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Balance-of-Plant Impacts at Big Brown and Poplar River Power Stations

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TOXECON™ Test Sites

- TXU's Big Brown Station, tested one-quarter of Unit 2
- SaskPower's slipstream ECRF at Poplar River Station

Big Brown Station, Unit 2

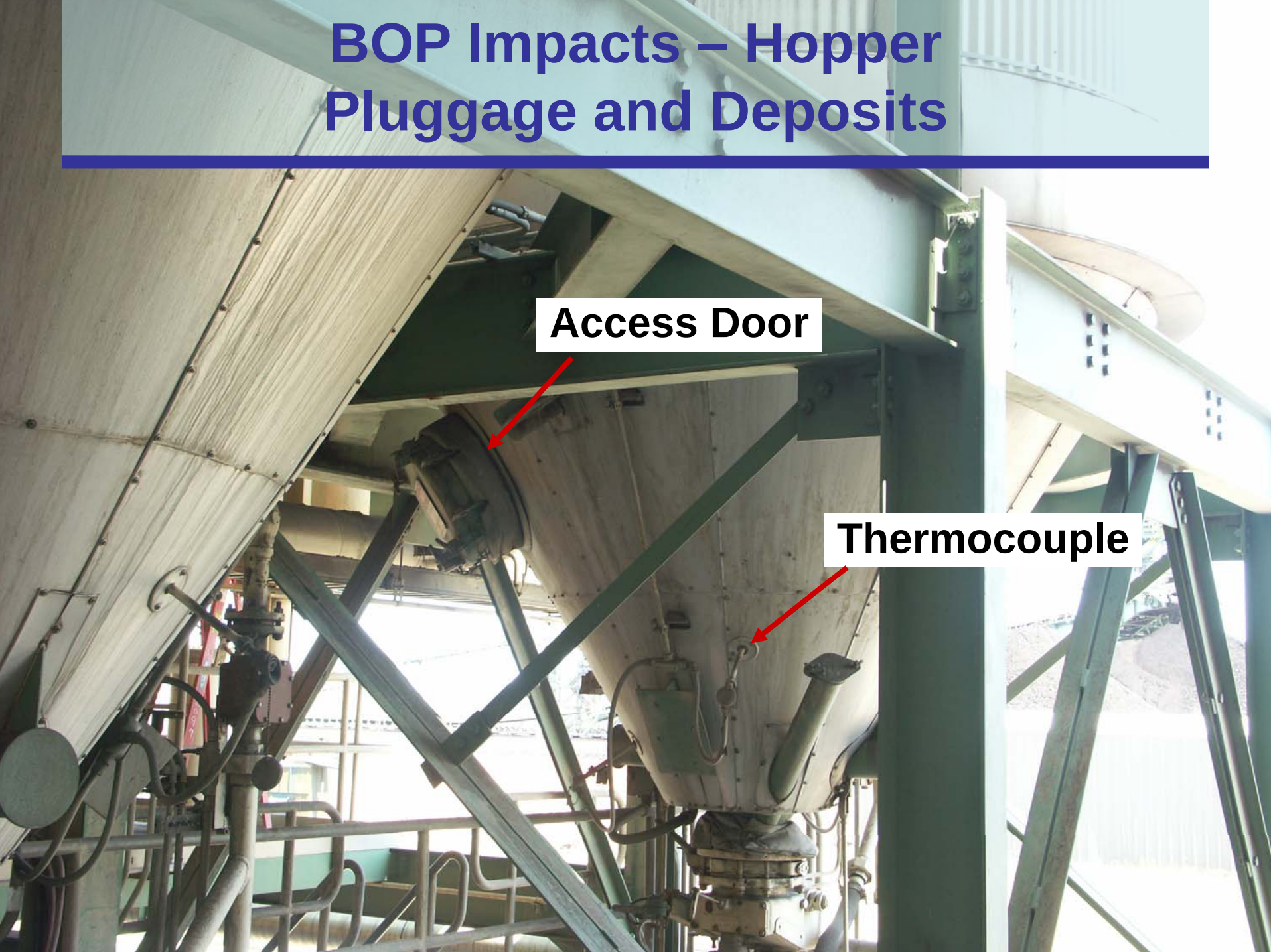
Big Brown Field Testing
Balance-of-Plant Issues

