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Inside This Issue

Modeling Helps Ensure Effective ACI Mercury Capture

(Courtesy of Airflow Science Corporation)

There are approximately 1,100 coal-fired power plants in the U.S. whose mercury emissions would have been regulated under the U.S. Environmental Protection Agency's (EPA) Clean Air Mercury Rule (CAMR). However, as a result of recent events the federal CAMR has been vacated and individual state are now developing and enacting state specific mercury emission control requirements for electric utilities. As a result many of these units are now planning to install Activated Carbon Injection (ACI) systems to meet the more than 21 state mercury rules for coal-based power plants.

ACI systems remove mercury from the flue gas by injecting activated carbon into the stream upstream of either the baghouse or ESP. ACI systems are one of the most effective and cost-efficient mercury capture methods available, but the efficiency and expense of an individual system depends on several factors, including; injection lance design and placement, distribution of the sorbent, and the temperature and velocity of the flue gas that carries the sorbent.

Flow modeling during the design process is essential to developing a system that will meet regulations while keeping sorbent and maintenance costs to a minimum.

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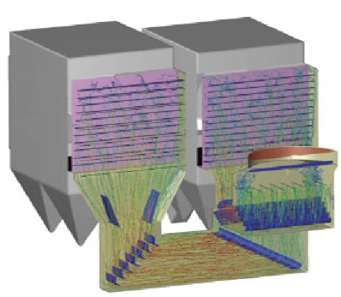
Computational Fluid Dynamics (CFD) modeling can help:

- Ensure uniform sorbent distribution
- Maximize sorbent residence times
- Determine optimal sorbent feed rates
- Determine the optimum lance quantity, design, and location
- Optimize duct layout
- Ensure proper mixing within the flue gas stream for maximum adsorption and capture efficiency

A typical ACI flow modeling project begins with CFD modeling of the ductwork and flow leading to the system (usually starting at the economizer hopper for hot side injection or at the air heater for cold side configurations).



CFD model tracks the trajectory and velocity of carbon particles from the lance to the ESP.

Several lance configurations and locations are then selected for numerical analysis. This helps ensure optimum configuration of the lances to so that uniform distribution and mixing will occur at the target location. Configuration changes can include non-uniform injection port placement and/or diameter to reflect a non-uniform flow field. Lance placement is usually as far upstream as is practical given installation and operational considerations.

In some cases the predicted flow field is sufficiently non-uniform that no lance placement and configuration can be found to provide adequate mercury reduction. Examples include high local temperatures that can lead to less mercury absorption, or excessive local velocities that can push the gas through the sorbent too quickly- greatly reducing resistance times. In these cases, Airflow Sciences Corporation can determine flow control devices leading to a flow field that allows for an acceptable ACI system design.

For more information please contact: Airflow Science Corporation;
http://www.airflowsciences.com/