Ammonium Bisulfate Anti-Fouling Probe

AbSensor-AFP

Why Ammonium biSulfate?

Ammonia is a difficult measurement:

- Equipment not robust ~ Scientific/Lab,
- Ammonia/ABS may already have reacted,
- Fouling may be also related to: SO_3, Spatial non-uniformity of NH_3, O_2, Temperature range and intensity - - -

Better to Measure Fouling Directly by Its Effect:

- <u>Heavy, wet, slimy</u> dew-point fouling at much higher temperatures than SO_3 ESP inlet particulate (dp),
- Fouling occurs at ABS dew-point of 300° to 575°F

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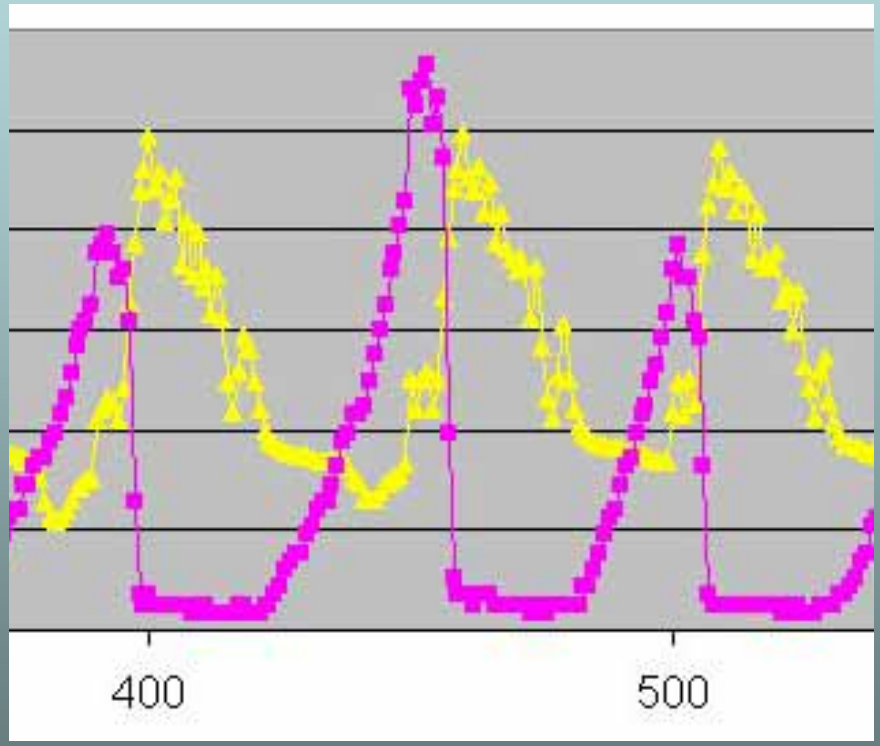
AbSensor-AFP

