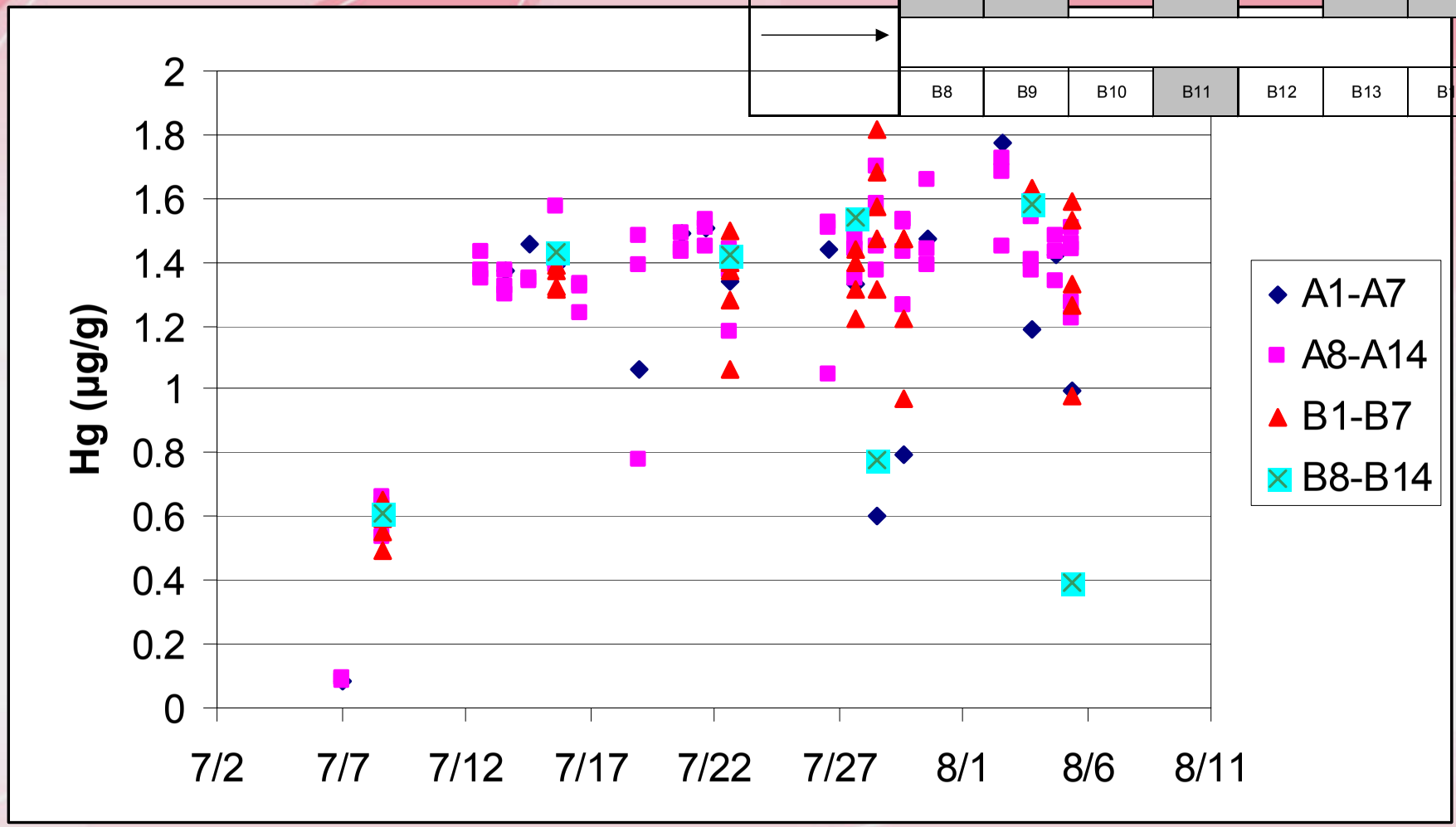
Hg in Ash – Variability



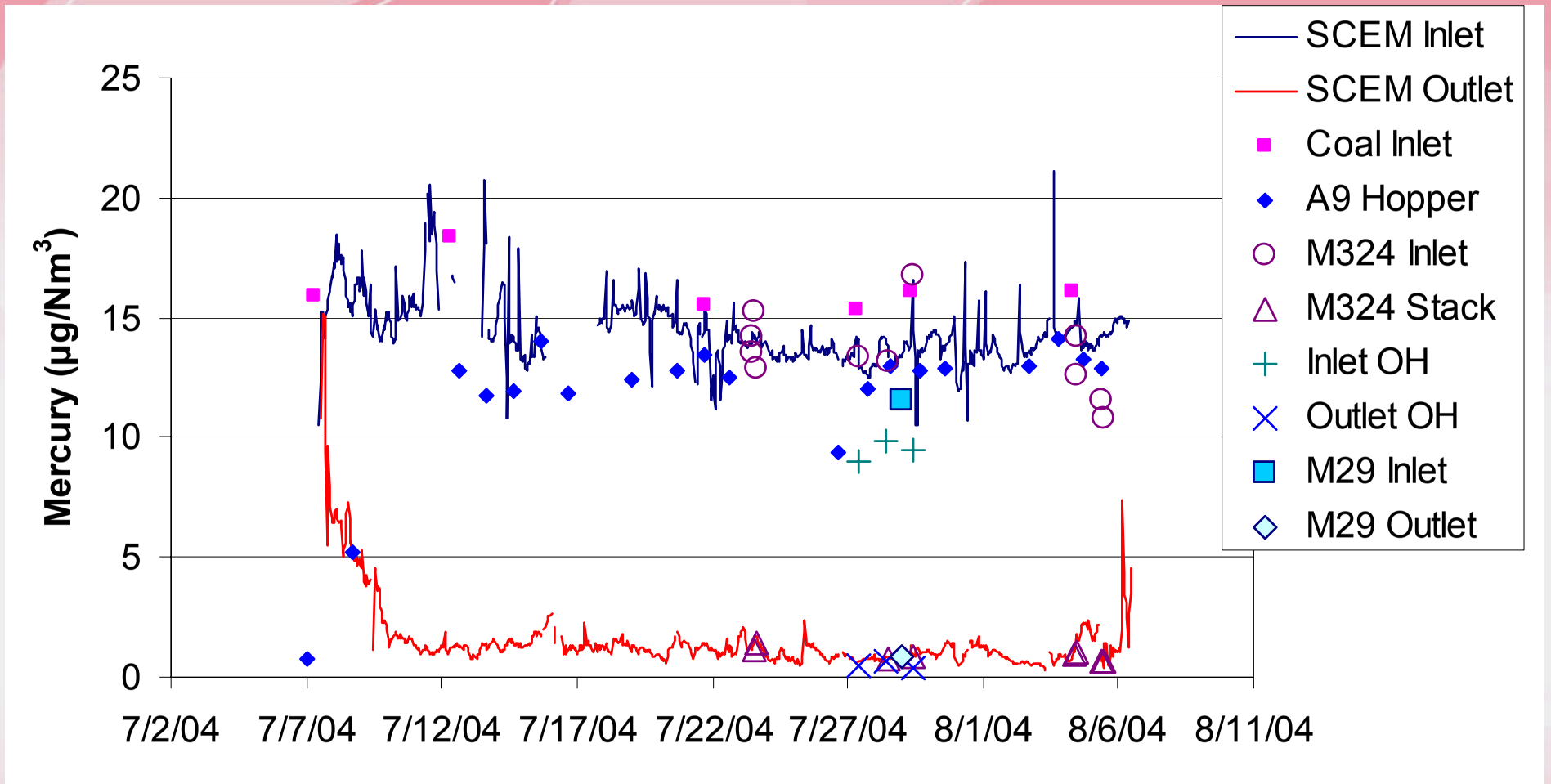


