Prevention of Significant Air Quality Deterioration Review

Final Determination

March 31, 2010

Facility Name: Dahlberg Combustion Turbine Electric Generating Plant
City: Nicholson
County: Jackson
AIRS Number: 04-13-15700034
Application Number: 18326
Date Application Received: July 10, 2008

State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch

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BACKGROUND

On July 8, 2008, Southern Power - Dahlberg Combustion Turbine Electric Generating Plant (hereafter Plant Dahlberg) submitted an application for an air quality permit to construct and operate four dual-fueled Siemens SGT6-5000F simple-cycle combustion turbines (Source Codes: CT11-CT14) and one fuel oil above-ground fixed-roof storage tank. The facility is located at 585 Jarrett Road in Nicholson, Jackson County.

The primary purpose of this permit amendment is to allow physical modifications for the expansion of the facility's electrical output from 770 MW to 1530 MW. The facility proposes to construct and operate four additional simple cycle dual-fuel fired (natural gas and ultra low sulfur fuel) combustion turbines with auxiliary support equipment and one fuel storage tank. The facility currently operates ten simple cycle combustion turbines and auxiliary support equipment, four fuel gas heaters and one fuel oil storage tank.

On November 9, 2009, the Division issued a Preliminary Determination stating that the modifications described in Application No. 18326 should be approved. The Preliminary Determination contained a draft Air Quality Permit for the construction and operation of the new equipment.

The Division requested that Plant Dahlberg place a public notice in a newspaper of general circulation in the area of the existing facility notifying the public of the proposed construction and providing the opportunity for written public comment. Such public notice was placed in *The Jackson Herald* (legal organ for Jackson County) on December 2, 2009. Georgia EPD held a question and answer session and a public hearing on February 18, 2010. The public comment period expired on February 22, 2010.

During the comment period, comments were received from the facility and Greenlaw on behalf of The Altamaha Riverkeeper, Micah's Mission, North East Georgia Children's Environmental Health Coalition and Georgia Chapter of Sierra Club and Plant Dahlberg.

A copy of the final permit is included in Appendix A. A copy of written comments received during the public comment period is provided in Appendix B.

SOUTHERN POWER – DAHLBERG COMBUSTION TURBINE ELECTRIC GENERATING FACILITY COMMENTS

Comments were received from Brian D. Toth, Principal Environmental Engineer, by letter on January 4, 2010.

Comment 1

Southern Power requests that Condition 3.3.32 (and associated monitoring, recordkeeping, and reporting provisions relating to this condition) be removed from the DRAFT Part 70 Operating Permit Modification. This condition, which establishes a BACT limit for NOx of 15 ppm (30-day rolling average, including periods of startup and shutdown) for the proposed combustion turbines when firing natural gas, is duplicative and unnecessary. BACT for the proposed combustion turbines when firing natural gas is already established by Condition 3.3.23 (9 ppm, 3-hour average, excluding periods of startup and shutdown). Similarly, emissions during startup and shutdown are already regulated under Condition 3.3.19 (limiting startup and shutdown of each of the proposed combustion turbines to 30 minutes each) and Condition 3.3.33 (limiting NOx emissions for each of the proposed combustion turbines, including periods of startup and shutdown, to 297 tons during any twelve consecutive months).

EPD Response

The intent of Condition No. 3.3.32 was to address startup and shutdown NOx emissions. EPD agrees that Condition No. 3.3.19 and Condition No. 3.3.33 sufficiently address these concerns. Georgia EPD will delete Condition Nos. 3.3.32, 5.2.14 and 6.1.7.b.xiii. Old Condition No. 3.3.33 will be renumbered as Condition No. 3.3.32. EPD will modify Conditions 3.3.33 and 5.2.11 as follows:

3.3.3~~3~~2 The Permittee shall not discharge, or cause the discharge, into the atmosphere, from each combustion turbine (Source Codes: CT11-CT14) NOx emissions, including emissions occurring during startup and shutdown, in excess of 297 tons during any twelve consecutive months.
[40 CFR 52.21(j)(2)]