Anti-Fouling Probe

AbSensor-AFP

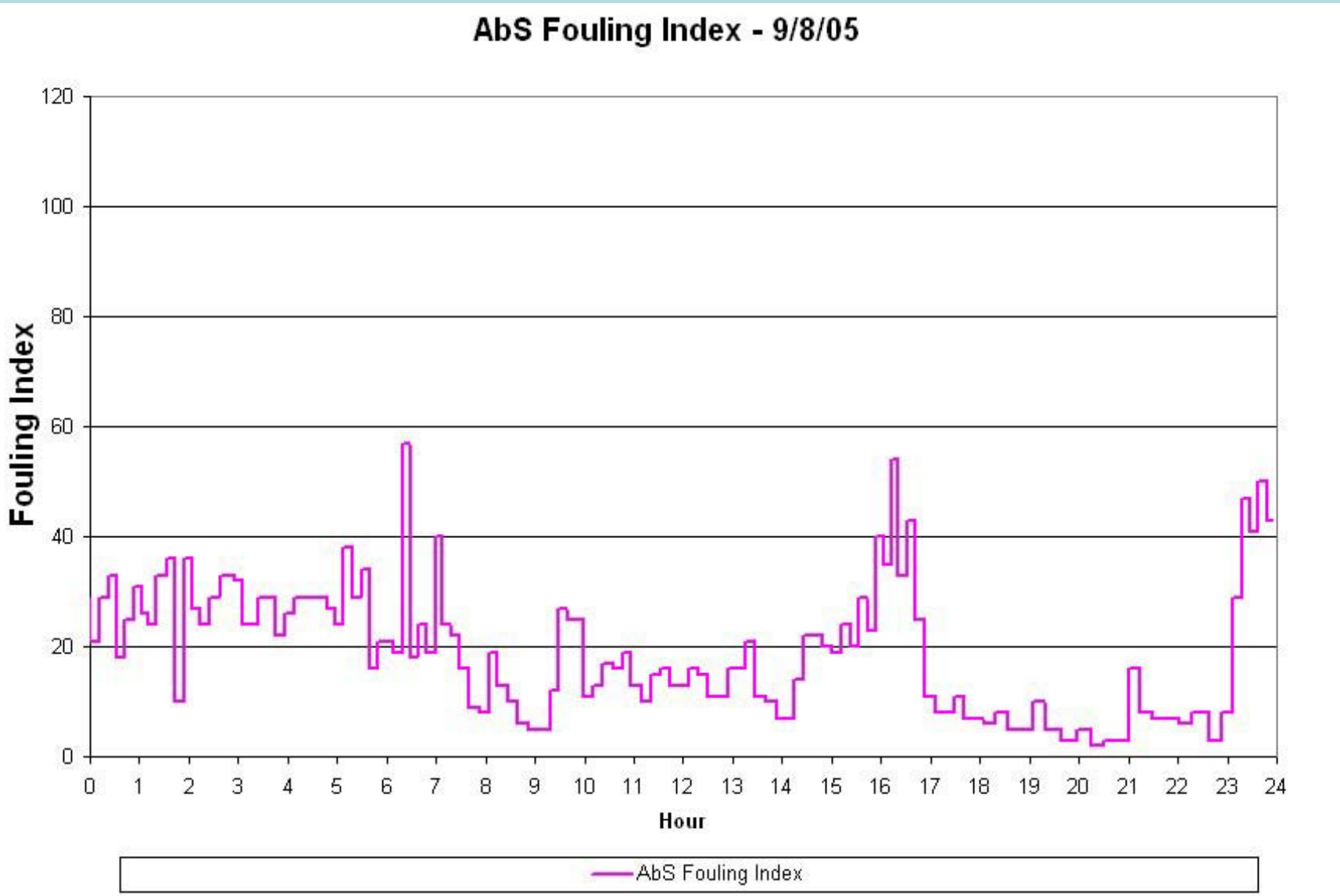
- Determines AbS related fouling propensity by determining the onset temperature (dew point) of and magnitude ammonium bisulfate.

How It Works!