Hg in Ash – Variability





Mercury Measurements at Holcomb



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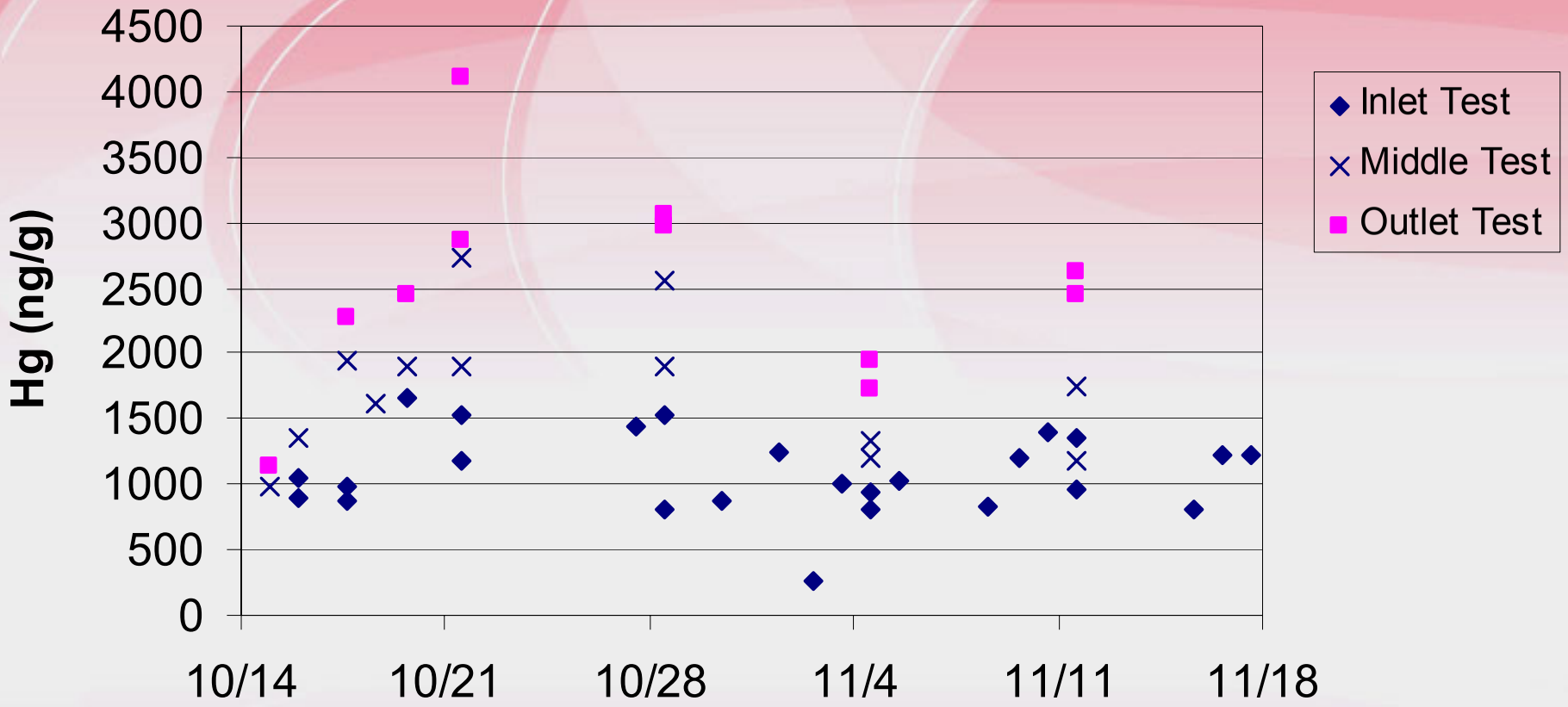
Mercury in ESP Ash