5.2.11 For each hour of operation of the combustion turbines (Source Codes: CT11-CT14), the Permittee shall correct the emissions of nitrogen oxides to 15 percent oxygen using Division approved equations and determine the one-hour average nitrogen oxides emissions rate as follows:
[391-3-1-.02(6)(b)1, 40 CFR 52.21, and 40 CFR 70.6(a)(3)(i)]

a. For purposes of verifying compliance with Condition 3.3.23, each one-hour average emission rate must be based upon at least 30 minutes of turbine operation and include at least two data points with each representing a 15-minute period, <u>and exclude periods of startup and shutdown</u>. For the purposes of this condition, each clock hour begins a new one-hour period.

b. For purposes of verifying compliance with Condition 3.3.27, each one-hour average emission rate must be based upon at least 30 minutes of turbine operation and include at least two data points with each representing a 15-minute period, <u>and exclude periods of startup and</u>

shutdown. For the purposes of this condition, each clock hour begins a new one-hour period.

c. For purposes of verifying compliance with Condition No~~s~~. 3.3.32 ~~and 3.3.33~~, each one-hour average emission rate must be based upon at least 30 minutes of turbine operation and include at least two data points with each representing a 15-minute period. This one-hour average emission rate shall include periods of startup, shutdown, and malfunction, when applicable. For purposes of this condition, each clock hour begins a new one-hour period.

d. For each hour of operation of the combustion turbines, the Permitee shall also calculate a 3-hour average emission rate (in ppmvd at 15 percent oxygen) using the NOx emission rate determined in accordance with paragraphs a and b.

Comment 2

Southern Power disagrees with the inclusion of the combustion turbine operating limits (in BTU per 12 consecutive month average) as part of the BACT limits for PM10 and requests that these limits be removed from Table 4-2 of the PSD Preliminary Determination. Southern Power agrees that BACT for PM10 is good combustion practices at the lb/h emission rates specified in Table 4-2 of the PSD Preliminary Determination and agrees to the operating limits (in BTU per 12 consecutive months) contained in Conditions 3.3.21 and 3.3.22 of the DRAFT Part 70 Operating Permit Modification. However, including these limits as part of the formal BACT conclusion is unnecessary in Table 4-2 of the PSD Preliminary Determination.

EPD Response

The PM_{10} lb/hr emission rates specified in Table 4-2 of the PSD Preliminary Determination are PM_{10} BACT limits as listed in Permit Conditions Nos. 3.3.24 and 3.3.28 of the DRAFT Part 70 Permit. The operating limits (in BTU per 12 consecutive months) contained in Permit Condition Nos. 3.3.21 and 3.3.22 are approximately equivalent to operating hours of 16,000 hrs combined for fuel oil and natural gas, and 4,000 hrs for fuel oil. The lb/hr PM_{10} BACT limits are based on these operating hours. Therefore, it is necessary that they are permit conditions that cite the PSD program. EPD agrees that it is not necessary to provide these operating limits as well as the lb/hr emission rates in the BACT conclusion in Table 4-2 of the PSD Preliminary Determination. EPD will delete the operating limits from Table 4-2 of the PSD Preliminary Determination.

Table 4-2: BACT Summary for the Combustion Turbines (Source Codes: CT11-CT14)

Pollutant	Control Technology	Proposed BACT Limit	Averaging Time	Compliance Determination Method
PM_{10}	Good Combustion Practices, Pipeline Quality Natural Gas	9.1 lb/hr	3 hours	Testing
	Good Combustion Practices, Ultra low Sulfur Distillate (USLD) Oil	69 lb/hr	3 hours	Testing
~~PM_{10}~~	~~Operating Limit~~	~~3.536×10^7 Btu while firing Natural Gas and USLD~~	~~12 consecutive month average~~	~~Recordkeeping~~
	~~Operating Limit~~	~~8.516×10^6 Btu while firing USLD~~	~~12 consecutive month average~~	~~Recordkeeping~~

