From: Alissa Oppenheimer
To: Wilson, Aimee
Cc: pmurin@murinenv.com; "Lisa Chavarria"
Subject: Questions - Chamisa CAES Tulia GHG PSD Permit Application
Date: Monday, July 29, 2013 3:33:08 PM
Attachments: ATT00001.txt

Aimee,

Please find answers to your questions embedded below. Do not hesitiate to contact us if you have any additional questions or comments.

Best Regards,

Alissa

Alissa Oppenheimer
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From: Wilson, Aimee [mailto:Wilson.Aimee@epa.gov]
Sent: Tuesday, July 23, 2013 12:52 PM
To: Alissa Oppenheimer
Cc: pmurin@murinenv.com; 'Lisa Chavarria'
Subject: Questions - Chamisa CAES Tulia GHG PSD Permit Application

Alissa,

I have a few questions and need additional information in order to send the draft permit and statement of basis for internal review.

- Can you provide cost information for the project? If CCS was implemented, by what percentage would the total capital costs increase**?** ***Response*: *The most recent project cost estimate was completed in February of this year. Total capital costs were estimated to be $352.5-413.6 million dollars. Based on the cost estimate for CCS provided in our permit application, CCS would increase the project capital cost by 55.6-65.2%.***

- The proposed NSPS for EGUs bases BACT limits in gross. Can you please provide a BACT limit in lb of CO_2/MWh(gross) for the turbines? It looks like you proposed 2 separate limits, one for maximum load, and one for all other loads which appeared to be based on the lowest sustainable level (25% load). The numbers were provided in the table of the February 28 response on page 4. Could you propose one limit that would cover all

operating scenarios? I want to ensure it will be easy to determine if you are in compliance with the BACT limit on a 12-month rolling average, it seems it would be difficult to track the different limits. Also, the LSL based value is significantly higher than the other loads, how frequently would Chamisa be operating at that low of load**?** ***Response*: *We appreciate the desirability of having a single value for the BACT limit. We propose a value of 575 lbs CO_2/MWh (gross) to be calculated on a 12-month rolling average. That value reflects the partial load condition identified as Part Load 3, which is the lowest load at which we expect to operate on a routine basis, with a 2% contingency factor. At this time, we do not have knowledge or certainty of the precise load curves our facility will actually supply, and we may very well have substantial operation below 35% load, including periods just above the lowest sustainable load level. We believe that given the inherently low release of CO_2 relative to other technologies, and the uncertainty of actual load profiles, a conservative establishment of the BACT level for compliance is justifiable.***

- Page 7 of the February response states the "recuperator is designed for a nominal effectiveness of 90%". The response also states parameters that will be monitored and that the values will be compared to expected values – can you please elaborate? ***Response: Our February response indicated that "The heat recovery performance of the Chamisa recuperator will be monitored continuously during plant operation. Pressure and temperature measurements of the air at the recuperator inlet and recuperator outlet, and of the combustion gas at the turbine exhaust will be monitored and compared to expected values based on the turbo-expander train's air mass flow and gas fuel input." The recuperator effectiveness of 90% is the thermal efficiency of the recuperator. That is based on the recovery of 90% of the enthalpy (or heat content) of the turboexpander hot exhaust gas into the inlet combustion air stream. The enthalpies of the two streams exchanging heat in the recuperator are determined by their mass flow, composition, temperature, and pressure. In the recuperator, however, there is no real-time measurement of the mass flows and composition of the two gas streams. In the absence of real-time measurements of the mass flows and stream compositions, the measured temperatures and pressures can be correlated with design values expected for various firing rates of the turboexpander combustors. These correlations can be used both to estimate the recuperator effectiveness, and to indicate if the monitored parameters are outside of the values expected for the specific firing rate of the turboexpander train. Please note that although the performance of the recuperator component of the turboexpander can be monitored, we believe that the essential BACT parameter, i.e., the lbs of CO_2 released per MWh of electricity produced, is the sole performance parameter which needs to be monitored to ensure compliant performance of the recuperator and other components in the complete turboexpander train.***

- The use of a flare to control maintenance purges of natural gas does not appear to be cost prohibitive. Can you provide additional information to support eliminating this option as BACT? ***Response: Although the yearly costs of use of a flare to control maintenance purges is not large, we suggest that the cost effectiveness of this control measure, at $79/ton of CO_2-e controlled, is not economically efficient and thus is not reasonable. As an alternative to the use of a portable flare system to control purge emissions, Chamisa***

offers to reduce the proposed number of maintenance purges per year by half, after the first year of operation, to 4 purges per year. This would reduce the emissions from the purge events to 108.9 tons/yr of CO_2-e.

Thanks,
Aimee

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