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AIR PROTECTION BRANCH

Ms. Susan Jenkins, Environmental Engineer
Stationary Source Permitting Program
Georgia Department of Natural Resources
4244 International Parkway, Suite 120
Atlanta, Georgia 30354

RE: APPLICATION NO. 19810
MACKINAW POWER – EFFINGHAM COUNTY POWER PLANT
EPA COMMENTS ON EFFINGHAM EXPANSION PROJECT PSD APPLICATION

Dear Ms. Jenkins:

In response to your faxed request to respond to the comments made by the U.S. Environmental Protection Agency (EPA) on the Prevention of Significant Deterioration (PSD) permit application for the Effingham County Power Plant expansion project (Effingham Expansion Project), Golder Associates Inc. (Golder) has prepared the following responses to assist you.

EPA LETTER DATED JUNE 7, 2011

Comment 1. Tables corresponding to sections in the best available control technology (BACT) analysis for CTs do not fully support the proposed limits. Sections 4.2 and 4.3 (page 28-48) provide an overview of the section and a detailed BACT analysis for the CTs, respectively. These sections propose a higher BACT for CO, VOCs, and PM when the CTs run with duct firing. However, the corresponding BACT determination tables in the appendices, (Tables 4-3 through 4-6, 4-9, and 4-10), only show limits for CTs without duct firing as opposed to with duct firing. The applicant should provide additional BACT tables or rationale to demonstrate the necessity of these higher limits.

Response: Carbon monoxide (CO) and volatile organic compound (VOC) emissions from a combustion turbine (CT) are typically controlled by oxidation catalyst systems, which have specific control efficiencies and cannot be adjusted as needed. Therefore, during duct firing, when there are additional emissions from the duct burner, the total stack emissions are higher than without duct firing. In the PSD application, Mackinaw Power did not propose an oxidation catalyst system. However, as mentioned in the March 22, 2011 letter to Georgia Environmental Protection Division (GEPD), Mackinaw Power is proposing to install an oxidation catalyst system and proposing CO emissions limits of 2 parts per million by volume, dry at 15-percent oxygen (ppmvd @ 15% O_2) for natural gas-firing and 4.0 ppmvd @ 15% O_2 for fuel oil-firing. These rates have been proposed for with and without duct-firing with the understanding that the actual rates without duct-firing will be less.

Although new VOC emissions limits were not proposed in the March 22 letter, the actual VOC emissions rates are expected to be 40 to 50 percent lower than the proposed limits due to the oxidation catalyst systems. The particulate matter (PM) emissions are higher during duct firing than when duct firing does not occur due to additional emissions from the duct burner.

Tables 4-3, 4-5, and 4-9 in the PSD permit application present a summary of BACT determinations for natural gas-fired CTs for CO, VOC, and $PM/PM_{10}/PM_{2.5}$, respectively. These tables present some examples of higher permitted emissions limits when the duct burner is fired compared to when the duct burner is not fired. For example, Table 4-3 shows that for the Live Oaks Power project in Georgia (permit date 4/8/2010), the CO emissions limits are 3.2 and 2.0 ppmvd @ 15% O_2 for natural gas-fired CTs with

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and without duct firing, respectively. There are other examples in Table 4-3 showing different CO emissions limits with and without duct firing. Although not shown in Table 4-3, the West County Energy Center Unit 3 project in Florida (Permit No. 0990646-002-AC/PSD-FL-396) has CO emissions limits of 4.1 ppmvd @ 15% O_2 without duct firing and 7.6 ppmvd @ 15% O_2 with duct firing. Table 4-4 shows one example of different CO emission limits with and without duct firing for LSP Nelson Energy, LLC permitted in 2000. No recent examples for oil firing could be found.

Similarly, Table 4-5 shows examples of different VOC emissions limits with and without duct firing for natural gas-firing such as Progress Energy Bartow Plant in Florida (permit date 1/26/2007), FPL West County Energy Center, Florida (permit date 1/10/2007), and FPL Martin Plant, Florida (permit date 4/16/2003). Although not shown in Table 4-5, the McDonough combined-cycle generating units in Georgia (permit date 1/7/2008) have VOC emissions limits of 1.8 ppmvd @ 15% O_2 with duct firing and 1.0 ppmvd @ 15% O_2 without duct firing. Similar to oil-firing CO BACT limits, no recent BACT determination with different VOC emissions limits for oil-firing CTs with and without duct firing could be found. Table 4-6 shows one example of different VOC emission limits with and without duct firing for LSP Nelson Energy, LLC permitted in 2000.

Table 4-9 of the PSD application shows that the Live Oaks Power Project in Georgia (permit issued 4/8/2010) has different PM/PM_{10} emissions rates with and without duct-firing. The table also shows other examples, such as the Forsyth Energy Plant in North Carolina (permit date 9/29/2005), with different PM/PM_{10} emissions limits with and without duct firing. Table 4-9 shows that limitation on the fuel sulfur content of natural gas has been determined as BACT for PM/PM_{10} emissions for recent power projects in Florida. Table 4-10 shows one example of different PM/PM_{10} emissions limits for fuel oil-firing CTs with and without duct firing.

Comment 2. **In reference to the cooling towers, it is unclear how footnote "d" was used to calculate the values in Table 2-5. A more detailed explanation of the calculations should be provided. Also, Table 4-13 provides a summary of the BACT for cooling towers. Several facilities have drift eliminators with a maximum drift rate of 0.0005%, (*e.g.*, FPL West County Energy Center Unit 3, FL). However, the applicant proposed in section 4.6, to use a drift eliminator with a maximum drift rate of 0.001% (page 49). The applicant should elaborate why a drift eliminator with 0.0005% drift rate is cost prohibitive. They should provide a cost analysis and a cost effectiveness value in section 4.6 before this option is eliminated.**

Response: Footnote "d" in Table 2-5 explains how solution drift, which is the amount of water droplets that are emitted from each type of tower, is calculated. For the mechanical draft cooling tower (MDCT), the circulating water flow rate is 155,000 gallons per minute (gpm). With a 0.001-percent design drift rate, solution drift can be calculated as follows:

> Solution drift [pounds per hour (lb/hr)] = Water flow 155,000 gpm x 60 minutes per hour x 8.34 pounds per gallon (lb/gal) (water density) x 0.001 percent = 776 lb/hr

As shown in Table 4-13, maximum drift rates of 0.001 and 0.0005 percent are both common; and the 0.0005-percent drift rate was mostly used for the larger cooling towers with a water circulation rate in the range of 300,000 gpm. The 0.001-percent maximum drift rate was permitted for the Live Oaks Power Project in Georgia (permit date 4/8/2010), which is a 2-on-1 nominal 600-megawatt (MW) combined cycle power project. As shown in Table 2-5, the MDCT has the potential to emit only 2.6 tons per year (TPY) of PM_{10} and 0.01 TPY of $PM_{2.5}$. A drift eliminator with 0.0005-percent maximum drift would control only 1.3 TPY of additional PM_{10} and 0.005 TPY of additional $PM_{2.5}$, which are approximately 1 and 0.005 percent respectively of the project emissions potentials (see Table 2-8 for PM_{10} and $PM_{2.5}$ emissions potentials).

The maximum predicted air quality impacts for the project PM_{10} and $PM_{2.5}$ emissions were presented in Table 6-9 of the PSD application; and as shown, the maximum PM_{10} impacts were predicted to be well below the PSD significant impact levels. The 24-hour average $PM_{2.5}$ impact was predicted to be higher than the PSD significant impact level; however, additional air quality analyses were performed to