Comment 3

Southern Power disagrees with the inclusion of the combustion turbine startup/shutdown limits (30 minutes per cycle) as part of the BACT limits for CO and VOC and requests that these limits be removed from Tables 4-3 and 4-4 of the PSD Preliminary Determination. Southern Power agrees that BACT for CO and VOC is good combustion practices at the ppm emission rates specified in Tables 4-3 and 4-4 of the PSD Preliminary Determination and agrees to the startup/shutdown limits (30 minutes per cycle) contained in Condition 3.3.19 of the DRAFT Part 70 Operating Permit Modification. However, including these limits as part of the formal BACT conclusion is unnecessary in Tables 4-3 and 4-4 of the PSD Preliminary Determination.

EPD Response

The startup and shutdown operating limits specified in Tables 4-3 and 4-4 of the PSD Preliminary Determination are listed in Permit Condition No. 3.3.19 of the DRAFT Part 70 Permit. Permit Condition No. 3.3.19 limits startup/shutdown of combustion turbines (Source Codes: CT11-14) to 30 minutes. The startup/shutdown limit is necessary to comply with Condition 3.3.32 that states the combustion turbines shall not discharge NOx emissions in excess of 297 tons during any twelve consecutive months. Therefore, it is necessary that this is a permit condition that cites the PSD program. It follows that CO emissions and VOC emissions are also limited by Permit Condition No. 3.3.19 and Condition No. 3.3.32. EPD agrees that it is not necessary to provide these operating limits as well as the ppmvd limits in the BACT conclusion in Tables 4-3 and 4-4 of the PSD Preliminary Determination for CO emissions and

VOC emissions. EPD will delete the startup/shutdown limits from Tables 4-3 and 4-4 of the PSD Preliminary Determination.

Table 4-3: BACT Summary for the Combustion Turbines (Source Codes: CT11-CT14)

Pollutant	Control Technology	Proposed BACT Limit	Averaging Time	Compliance Determination Method
CO	Good Combustion Practices Natural Gas	9 ppmvd @ 15% O_2	3 hours	Testing
	Good Combustion Practices (ULSD) Oil	30 ppmvd @ 15% O_2	3 hours	Testing
~~CO~~	~~Startup/Shutdown limits~~	~~30 minutes per cycle~~		

Table 4-4: BACT Summary for the Combustion Turbines (Source Codes: CT11-CT14)

Pollutant	Control Technology	Proposed BACT Limit	Averaging Time	Compliance Determination Method
VOC	Good Combustion Practices Natural Gas	5 ppmvd @ 15% O_2	3 hours	Testing
	Good Combustion Practices (ULSD) Oil	5 ppmvd @ 15% O_2	3 hours	Testing
~~VOC~~	~~Startup/Shutdown limits~~	~~30 minutes per cycle~~		

Comment 4

Southern Power requests the following corrections be made to Tables 6-4, 6-6 and 6-7 of the PSD Preliminary Determination. Based on the results of the air quality analysis submitted with the application, Southern Power requests the following changes for accuracy.

Table 6-4: Class II Significance Analysis Results – Comparison to MSLs

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact ($\mu g/m^3$)	MSL ($\mu g/m^3$)	Significant ?
NO_2	Annual	~~1990~~ 1992	279.0	3768.9	~~0.21~~ 0.30	1	No
PM_{10}	24-hour	1990	279.5	3768.8	2.54	5	No
	Annual	1992	279.0	3768.9	0.05	1	No
CO	1-hour	1990	278.1	3768.4	~~128.97~~ 393.82	2000	No
	8-hour	~~1989~~ 1990	279.3	3768.7	~~31.95~~ 40.85	500	No

Data for worst year provided only. Results are the maximum of Four (4) Load Groups; 100EVAP, 100LD, 80LD and 60LD and Dual-fuel Operations.

