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AR-17-039

April 21, 2017

Stuart Spencer
Associate Director
Office of Air Quality
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Re: Response to Information Request
Entergy Arkansas, Inc. – White Bluff Plant
AFIN: 35-00110 Permit No.: 0263-AOP-R10

Dear Mr. Spencer:

On behalf of Entergy Arkansas, Inc. (EAI), Entergy Services, Inc. (ESI) has reviewed your letter of April 5, 2017, regarding costs associated with potential SO_2 emissions control options at the White Bluff Plant. As requested, ESI provides the following responses to the questions posed by ADEQ in this letter. For convenience, these responses have been numbered in the order they appear in the April 5 letter.

Please note that, for all costs associated with dry flue gas desulfurization (dry FGD) controls, two separate cost ranges are provided. The first is the full capital cost estimate prepared by Sargent and Lundy (S&L) for Entergy, based on S&L's extensive experience estimating costs for similar projects at similar electric generating facilities. While ESI believes the full S&L capital cost estimate to be the most accurate representation of costs that would be borne by EAI and its ratepayers, the U.S. EPA has previously disallowed consideration of several components of this cost estimate, including escalation, interest during construction (IDC), and owner's costs. Recognizing this, ESI is also providing a second, partial, cost range that eliminates escalation, IDC, and owner's costs, even though the removal of such costs severely underestimates the actual amount EAI would incur to install SO_2 emissions controls at White Bluff. All capital costs are from S&L estimate 33787B issued November 18, 2016.[1] O&M costs are the same for both scenarios and are from S&L report SL-012831 issued July 14, 2015. All costs are in 2015 dollars.

1. **Please confirm whether the cost-effectiveness values for Dry FGD of approximately $10,400 – 11,800 per ton under the assumption of four to five years of remaining useful life is still accurate.**

   For a four- to five-year remaining useful life (RUL), the cost-effectiveness range in dollars per ton of SO_2 emissions reduced is approximately $9,100-$11,000 based on the full costs and $6,900 to $8,200 based on the partial costs.

2. **Please confirm whether the cost effectiveness values for dry FGD of approximately $7,500 to $8,500 per ton under the assumption of six-to-seven years of remaining useful life is still accurate.**

   For a six- to seven-year RUL, the cost-effectiveness range in dollars per ton of SO_2 emissions reduced is approximately $7,100-$8,000 based on the full costs and $5,400-$6,100 based on the partial costs.[2]

[1] S&L revised its prior cost estimates, as explained in EAI's Petition for Reconsideration of the final FIP. *See* EAI Petition for Reconsideration, at 8 n. 31 (Nov. 23, 2016). These revised cost estimates have been used to respond to the Department's questions.
[2] EAI Petition for Reconsideration, at 8.

3. **Please provide a cost-effectiveness estimate for meeting a 0.6 lb/MMBtu on a 30-day rolling average limit for SO_2 based on the use of low-sulfur coal compared to White Bluff's currently permitted emission limit of 1.2 lb/MMBtu proposed in comments dated August 7, 2015 on the AR RH FIP.**

   To meet an emission limit of 0.6 lb/MMBtu, EAI would purchase coal with a sulfur content lower than 0.6 lb/MMBtu to provide an adequate margin for compliance. Based on coal market information available to Entergy's fuel supply group, the cost premium for coal purchased to meet a SO_2 limit of 0.6 lb/MMBtu is expected to be approximately 50 cents per ton of coal purchased. Based on this cost premium, a typical low-sulfur coal heat content of 8,800 btu/lb (as supplied), and the annual heat input value utilized in the S&L dry FGD cost estimate (55,829,551 MMBtu/year), the annual cost premium associated with the use of low-sulfur coal at one White Bluff unit is estimated to be approximately $1,600,000.[3]

4. **Please provide an analysis of the expected cost-effectiveness values for dry FGD with compliance based on the following scenarios:**

   a. **Seven to eight years of remaining useful life,**

      For a seven- to eight-year RUL, the cost-effectiveness range in dollars per ton of SO_2 emissions reduced is approximately $6,500-$7,200 based on the full costs and $5,000-$5,500 based on the partial costs.

   b. **Fifteen years remaining useful life (EPA's assumption for financing control equipment in the IPM model), and;**

      For a 15-year RUL, the cost-effectiveness in dollars per ton of SO_2 emissions reduced is approximately $4,500 based on the full costs and $3,500 based on the partial costs.

   c. **Nineteen years of remaining useful life (sixty years from the start of operations at White Bluff).**

      For a 19-year RUL, the cost-effectiveness in dollars per ton of SO_2 emissions reduced is approximately $4,050 based on the full costs and $3,175 based on the partial costs. It should be noted that the White Bluff units first began commercial operation on August 21, 1980 (Unit 1) and July 23, 1981 (Unit 2). Assuming that compliance with a SIP limit for a dry FGD system would be required in 2022, a 19-year RUL would end in 2041.

We appreciate the Department's consideration of this information. Should you or your staff have any further questions or require any additional information, please feel free to contact me at (501) 377-5760, Tracy Johnson at (501) 377-4033, or David Triplett at (501) 377-4030.

Sincerely,

Kelly McQueen

Associate General Counsel

KMM/dct

[3] EAI cannot estimate the cost-effectiveness of meeting a SO_2 limit of 0.6 lb/MMBtu based on the use of low sulfur coal given that the actual sulfur content of low sulfur coal varies, making it difficult to estimate the tons of SO_2 that would be reduced, particularly in comparison to the historical emissions. Furthermore, to estimate a predicted annual average SO_2 emission rate based on operation with low sulfur coal could under-estimate the cost effectiveness of this option.