ESP'S AND MERCURY CONTROL

For a number of years, fabric filters have almost automatically been the first choice when either low particulate emissions, mercury control, or both have been required.

Recent developments suggest that "one size does not fit all", and that more cost effective solutions may produce similar emissions results.

ESP'S AND MERCURY CONTROL

Objections to refurbishment of ESP's have stemmed largely from the following:

- ESP's could not achieve increasingly low particulate outlet loadings required.
- ESP's were generally thought to be inferior in their ability to address mercury control issues.

ESP'S AND MERCURY CONTROL

OLDER ESP's (from published literature)

	Outlet SCA	lb/mmBtu
Pleasant Prairie 1	440	0.0018
Naughton 1	576	0.0015
Johnsonville 4	256	0.0097
Dave Johnson 1	661	0.0035
Boardman 1	697	0.0053
Average	526	0.0051

ESP'S AND MERCURY CONTROL

RECENT SEI ESP's

	SCA	Outlet lb/mmBtu
Coffeen #2	***	.0048
Duck Creek #3	***	.0047
Tecumseh #9	***	.0038
Thomas Hill #3	***	.0054
Cliffside #5	***	.0066
Average	273	.0051

*** Proprietary data

ESP'S AND MERCURY CONTROL

The traditional method of mercury control is to install or retrofit fabric filters and inject powdered activated carbon (PAC).

- **Mercury is readily adsorbed onto carbon surfaces**
- **Chemically treated PAC enhances mercury removal**
- **Fabric filters are the preferred collection device due to the increased residence time of the PAC on bag surfaces.**

ESP'S AND MERCURY CONTROL

While this method is generally effective, there are drawbacks:

- **Costs to install new or retrofit FF are prohibitive.**
- **In most cases, flyash sales are lost.**
- **Greatly reduced effectiveness where high SO3 concentrations are present, or if SO3 conditioning is required for resistivity reduction.**
- **Reduced effectiveness at high flue gas temperatures.**
- **Ineffective on units firing lignite coal.**

ESP'S AND MERCURY CONTROL

A 2010 survey indicated that there were 830 operating ESP's in the U.S., nearly ½ of which are equipped with wet flue gas desulfurization systems.

Conversely, the same study indicated that only 275 fabric filters were in operation on coal fired units.

ESP'S AND MERCURY CONTROL

Another recent study indicated that the capital cost impact of retrofitting fabric filter components into an existing ESP casing far exceeded the costs associated with a similar ESP internal upgrade.

Annualized operating costs of the fabric filter were similarly much greater.

Information presented earlier indicated the particulate removal capability of a well designed ESP to be comparable to that of a fabric filter.

Consequently, if mercury oxidation and removal can be achieved without a fabric filter, then considerable cost savings can be realized.

ESP'S AND MERCURY CONTROL

Developments over the last half of the previous decade indicate that mercury oxidation and capture can be accomplished using additives other than activated carbon.

- **Several Suppliers have reported successful tests indicating ≥90% mercury reduction using halogen additives to oxidize the elemental mercury for capture and removal in a downstream WFGD.**
- **Other suppliers have installed similar systems in conjunction with PAC systems and achieved similar results with no negative impact on flyash sales.**

ESP'S AND MERCURY CONTROL

In so doing, these systems have opened up the possibility of retaining existing particulate removal equipment while lowering the overall cost of mercury control.

- **No need to retrofit or install fabric filter. ESP upgrade will achieve similar particulate emissions.**
- **Mercury control has been demonstrated without the use of activated carbon.**
- **Lower overall operating costs (parasitic power, maintenance of particulate control device, lower sorbent injection cost, ash sales maintained).**
- **Booster fan not required.**

ESP'S AND MERCURY CONTROL

DISCUSSION QUESTION:

What is keeping these systems from being mainstream solutions?