Table 6-6: CO Startup SIL Modeling Results

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Year Modeled	SIL ($\mu g/m^3$)
CO	1-Hour	~~128.97~~ 393.82	1990	2000
CO	8-hour	~~31.95~~ 38.89	1989	500

Table 6-7: Significance Analysis Results – Comparison to Monitoring *De Minimis* Levels

Pollutant	Averaging Period	Year*	UTM East (km)	UTM North (km)	Monitoring De Minimis Level (ug/m^3)	Modeled Maximum Impact (ug/m^3)	Significant?
NO_2	Annual	~~1990~~ 1992	279.0	3768.9	14	~~0.2082~~ 0.30	No
PM_{10}	24-hour	1990	279.5	3768.8	10	2.545	No
SO_2	24-hour	N/A	NS	NS	13	NS	NS
CO	8-hour	~~1989~~ 1990	279.3	3768.7	575	~~31.95~~ 40.85	No

Data for worst year provided only. NS = Emission rate less than significant emission rate.

EPD Response

It is the contention of Georgia EPD modeling staff that the facility modeled NO_x instead of NO_2. ENSR also modeled the maximum NO_x emission rate per fuel (2 emission rates) for each operating load scenario, while Georgia EPD modeled the maximum NO_2 emission rates associated with each operating load and fuel (8 emission rates). The facility has entered into the model the fuel oil and natural gas worst-case emission rates adjusted for the proposed hours-per-year limitation requested in the application. Georgia EPD accounted for these hour-per-year fuel limitations after the model predicted worst-case annual impacts, and added the worst-case fuel oil impact to the worst-case natural gas impact at the same receptor for each year modeled. Re-visiting these impacts, a slight error was discovered such that, for NO_2, PD Tables 6-4 and 6-7 should be modified to reflect the modeled maximum annual impact annual value of 0.1915 ug/$m^{3.}$

Two CO start-up scenarios were modeled. A one-hour scenario combining the 15-minute duration start-up emissions firing fuel oil, with the 70% load fuel oil firing CO emission rate making up the remainder of the hour. The start-up and 70% load stack characteristics for these two emission levels were averaged on a time-weighted basis over the hour. The maximum one-hour model-predicted concentration is 409.5 µg/m^3.

The second modeled start-up scenario was intended to be compared to the 8-hour CO SIL. The emission rate during start-up was configured to emit over a 45-minute period (3 periods of start-up), and added to the 70% load emission rate emitted over a 435-minute period (the balance of the 8 hours). The stack characteristics were derived by calculating the same time-weighted averages. The maximum 8-hour model-predicted concentration is 36.32 µg/m^3.

The CO impact levels reported were all start-up impacts at the 70% load firing fuel oil. This was the obvious worst-case circumstance.

Start-up conditions were not evaluated for NO_2 since it only has an annual standard. The maximum impact of NO_2 was assessed by modeling the worst-case conditions for each operating scenario and fuel, based on the hourly limitations applied for in the application (1000 hrs/yr firing fuel oil, 3000 hrs/yr firing natural gas). The annual average concentration at each receptor for each scenario modeled were post-processed by multiplying by the hourly limitations described above, added together, and divided by the number of hours in the year. The two 100% load scenarios were found to show the maximum annual impact.

Two PM_{10} worst-case conditions were modeled , 80% load firing natural gas, and 70% load firing fuel oil. These conditions, again, were obviously worst-case. The maximum impact was reported associated with firing fuel oil, assuming the PM_{10} emission rate would be constant over the hour. Appendix B of the application indicates that PM_{10} emissions firing fuel oil are maximum (69 lbs/hr) at 50% fuel oil firing. This was the emission rate used for all fuel oil firing. This information is presented to clear up any misconceptions due to the sentence below Table 6-4, which conveys information which is not entirely correct.