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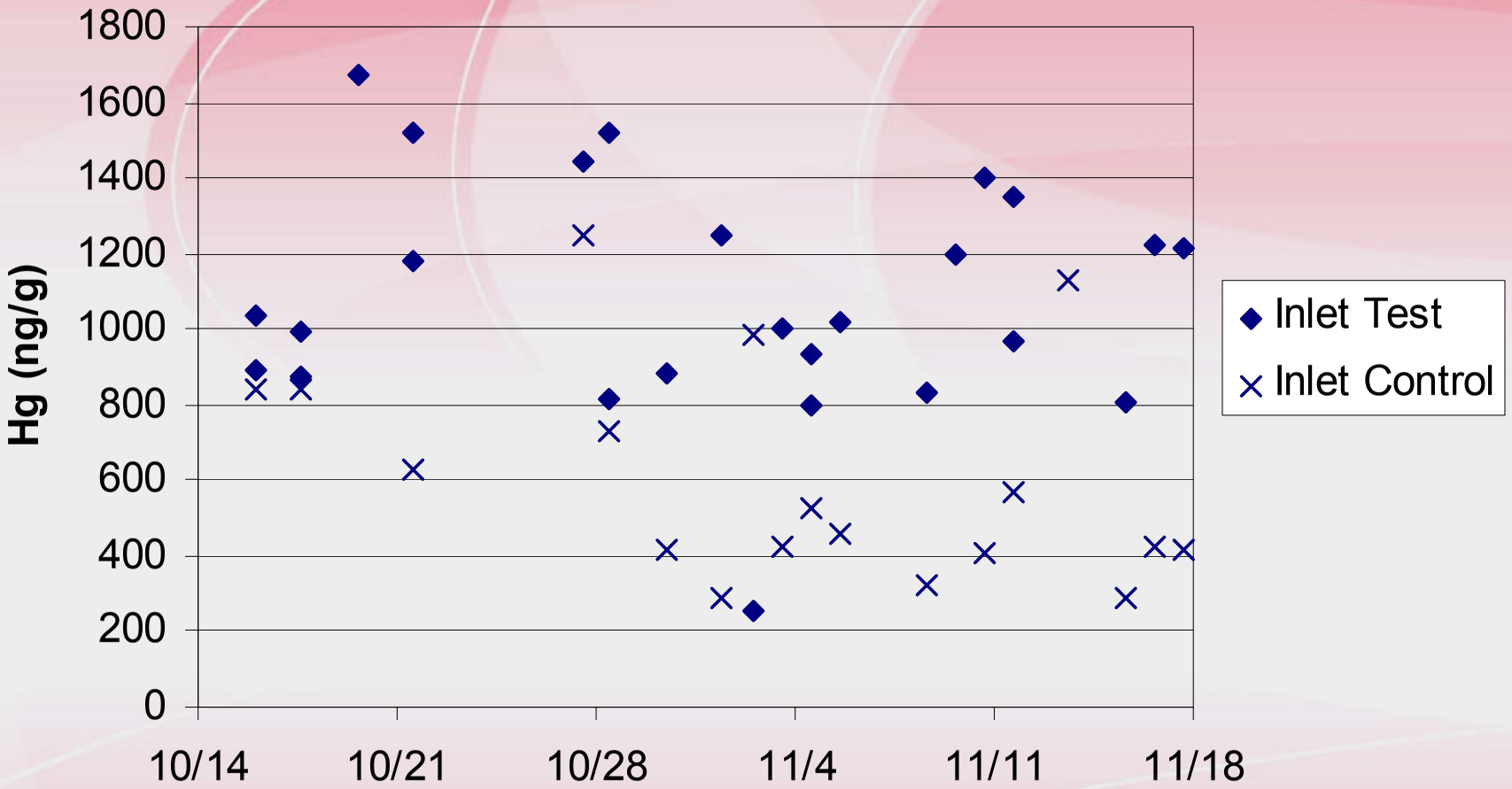
Mercury in ESP Ash