- **Bag Blinding**—Following Hg field testing, the residual drag across FF 2-4 had reached a point where TXU was not confident in its performance for the upcoming summer season; therefore, the plant initiated a full bag replacement of FF 2-4 in May 2006.
- **Plugged Hoppers/Deposits**—During the bag change, it was discovered that two of the eight hoppers (hoppers C and H) on FF 2-4 were plugged and filled with ash.
- **Ash Smoldering**—In the two plugged hoppers, unusual deposits were found mixed with the loose ash, which was reported to be very hot and smoldering.

Determining Cause-and-Effect Relationships are Very Difficult – Many Possible Factors to Consider

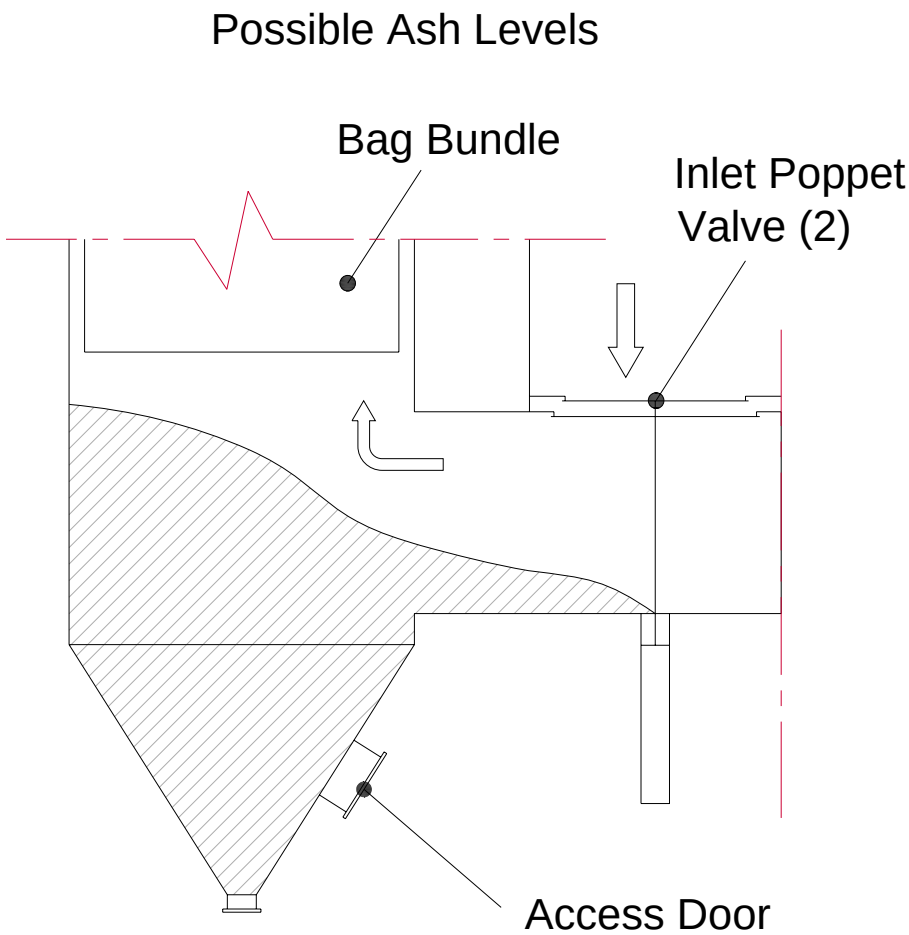
- Injection of material causing filter blockage
  - AC
  - Additives/treatments
- Changes in flue gas or ash chemistry due to addition of sorbent materials and/or changes in operating conditions
- Changes in operating conditions
  - Flow rate (rebalancing of flow, increased flow)
  - Temperature
  - Ash conditioning (SO3, NH3)
  - Fuel blend
  - Load variation
  - Outages