Therefore, Georgia will modify Tables 6-4, 6-6 and 6-7 of the PSD Preliminary Determination as follows:

Table 6-4: Class II Significance Analysis Results – Comparison to SIL

Pollutant	Averaging Period	Year	UTM East (km)	UTM North (km)	Maximum Impact ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Significant?
NO_2	Annual	1992	279.0	3768.9	0.1915	1	No
PM_{10}	24-hour	1990	279.5	3768.8	2.54	5	No
	Annual	1992	279.0	3768.9	0.05	1	No
CO	1-hour	1990	278.2	3768.5	409.5	2000	No
	8-hour	1989	279.3	3768.7	36.32	500	No

Data for worst year provided only. Results are the maximum of Four (4) Load Groups; 100EVAP, 100LD, 80LD and 60LD and Dual-fuel Operations.

Table 6-6: CO Startup SIL Modeling Results

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Year Modeled	SIL ($\mu g/m^3$)
CO	1-hour	409.5	1990	2000
CO	8-hour	36.32	1989	500

Table 6-7: Significance Analysis Results – Comparison to Monitoring *De Minimis* Levels

Pollutant	Averaging Period	Year*	UTM East (km)	UTM North (km)	Monitoring De Minimis Level (ug/m^3)	Modeled Maximum Impact (ug/m^3)	Significant?
NO_2	Annual	1992	279.0	3768.9	14	0.1915	No
PM_{10}	24-hour	1990	279.5	3768.8	10	2.545	No
SO_2	24-hour	N/A	NS	NS	13	NS	NS
CO	8-hour	1989	279.3	3768.7	575	36.32	No

Data for worst year provided only. NS = Emission rate less than significant emission rate.

GREENLAW COMMENTS

Comments were received from Greenlaw on behalf of Altamaha Riverkeeper, Micah's Mission, North East Georgia Children's Environmental Health Coalition and Georgia Chapter of Sierra Club. The letter was received on January 5, 2010 and was signed by Justine Thompson, Greenlaw Executive Director and Ela Orenstein, Greenlaw Staff Attorney.

Comment 1

The formaldehyde emission factor for natural gas is underestimated.

The consulting firm, ENSR, prepared emission estimate of hazardous air pollutants for the proposed combustion turbine generators at Plant Dahlberg using the "EPA's MACT Database Version 5". A review of that database reveals that this emission factor was based on the average concentration (lb/MMBtu) of the averages of three test runs using various fuel types with various fuel Fd factors. ENSR indicated that the formaldehyde factor for natural gas combustion "includ[ed] one outlier." The data point, 0.039 lb/MMBtu, may have been considered an outlier by the United States Environmental Protection Agency ("USEPA") because it was reported as five (5) standards of deviation from the mean of all average formaldehyde concentrations. However, the testing group that analyzed the formaldehyde test results prepared for the USEPA, admits that only tests conducted at loads higher than 80% of full load were considered in the formaldehyde emission factors. If this data point were evaluated against formaldehyde test data at loads higher than 80% it would stand to reason that it would vary significantly from a mean including results at "higher loads" since volatile organic compound emissions increase with decreased combustion efficiency at lower loads. The so called "outlier" is the only available test data for formaldehyde emissions that was conducted at loads below 90% of full load. Since the Georgia Environmental Protection Division ("EPD) has permitted the operation of these proposed turbines at loads of 60% of full load, as explained in Argument V. below, all test data using air pollution controls similar to that proposed by Dahlberg and accepted by EPD must be included in the formaldehyde emission factor. If ENSR had, in fact, included this outlier, the emission factor for formaldehyde from natural gas combustion over all permitted loads would have been noted as 9.86E-03 lb/MMBtu (See Attachment A), not 1.83E-04 lb/MMBtu. The emission rate resulting from the average of ALL formaldehyde test results reported is as follows:

(2120 MMBtu/hr/turbine)(4 turbines)(9.86E-03 lb/MMBtu)(4000 hr/year) = **42 TPY**

Furthermore, one of the average concentrations from formaldehyde from natural gas combustion was from a turbine equipped with selective catalytic reduction (SCR) which boasts a 90% efficiency for destroying volatile organic hazardous air pollutants such as formaldehyde. When this data point is omitted from the average emission factor, the emissions of formaldehyde from natural gas combustion, over all permitted loads alone, are as follows:

