Controlling Mercury at Power Plants—What's Possible?

Controlling mercury from power plants is feasible. In 1999, EPA found that controls used for other pollutants were effective in capturing mercury. If these controls are optimized for mercury, even greater reductions would be possible. In addition, nearly a dozen full scale demonstrations are currently underway testing mercury-specific control technologies for coal-burning power plants. The tests have generally followed one of two approaches: either injecting a sorbent (such as activated carbon) to elemental mercury, or adding a system to oxidize elemental mercury to the more readily captured oxidized form. While many of the projects are still in their infancy, a few have completed their first round of tests. The tests demonstrate that effective mercury control is possible at all plants regardless of the coal burned.

Over 90% control measured at plants burning bituminous and subbituminous coal. Based on stack tests conducted in 1999:

- Plants burning bituminous coal that have fabric filters and wet flue gas desulfurization units installed are capturing over 90% of their mercury emissions.

- Plants burning subbituminous coal that are equipped with fabric filters and other stack controls coals are capturing over 70% of their mercury:
    1. 75% mercury control was measured at Public Service Company in Colorado, at a boiler equipped with a fabric filter.
    2. 74% mercury control was measured at AES Hawaii, Inc., at a boiler using limestone injection and a fabric filter.
    3. 84% mercury control was measured at Intermountain Power Agency in Utah, which burns subbituminous and bituminous coal in a boiler equipped with a low NOx burner, wet scrubber, and a fabric filter.

Other tests conducted in recent years have shown good mercury capture results:

- Preliminary results at PG&E's Brayton Point plant, which burns bituminous coal and is equipped with two electrostatic precipitators, showed 90% control at high activated carbon injection rates.

- At Southern Company's Gaston Plant (Alabama Power), which burns bituminous coal and is equipped with a COHPAC fabric filter, 85% control was achieved using activated carbon on a continuous basis, with short-term removals averaging more than 90%.

- MI South Central Power Agency completed a small pilot project using technology developed by Babcock and Wilcox. Preliminary results found nearly 80% capture efficiency with this system, which relies on a chemical additive in the scrubber slurry to enhance capture of oxidized mercury.

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- First Energy's Burger Plant in Ohio completed a small pilot project using an electro-catalytic oxidation technology developed by Powerspan Corp. Over 80% of the mercury was captured, along with 97% of SO2, 90% of NOx, and 99.9% of fine particulates. A larger pilot demonstration was planned for Spring 2003, with a target of achieving 90% mercury capture.

- At We Energies' Pleasant Prairie plant, which burns Powder River Basin subbituminous coal and is equipped with an electrostatic precipitator, up to 70% mercury control was measured at the highest activated carbon injection rate tested. Higher capture efficiency is likely if a fabric filter is used in conjunction with the activated carbon technology.

- At Otter Tail Power Company's Big Stone plant in South Dakota, which burns subbituminous coal, the Advanced Hybrid system (which combines aspects of ESPs and fabric filters) was found to capture up to 97% of total mercury, at a low activated carbon injection rate.

Lignite plants are capable of achieving 70-90% mercury control.
By far, the least amount of pilot demonstrations have been completed on plants burning lignite. Nevertheless, preliminary results from one pilot project show that high mercury removal is possible.

- Based on the 1999 stack tests, 79% mercury control was measured at a Texas-New Mexico Power Company boiler using limestone injection and equipped with a fabric filter.

- One pilot demonstration at a North Dakota lignite-fired boiler equipped with a baghouse measured over 90% mercury control using iodine impregnated carbon, and 70% mercury control using activated carbon at the highest injection rate tested.

Other tests are underway using other innovative approaches.

- We Energies is partnering with ADA Environmental Solutions in conducting tests at the Presque Isle plant in Marquette Michigan using the TOXECON technology (which includes activated carbon injection and installation of a Compact Hybric Particulate Collector (COHPAC) fabric filter). The project goal is to achieve at least 90 percent mercury removal, recover at least 90 percent of the mercury in ash, and minimize waste disposal.