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Coal Washing Credit Example

Issue:

Determining a value for an output based standard that gives reasonable credit for coal washing, as currently performed for Illinois coal. This is because coal washing, in addition to removing non-combustible rock and sulfur, also removes mercury from the raw coal along with the other contaminants.

If credit were not given for coal washing, a unit burning a washed coal would have to achieve a minimum 90% reduction from the levels of input mercury after coal washing, a level which could vary significantly and potentially be much lower than the mercury content of unwashed coal.

Background:

Available data from the Illinois State Geological Survey indicates the median mercury content of Illinois coal is 10.24 lbs Hg/TBtu, with approximately 60% of Illinois coal is between 4 and 13 lbs Hg/TBtu. Since the mercury content of Illinois coal varies widely, it is appropriate to base the output based standard on the reported median mercury content of the coal supply.

Note: Conversion factor: 1.0 lb Hg/TBtu x 0.011 = lbs Hg/GWh.

Available data also indicates a wide range of mercury removal by coal washing. The reported average mercury removal due to current coal washing processes is reported as approximately 47%, with a possible range from 25% to 60% depending on the particular coal and the level of washing that is performed.

Mercury content of “median coal” after “average washing:”

10.24 lbs Hg/TBtu x (1.0 - 0.47) = 5.43 lbs Hg/TBtu washed coal.

Converting to an equivalent uncontrolled emission rate in terms of output:

5.43 lbs Hg/TBtu x 0.011 lbs Hg/GWh = 0.060 lbs Hg/GWh

Discussion:

An output based standard has been selected that relies upon a minimum level of mercury removal by coal washing, i.e., 0.008 lbs/GWh.

The control efficiency required to achieve 0.0080 lbs Hg/GWH for a unit burning the median coal after average coal washing can be expressed as:

0.060 lbs Hg/GWh x (1 - X) = 0.0080 lbs Hg/GWh.

Where X = The necessary mercury control efficiency.

Solving for X, X = 0.87 or 87%.

Therefore, an EGU burning this "typical" washed coal would only be required to achieve **87%** mercury removal with control equipment to meet the 0.0080 lbs Hg/GWh standard. Given an option of 90% removal or 0.0080 lbs Hg/GWh, the owner of such an EGU would likely choose to comply with the latter standard.

Another approach is to calculate what the output based standard would be if the EGU burning "standard washed coal" was required to achieve a 90% reduction. Solving for the equivalent output based standard at 90% control gives:

(0.060 lbs Hg/GWh) x (1 - .90) = ***0.0060 lbs Hg/GWh (lower boundary)***.

The proposed output based standard of 0.0080 lbs Hg/GWh is 33% greater than 0.0060 lbs Hg/GWh.

Of course the more efficient coal washing and the lower the mercury content of the raw coal, the lower the level of mercury reduction required by control equipment on a unit . For example, if coal washing removed 70% of the mercury from an 8 lbs Hg/Tbtu raw coal, the control equipment on a boiler would only be required to achieve a minimum of 70% removal of mercury.