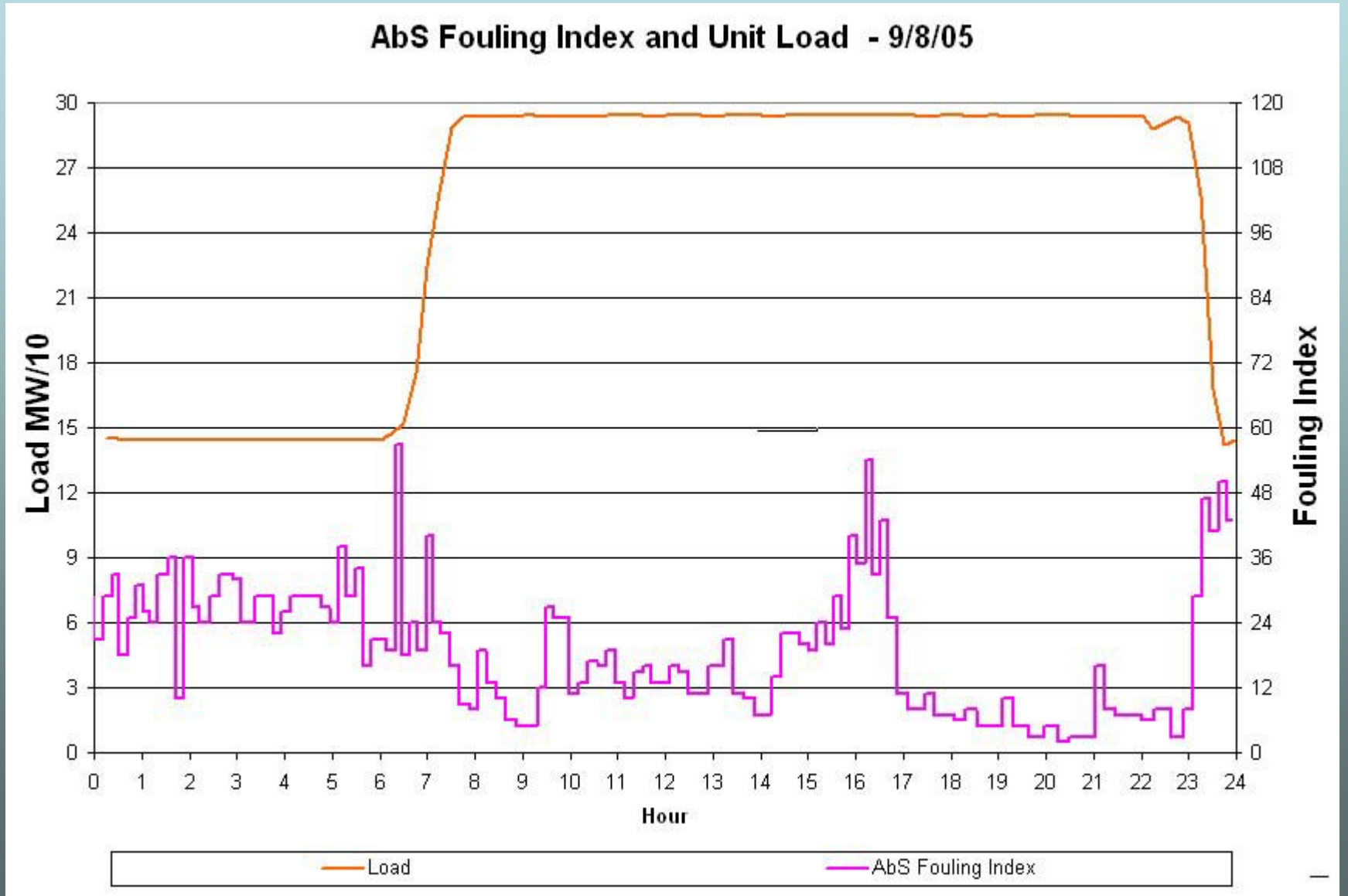


1. A hot probe is precisely cooled until condensation current is detected. (Dew Point)
2. It then heats up via flue gas temperature until current stops. The max current is noted.