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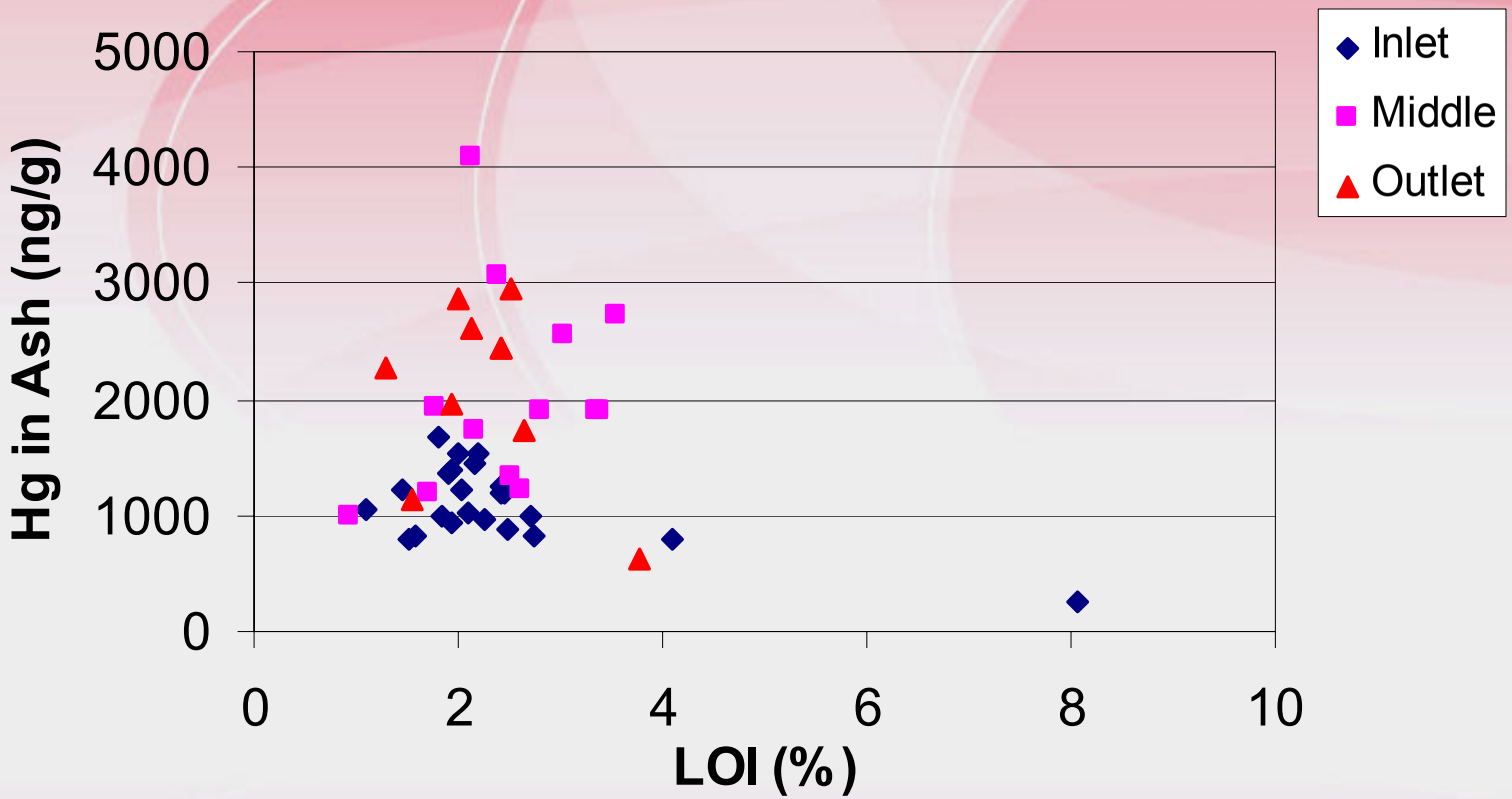
Hg and LOI: Test-Side