BOP Impacts – Hopper Pluggage and Deposits



BOP Impacts – Hoppers Ash Level

- When opened for the bag change, both Hoppers C and H were completely full of ash to a height above the access door.
- The operators did note that ash had collected in the inlet duct and was probably at least to that level and, therefore, completely filling the bottom cone.
- They did not think ash contacted the bags since that would require the entire inlet duct to become blocked.



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Smoldering Ash/AC Ignition

- It appears that the hoppers plugged during ACI creating conditions suitable for ignition of the AC to occur, but a key unanswered question is, what is the exact mechanism of ignition and under what conditions does it occur.
- Given the hopper construction and information from the plant, hopper heaters, electrical shorts, welding, etc., have been ruled out as sources for igniting the AC.
- Self-heating and eventual ignition seems most feasible, however, this case differs from Presque Isle in that the hopper heaters were off and the only apparent ambient heat sources are the flue gas and possible hydration reactions. Note, self-ignition was not observed on any of the remaining hoppers for which the hopper heaters were functioning properly.

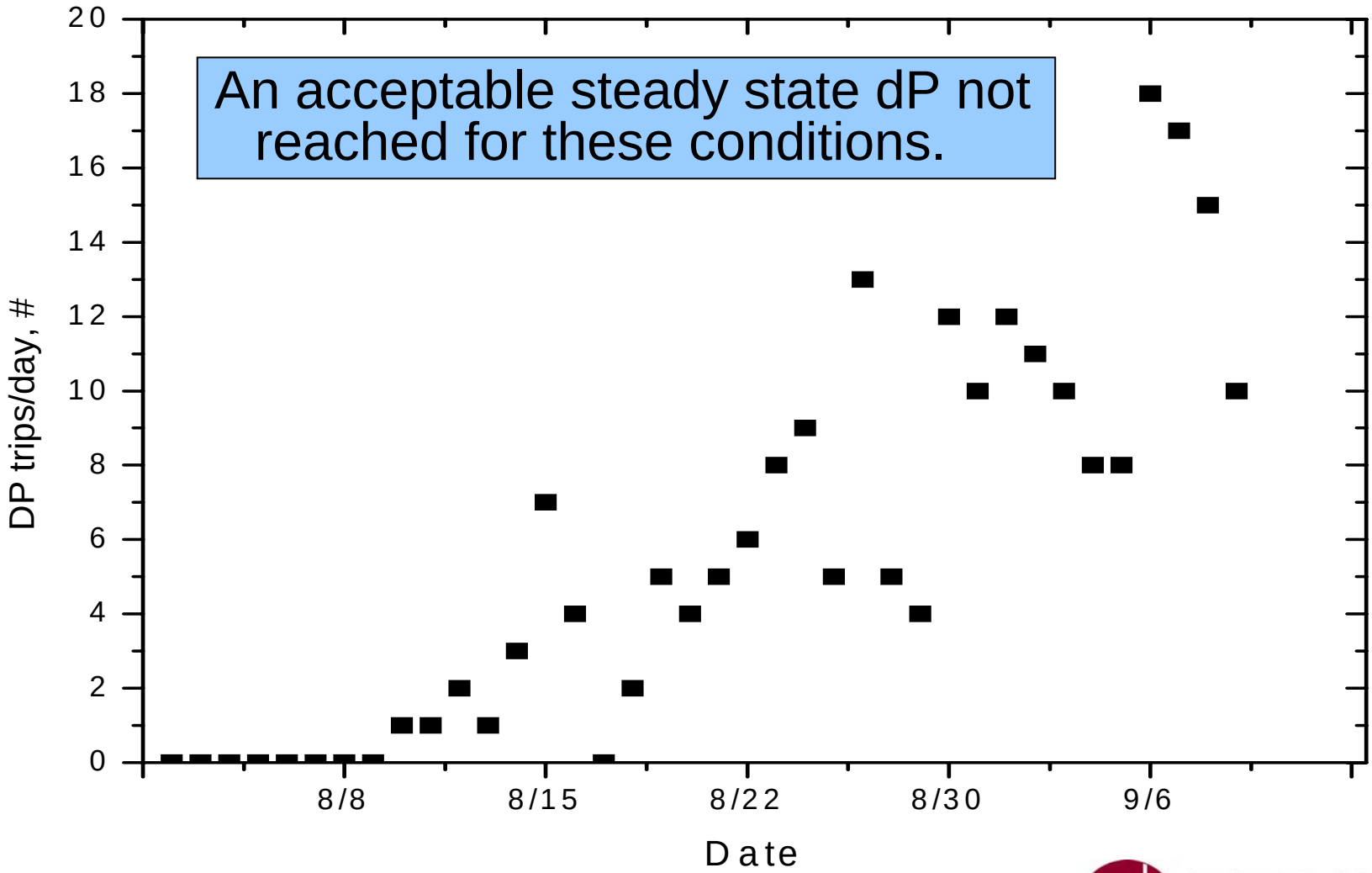
ECRF at Poplar River Station

ECRF Long-Term Testing

Designation	LT1	LT2	LT3
Air-to-Cloth, ft/min	6	6 & 8	6
FF Outlet Temp., °F	300	300	300
Ash Loading, lb/Macf	34	4.7	34
AC Feed, lb/Macf	2.5	2.5	2.8
Cleaning, p/b/hr[1]	3.4	3.4	3.4
Bag Type	Std.	Std.	Hi-Perm.
Duration, weeks	5	10	10

[1] Cleaning also initiated when dP reaches 10” WG.

ECRF LT1 Cleaning "Trips" at dP of 10" WG



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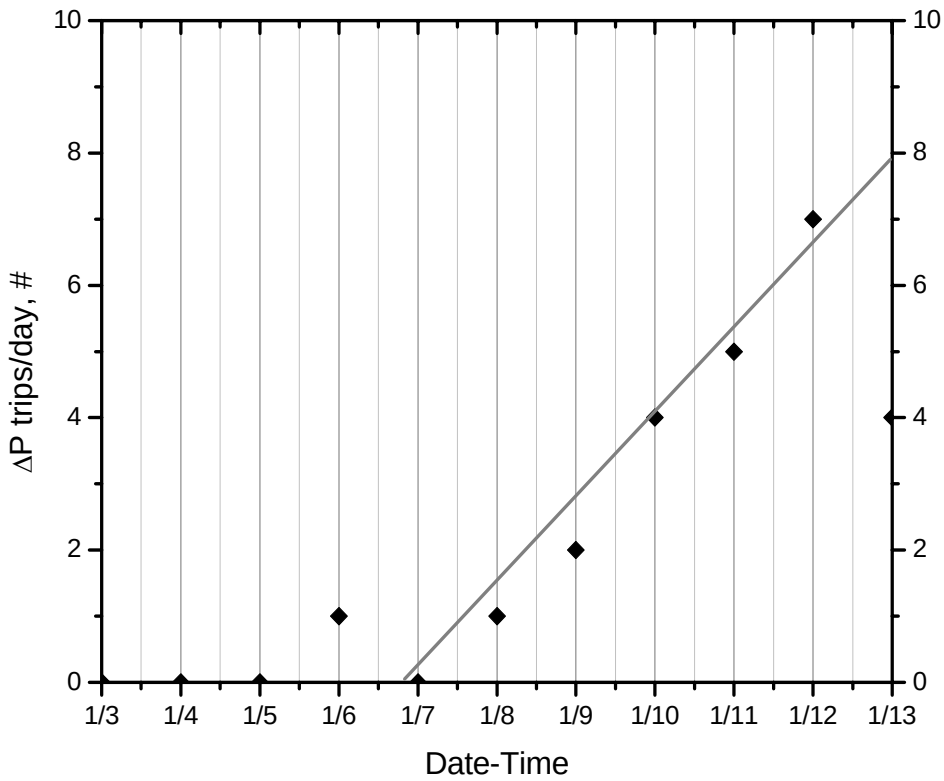
ECRF LT2 Cleaning “Trips”



