emissions limit for the pollutant under review is infeasible and that the chosen operational standard is practically enforceable. The administrative record in this case does not provide any explanation for why establishing a numerical BACT emissions limit is infeasible. In general, a large, non-fugitive source of emissions should be able to directly measure emissions. In the event that there are technological or economic limitations that make a numerical limit infeasible, the Georgia Environmental Protection Division should provide that demonstration in the record for this permit.

Response: The greenhouse gas (GHG) BACT analysis for the proposed CTs demonstrated that the design efficiency of the combined cycle system is the BACT for GHGs. Since there are no pollution control technologies or techniques, a numerical GHG emissions limit will not reflect any control or degree of reduction attributable to any control technology. If a numeric emissions limit has to be established, it will likely be the GHG emissions potential of the combined-cycle system. The GHG emissions potential in units of pounds per megawatt-hour (lb/MWh) were presented in Table A-1 of the GHG BACT analysis submitted to GEPD in March 2011, which were calculated using published GHG emission factors (lb/MMBtu) and the design heat input rate of the CTs. Adding the GHG emissions potential in lb/MWh or TPY in the permit will not add any extra value to the permit. As long as the actual heat input rates are lower than the design rates, actual GHG emissions will also be lower than the emissions potential.

Note that the actual heat input rates will be continuously monitored under the requirements of Acid Rain. Carbon dioxide (CO_2) emissions will also be continuously monitored based on the heat input rates. Therefore, the GHGs will be continuously monitored.

Comment 2. **Sections 1.3 and 1.4 of the March 22 submission briefly describe the CO_2 emissions from the auxiliary boiler and fuel gas heater, respectively. However, BACT is required on all emission units, and these sections do not include a BACT analysis or limit for either unit. While we do not expect the applicant to look at add-on control technologies (such as Carbon Capture and Storage) for these smaller units, the applicant should perform a BACT analysis to assess the efficiency of both the auxiliary boiler and the fuel gas heater and establish a BACT limit consistent with that analysis. Furthermore, the revised BACT analysis for these units should address GHGs as one pollutant as was done for the large CTs and not just CO_2 emissions.**

Response: A BACT analysis for GHG emissions from the auxiliary boiler and gas heater is included in Attachment A.

Thank you for your consideration of this information. If you have any questions, please do not hesitate to call us at (352) 336-5600.

Sincerely,

GOLDER ASSOCIATES INC.

Robert C. McCann, Jr.
Principal and Air Group Leader

Salahuddin K. Mohammad
Senior Project Engineer

cc: M. Lydon, Mackinaw Power

Enclosures

RCM/SKM/nav/tz

ATTACHMENT A

BACT ANALYSIS FOR GHGS FROM AUXILIARY BOILER AND FUEL GAS HEATER

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS FOR GREENHOUSE GASES FROM AUXILIARY BOILER AND FUEL GAS HEATER

In March 2011, a best available control technology (BACT) analysis for greenhouse gas (GHG) emissions from the Effingham expansion project was submitted to the Georgia Environmental Protection Division (GEPD). The BACT analysis, which included GHG emissions from the proposed combustion turbines (CTs), auxiliary boiler, and fuel gas heater followed the U.S. Environmental Protection Agency (EPA)-recommended 5-step procedure for the CTs and included a brief discussion on BACT for the other equipment. The detailed 5-step procedure was conducted only for the CTs because more than 99 percent of the GHG emissions for the expansion project are emitted by the CTs. In response to EPA Region IV's comments, the 5-step BACT analysis process is discussed in this document for GHG emissions from both the auxiliary boiler and the gas heater. The cooling tower and the fuel oil storage tank do not emit any GHG emissions.

For prevention of significant deterioration (PSD) purposes, GHGs are a single air pollutant defined as the aggregate group of the following six gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Based on EPA's definition, the 5-step "top-down" BACT process has the following five steps:

- Step 1: Identify all available control technologies
- Step 2: Eliminate technically infeasible options
- Step 3: Rank remaining control technologies
- Step 4: Evaluate most effective controls and document results
- Step 5: Select the BACT

The GHG BACT analysis for the CTs presented in the March 2011 submittal discussed energy efficiency and concluded that the proposed project will be one of the most efficient electric generating facilities in Georgia and will result in GHG emissions that are lowest in the SERC Reliability Corporation's (SERC's) sub-region and Georgia.

In Table A-1 of the March 2011 submittal, GHG emissions were presented as a function of power output [pounds per megawatt hour (lb/MWh)] for different operating scenarios of the CTs. Using the worst-case emission factors in lb/MWh for each type of fuel, total GHG emissions for the 2-on-1 combined-cycle system was estimated as CO_2 equivalent (CO_2e) in Table A-2 (attached). Total GHG emissions for the auxiliary boiler and gas heater were also estimated and presented in Table A-2. As shown, GHG emissions potential for the auxiliary boiler and the gas heater was estimated to be only 0.1 percent and 0.2 percent of the combined-cycle system, respectively. Due to the negligible amount of GHG emissions from the auxiliary boiler and the gas heater compared to the combined-cycle system, even 100-percent control of GHG emissions from these units will not make any meaningful reduction in total GHG emissions

potential of the expansion project. A detailed BACT analysis for GHG emissions from these units will therefore not be very productive.

A brief discussion of the BACT steps with respect to GHG emissions from the auxiliary boiler and gas heater is presented below.

Step 1 – Identify All Available Control Technologies

The first step in the top-down BACT process is to identify all "available" control options. Available control options are those air pollution control technologies or techniques (including lower-emitting processes and practices) that have the potential for practical application to the emissions unit and the regulated pollutant under evaluation.

The definition of BACT in Title 40, Part 52.21(b)(12) of the Code of Federal Regulations [40 CFR 52.21(b)(12)] includes use of clean fuels as a pollution control technique. The proposed auxiliary boiler and gas heater will be fired with only natural gas, which is the cleanest fuel compared to other fossil fuels such as oil or coal due to its low GHG emissions potential when combusted.

In the BACT analysis, GHGs are considered as a single air pollutant, which is the aggregate group of the six principal gases, CO_2, N_2O, CH_4, HFCs, PFCs, and SF_6. CO_2 emissions result from the oxidation of carbon in the fuel. CH_4 emissions result from incomplete combustion, and N_2O emissions result primarily from low temperature combustion. CO_2, N_2O, and CH_4 are the principal GHGs that will be emitted from the auxiliary boiler and the gas heater. Emissions of CH_4 and N_2O are negligible compared to CO_2 and specific control options for these pollutants are not discussed.

EPA recommends that permit applicants and permitting authorities should identify all "available" GHG control options that have the potential for practical application to the source under consideration. In the PSD and Title V Permitting Guidance for GHGs, EPA emphasizes on two mitigation approaches for CO_2 – energy efficiency and carbon capture and storage (CCS). CCS is not practical for CO_2 emissions from the proposed 17 million British thermal units per hour (MMBtu/hr) auxiliary boiler or the 8.75 MMBtu/hr gas heater due to the small amount of CO_2 emissions potential from this equipment compared to the combined-cycle system.

Energy Efficiency

In the GHG BACT guidance, EPA has stressed importance of energy efficiency for combustion sources. The proposed 17 MMBtu/hr auxiliary boiler will be used to provide steam to the steam cycle during the startup sequences, and the 8.75 MMBtu/hr gas heater will be used to warm up the natural gas flowing through the pipeline before feeding into the CTs.

A boiler's efficiency is measured by its annual fuel utilization efficiency (AFUE). AFUE is the ratio of heat output of the boiler compared to the total energy consumed by the boiler. An AFUE of 90 percent means