3. An algorithm combines the information into the fouling index.

Field Trials



Field Trials



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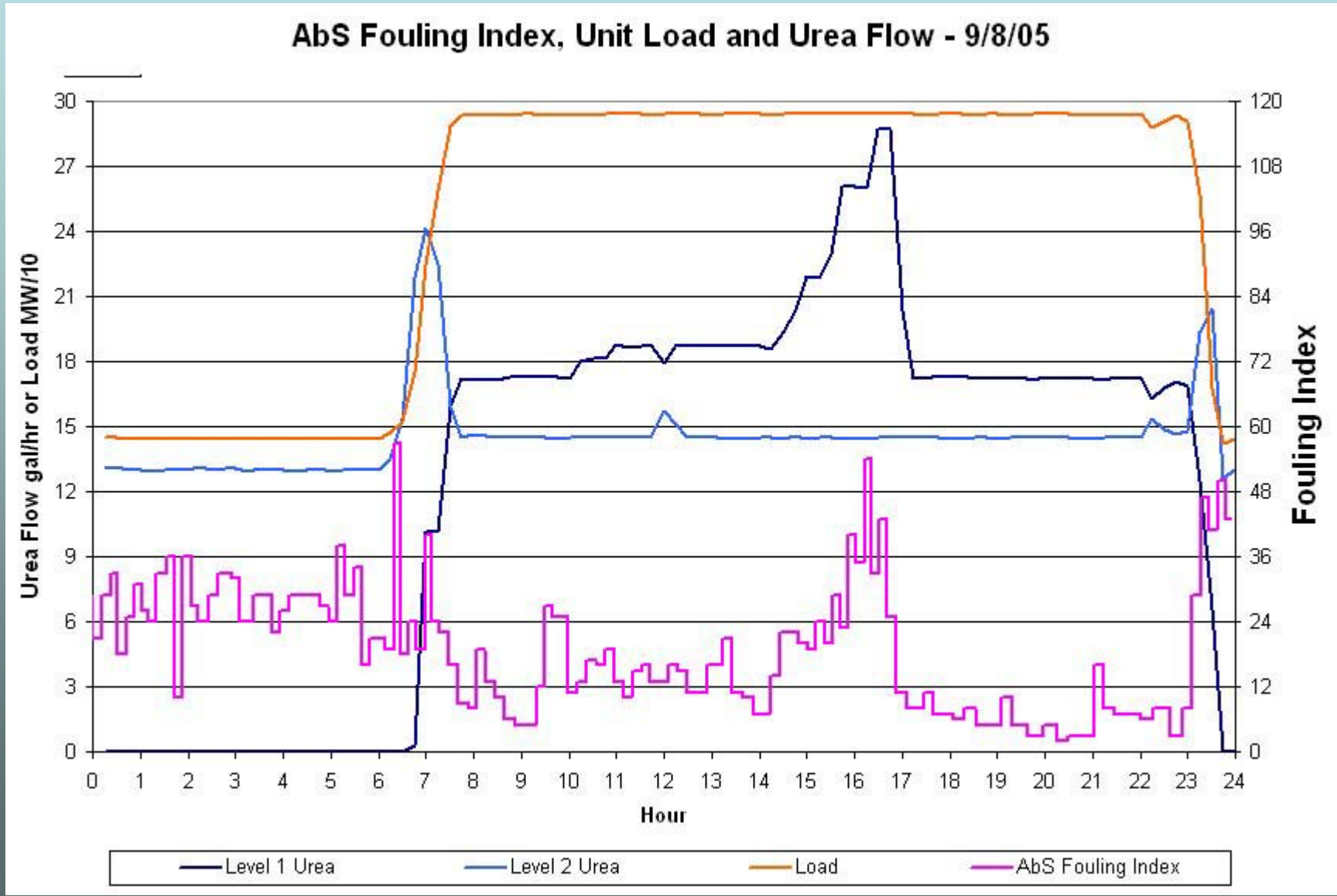
Field Trials