No correlation between mercury in the ash and LOI in samples with PAC

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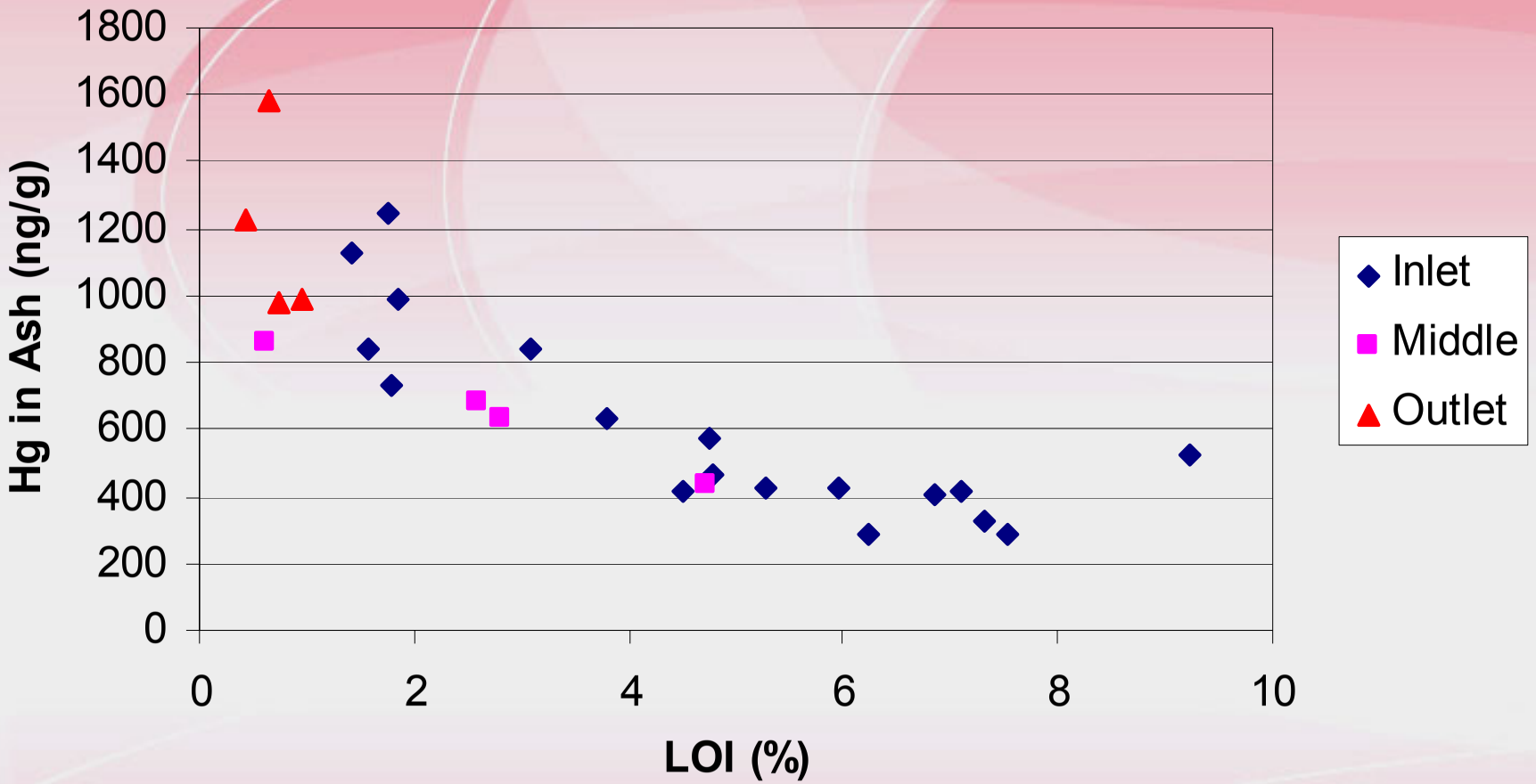
Hg and LOI: Control-Side