- LT2 conditions (low ash load) at A/C of 6 ft/min resulted in a steady-state dP of approximately 6”.
- However, at an A/C of 8 ft/min, dP could not be maintained, and cleaning trips started within three days.

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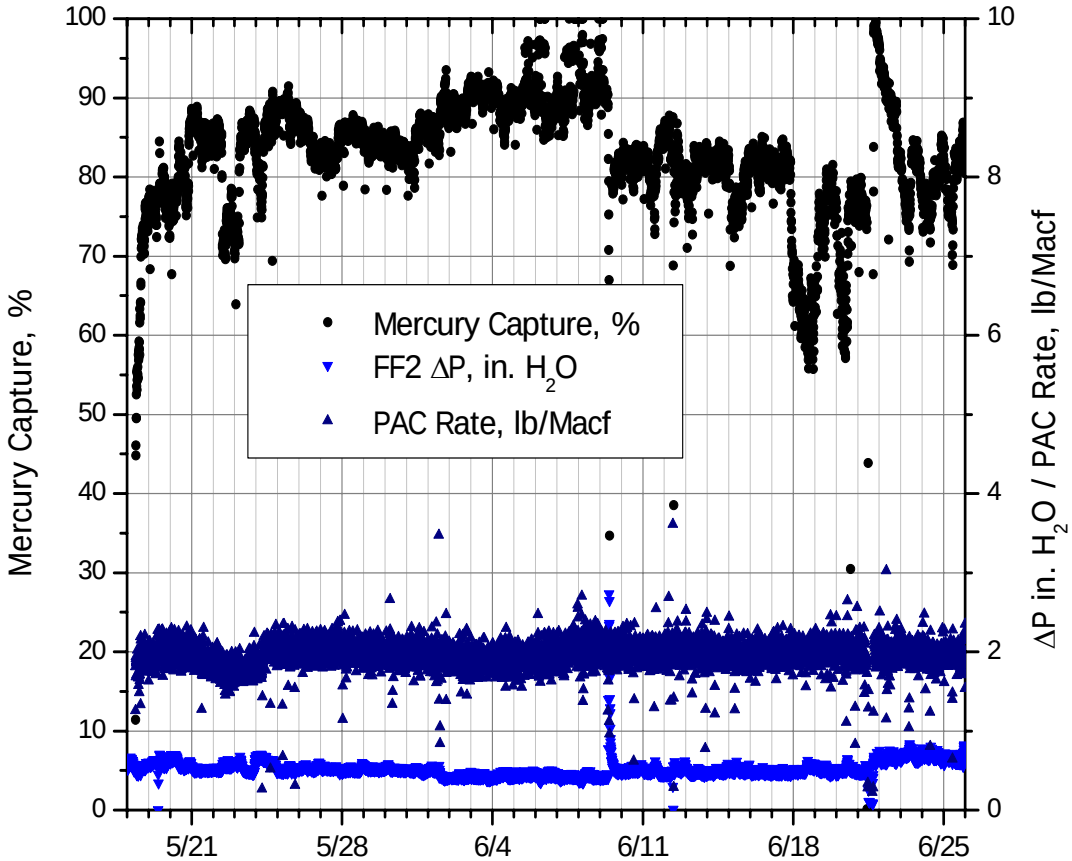
LT 3—Hg Capture, ACI Rate, and dP



- With a switch to high-perm bags and the same ash loading conditions of LT1, steady-state dP was less than 1”.

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