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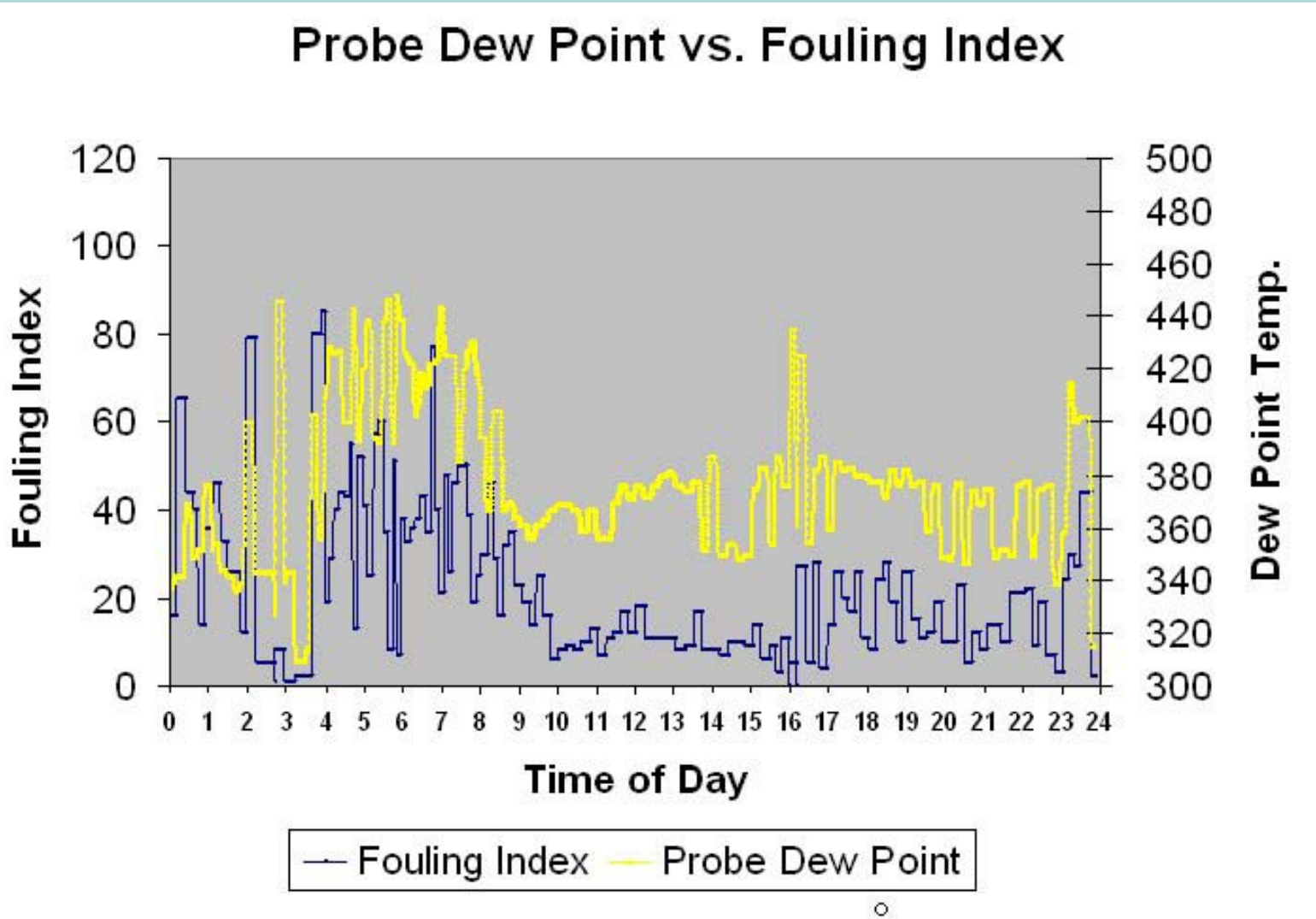
