Title: Experience Using a CAMRAC Online UBC Analyzer to Help Improve Combustion

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Summary:

CAMRAC is a semi-continuous diagnostic for online measurement of flyash carbon using a microwave absorption technique. Fly ash samples can be collected every 10-15 minutes using a special isokinetic-sampling probe mounted on the economizer outlet duct. The flyash samples are automatically transferred to the instrument, which is closely coupled to the probe.

ADA-ES has used the CAMRAC instrument to tune burners for low NO_x, LOI, and opacity. We also have monitored cyclone boiler combustion and used the CAMRAC to quantify improvement when the slag coating in the cyclone barrel is thickened. The LOI readings also could be useful for understanding mercury emissions data, since carbon can affect Hg capture by electrostatic precipitators. Results from three power plants are summarized below.

Wall-fired Boiler.

- Unburned carbon was suspected as the root cause of frequent opacity violations experienced at this unit.
- We installed the CAMRAC unit at the economizer outlet as a diagnostic for combustion tuning tests.
- Baseline (as-found) carbon in the flyash was measured at 20-30%, with much of the carbon as sub-micron soot as determined by microscope analysis.
- Analysis of precipitator performance data indicated a space-charge limitation due to the sooting.
- Guided by the CAMRAC, we biased the coal and airflow among three burner elevations and underfire air ports.

- Temporary improvements were achieved when flyash carbon was reduced to the 5-10% range.
- ADA-ES is now under contract to implement permanent combustion improvements.

Cyclone Boilers.

- ADA-ES has installed additive injection systems into the coal transport lines on two cyclone boilers burning PRB coals.
- The additive is a blend of iron compounds, mineralizers, and flow enhancers designed to reduce slag viscosity and increase slag layer thickness in the cyclone barrel.
- The problem with PRB coal is that this slag layer is too thin to capture the incoming coal so that it burns in the cyclone.
- Instead, most of the coal burns in flight in the main furnace, resulting in extensive carbon carryover into the flyash.
- Therefore the flyash can't be sold and the bottom ash quantity is greatly reduced, both of which cut revenues from sale of coal combustion products.
- ADA-ES has installed the CAMRAC analyzer in two cyclone units feeding ADA-249.
- Data from these tests will be available for the oral presentation at this Conference.