Mercury in the native ash inversely proportional to LOI

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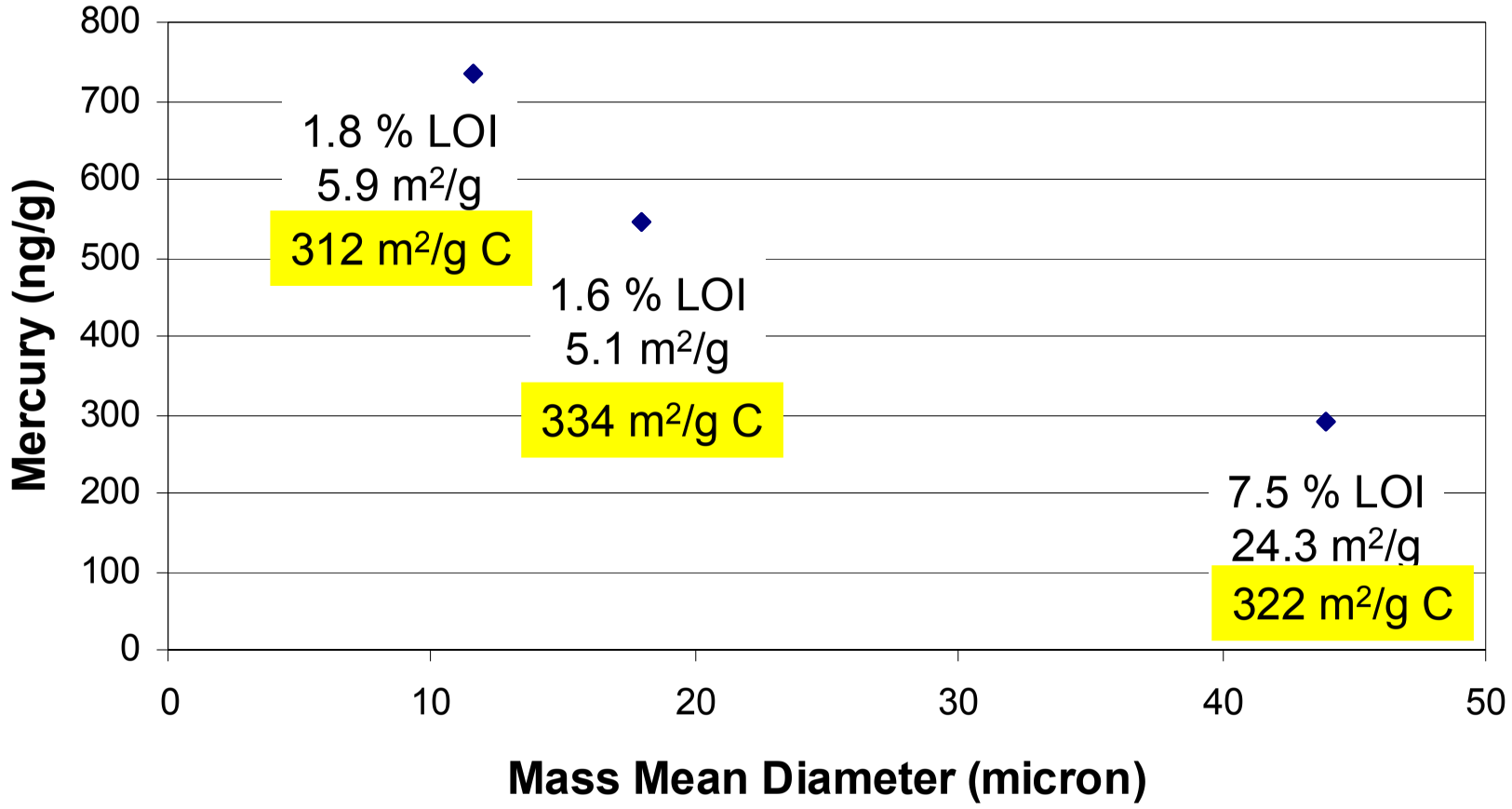
Ash Size and Surface Area Control-Side