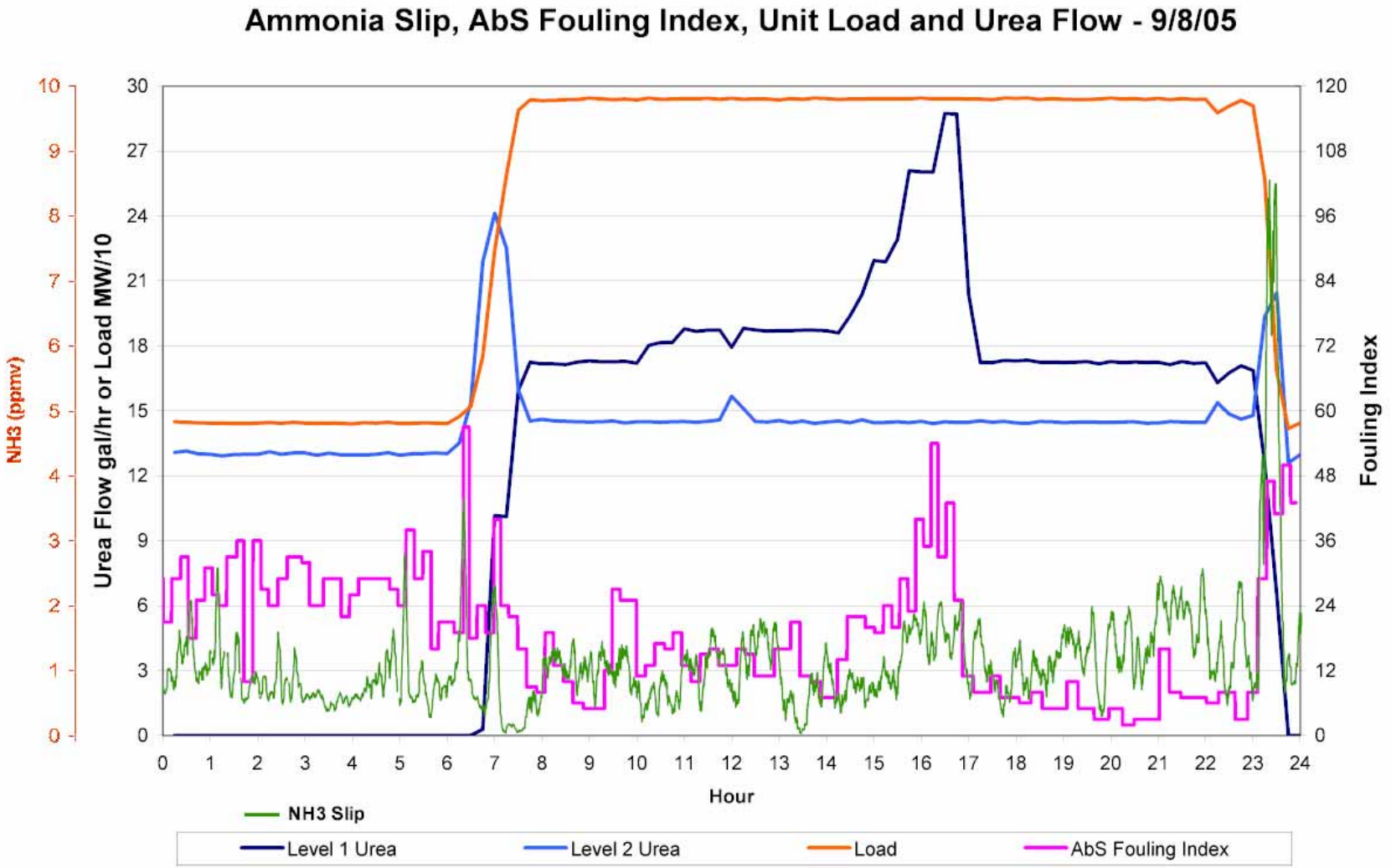
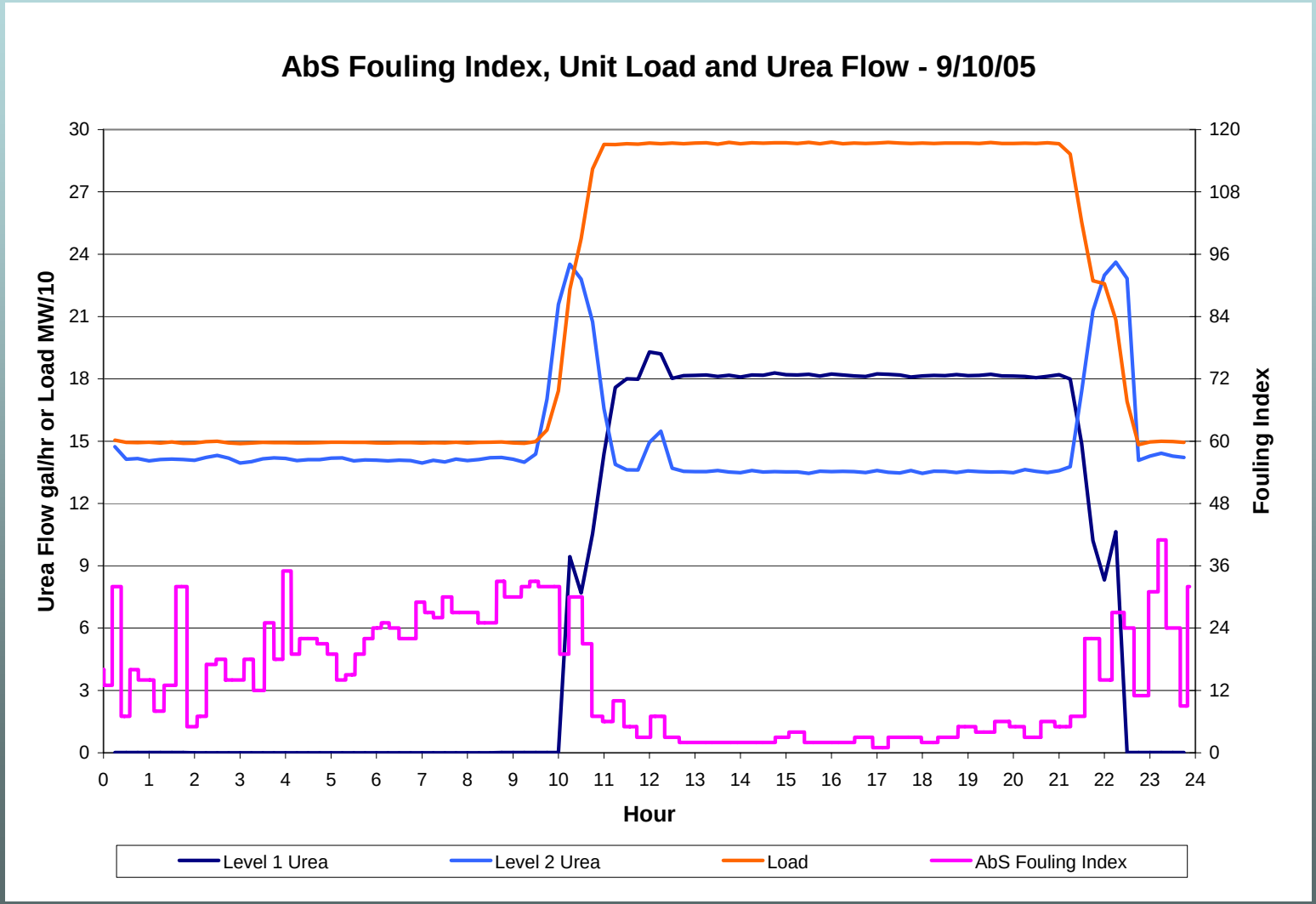
AbS?



