

Where is Mercury in FGD Scrubbers: Gypsum, Scrubber Water, or Emitted?

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ABSTRACT

Emerging environmental regulations, both at individual state and federal levels, will require a deep reduction in mercury emission from coal burning power plants. Because Midwestern coals' higher chlorine content facilitates the production of Hg^{2+} in the flue gas, it is argued that wet scrubbers can be used to achieve major mercury reductions by capturing the soluble mercury. However, recently reported research, including our own, raises the spectrum of mercury re-emission during the forced oxidation of the scrubber material. There is also controversy on whether the bulk of the oxidized mercury is in the FGD gypsum or in the scrubber water. Over one year we monitored on a weekly basis the mercury behavior of the gypsum produced by a wet FGD scrubber in a power plant burning high sulfur bituminous coal. We also investigated the return scrubber water associated with this scrubber unit. The FGD gypsum showed very large variations in the mercury concentration from week to week. Mercury concentration ranged from a low of 71 $\mu\text{g/kg}$ to a high of 290 $\mu\text{g/kg}$. The large variations observed in the mercury concentrations raised the spectrum that when samples are collected could influence the extent of mercury re-emission during wallboard manufacturing. However, what was surprising was that we observed a muddy suspension associated with the return scrubber water which on high speed centrifugation resulted in a oily solid material. This material was very difficult, if not impossible, to dewater and contained very high mercury concentrations, i.e., ranging from 6000 $\mu\text{g/kg}$ to 16000 $\mu\text{g/kg}$ depending upon the week. The centrifuged material was subjected to XRD, FTIR, DSC, DTA, TGA, and SEM measurements, and it appeared this material was largely composed of gypsum crystallites. Unlike recently reported work, it appears that centrifuged gypsum's mercury was not associated with iron.

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