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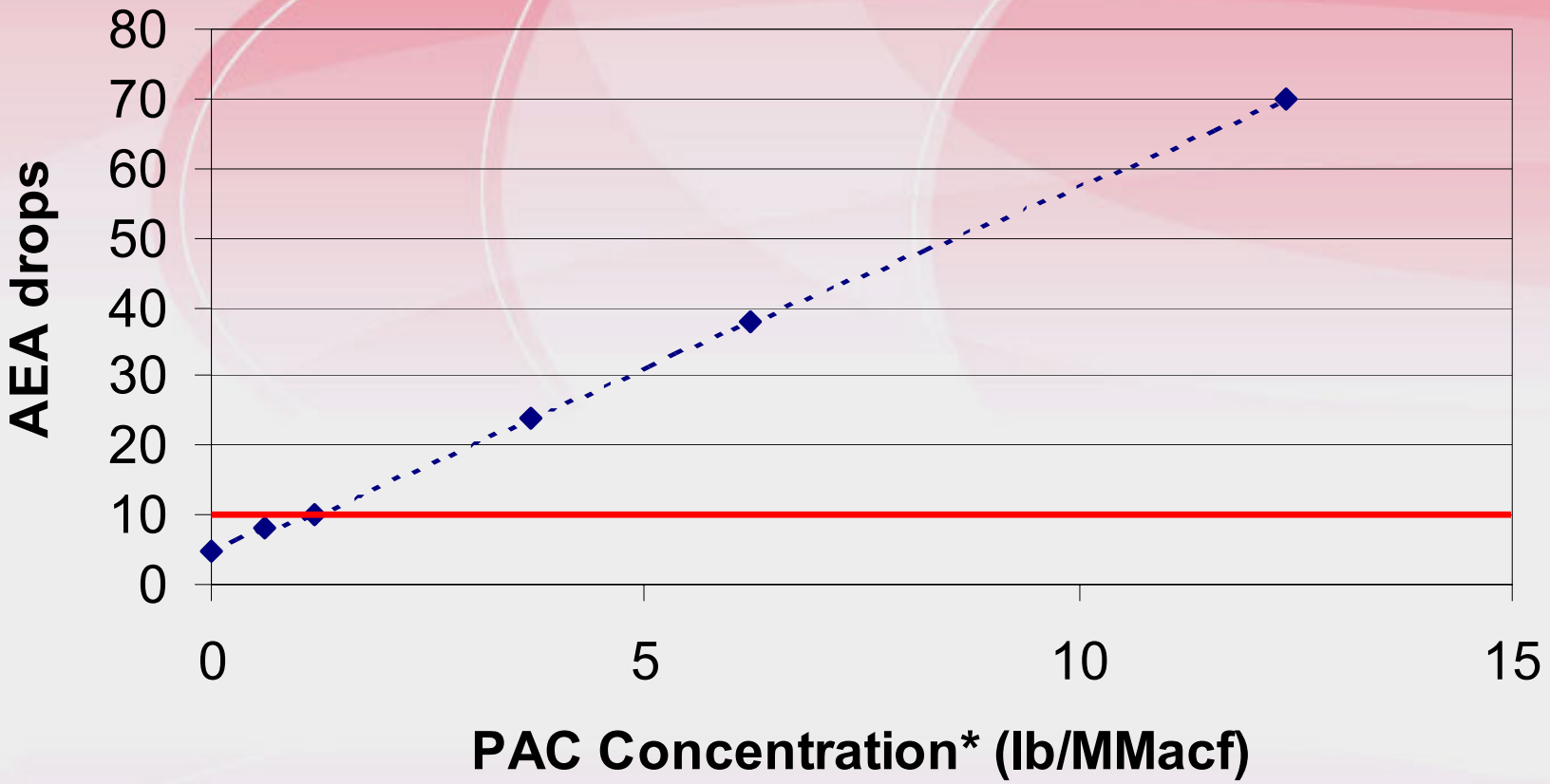
Foam Index Test Results



*Estimated concentration. PAC mixed with sample of baseline ash.

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Leaching

- SGLP Results:
  - Mercury below detection limit in all leachate solutions
  - Some bromine leached from the ash/ DARCO® Hg-LH sorbent mixtures

Additional testing and analysis should be conducted to quantify the impact of bromine leaching from fly ash/sorbent mixtures.

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Thermal Stability

The thermal stability of mercury in ash increases when DARCO® Hg-LH activated carbon is present.

- Holcomb:
  - 240°C (baseline)
  - 315°C (with PAC)
- Meramec:
  - 358°C (baseline)
  - 419°C (with PAC)

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Summary

- Careful sample collection, handling, and analysis are critical
- Mercury leaching from collected ash samples is near the detection limit for most methods
- Some bromine leached from the ash/DARCO® Hg-LH sorbent mixtures
- Mercury in the native ash at Meramec was inversely proportional to LOI
- Thermal stability of mercury in ash increases when DARCO® Hg-LH is present

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