Comparative Data



AbSensor as a Control Device



Life & O/M Costs

- In gas life should be 24 months
- Replacement of the probe tip is easy and inexpensive (<$5k)
- Operating air, electricity, and maintenance manpower are minimal.

Future Work

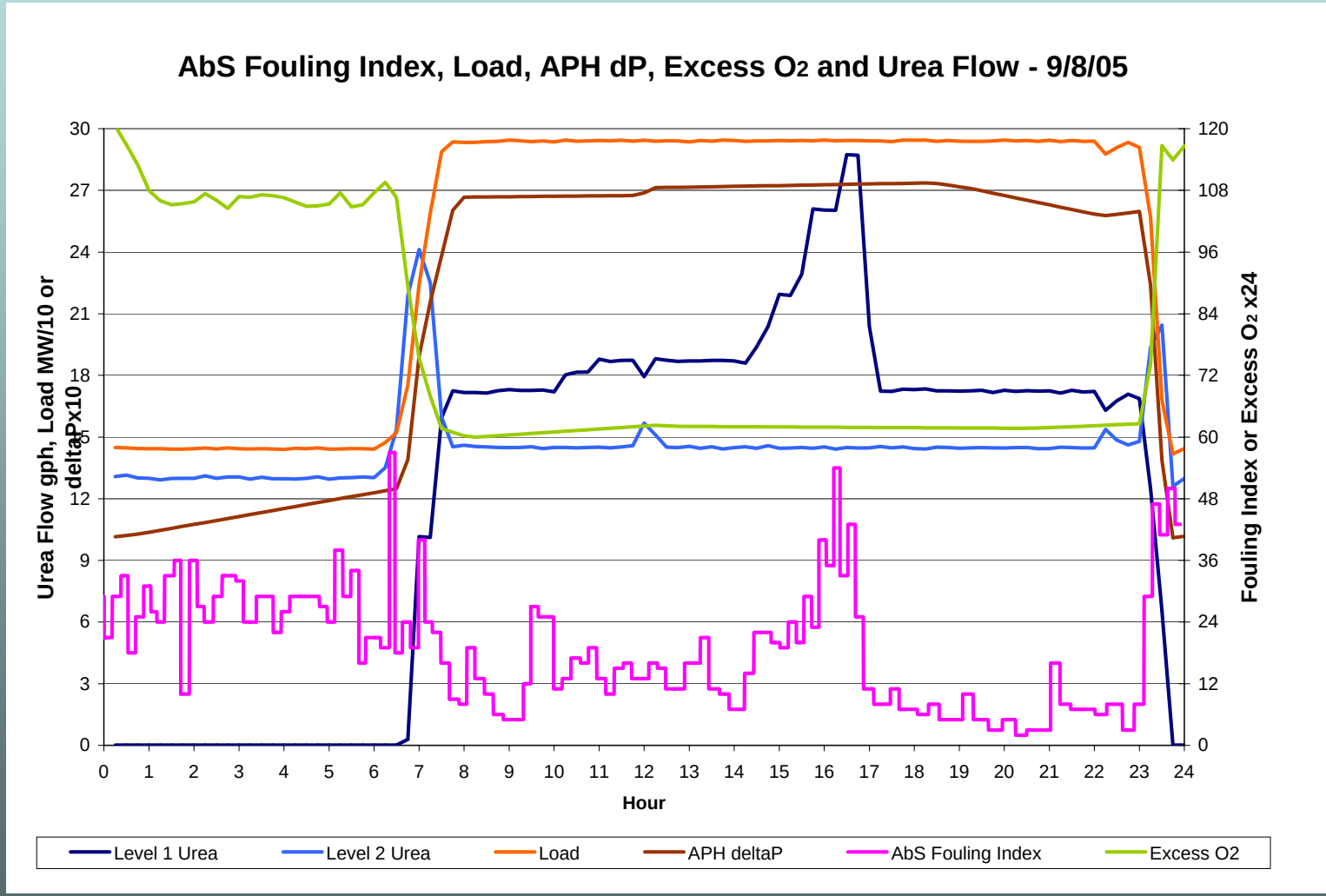
Future Work

- Closed Loop Control
- Multi-point Detection

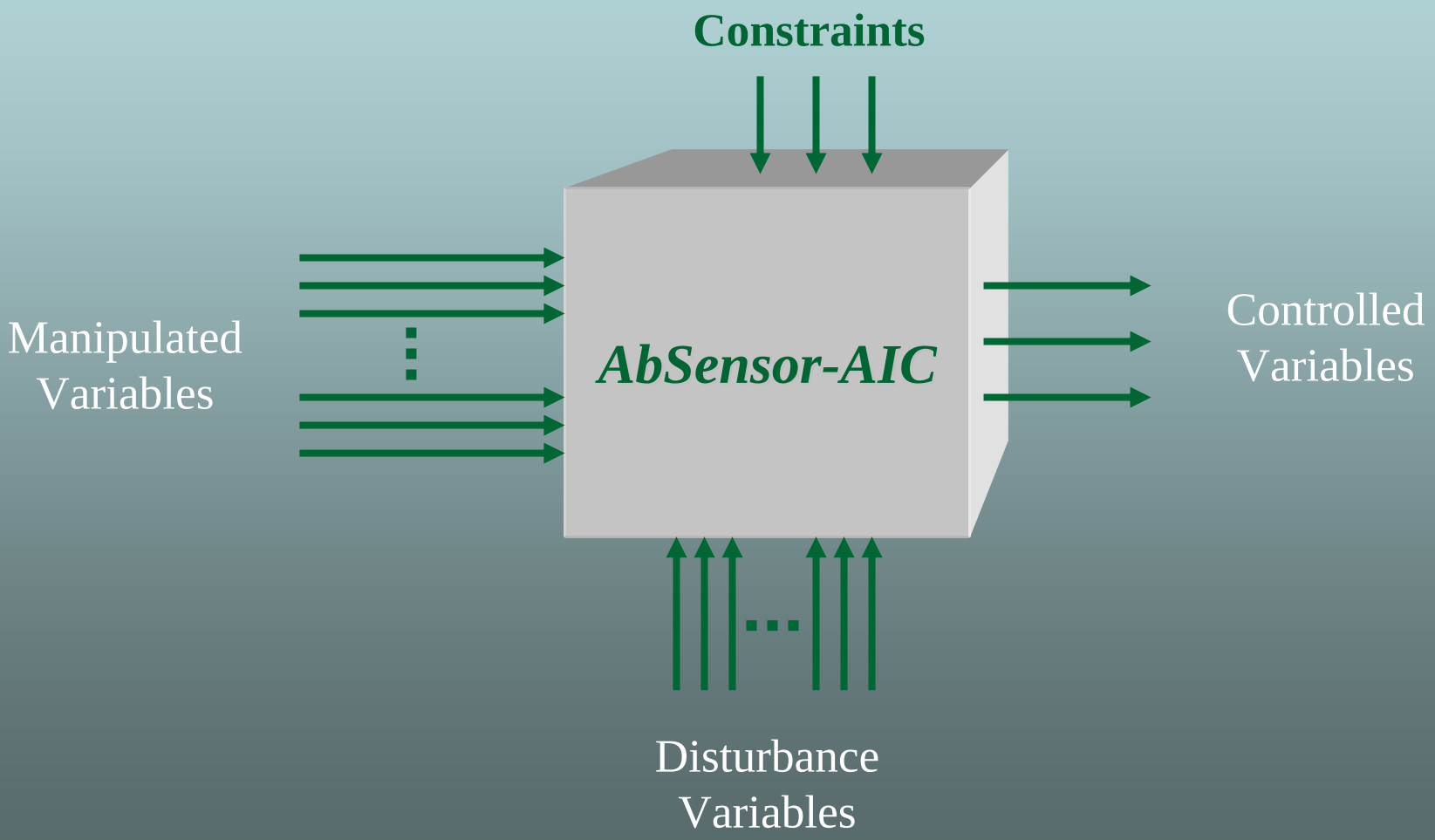
Fouling Point

- What is needed is to determine the relationship between the fouling index and the localized fouling threshold.
- This will almost certainly be site specific and could potentially benefit from the information used in the EPRI APH Fouling Model.
- The information in the model in conjunction with our MVPC algorithms will yield a real-time, predictive model of fouling which can be coordinated with AbSensor feedback into a powerful controller.

Fouling Point vs. FI



QuickStudy MVPC



2006 Beta Work

- Comparative AbSensor/EPRI Fouling Model coordination demonstration

- 2 – SNCR Closed Loop (AbSensor-AIC) Beta
- 2 - SCR Closed Loop (AbSensor-AIC) Beta
- 1 – Ash Quality Beta
- 1 – ESP Performance Beta

Multi-point Detection

- Point measurement vs. cross-duct?
  - There is no correct point nor is there a correct position for the cross duct placement.
  - Average reading vs. point discrimination
- Multiple Probe Potential
  - Low cost, slow response (up to four probes)
  - Higher cost, faster response, multiplexed electronics

Thank You!

For Further Information:
Cal Lockert, Tephra Resources, LLC
104 Champion Lane, Chagrin Falls, OH 44022
(440) 840-0137
Cal.lockert@tephraresources.com