(2120 MMBtu/hr/turbine)(4 turbines)(1.31E-02 lb/MMBtu)(1000 hr/year)(ton/2000 lb) = **56 TPY**

Also, existing emissions of formaldehyde are calculated as follows:

(298.5 MMBtu/hr/turbine)(10 turbines)(1.31E-02 lb/MMBtu)(4000 hr/year)(ton/2000 lb) = **78 TPY**

Since (1) the facility is a "major source" under 40 CFR Part 63, Subpart A, (2) the individual and combined hours of operation of each turbine on distillate may equal 1000 hours per year, and (3) the CTGs are designed to burn as lean premix engines only on natural gas, the CTGs meet the definition of

"Lean Premix Gas-Fired Stationary Combustion Turbine" under 40 CFR 63.3175. As such, plant Dahlberg must meet a formaldehyde limit of 91 parts-per-billion (ppbvd) (0.091 ppmvd) by installing SCR systems with oxidation catalysts on each turbine at the Title I site (all 14 turbines), regardless of the cost associated with SCR, and comply with all applicable provisions, for all affected sources and associated equipment, as defined under 40 CFR part 63 Subpart YYYY.

EPD Response

In determining the emission factor for formaldehyde for natural gas, the facility used an average of six test reports from EPA's MACT 5 Database. The emission ids are 321.4, 320.3, 319.2, 314.3, 314.2 and 314.1. The reports contain tests results when firing natural gas with Lean Premix Control devices. These controls are similar to the Dry Low NOx controls on the combustion turbines (Source Codes: CT11-CT14). The report was produced from EPA's MACT 5 Database and is included in Appendix C. Georgia EPD agrees with this methodology and the formaldehyde emission factor is not underestimated.

EPD's review of the data point, 0.039 lb/mmBtufrom Test Report 4.2.1.x shows that this "formaldehyde data point appears to be an outlier, retests of the same turbine generated formaldehyde data more consistent with other formaldehyde data in the database." Please refer to the memorandum dated February 9, 1999 from Keri Leach, Alpha-Gamma Technologies, Inc. to Sims Roy , EPA OAQPS ESD Combustion Group on the subject of Stationary Combustion Turbines Emissions Database.

As far as the reference to operating loads for natural gas, please see the response to comment 5 below.

Comment 2

Plant Dahlberg erred by stating that SCR has not been demonstrated on "F Class Combustion Turbines"

A review of the California state-wide RACT/BACT/LAER Clearing house indicates that SCR has been constructed and startup has occurred on January 01, 2004 on engine models General Electric PG7241FA or Westinghouse 501F. The "F" in the model numbers indicates that these are indeed "F Class" Turbines.

EPD Response

The applicant and Georgia EPD have acknowledged that SCR has been installed on F Class combustion turbines which operate in combined cycle mode, as was noted in the "category" of the search performed by the commenter. However, this project does not propose combined-cycle turbines – the application is for the installation of simple-cycle turbines. Simple-cycle turbines cannot use conventional (low temperature) SCR as readily due to the exhaust temperature. Large frame simple cycle gas turbines operate with exhaust gas temperatures near or above 1,100 ^{o}F. A Hot SCR system with tempering control is needed to reduce the exhaust temperature in the range of 800 ^{o}F to allow the Hot SCR system to work on a simple cycle turbine. The BACT Analysis performed by Georgia EPD determined Hot SCR to be not cost effective for the proposed turbines. Searches of both the EPA RACT/BACT/LAER Clearinghouse and the California state-wide RACT/BACT/LAER Clearinghouse did not identify any SCR installations on simple-cycle turbines as BACT.

Georgia EPD also discovered that the California state-wide RACT/BACT/LAER Clearinghouse indicates incorrectly that SCR has been constructed and startup had occurred on January 01, 2004 on engine models General Electric PG7241FA or Westinghouse 501F. This project was for Three Mountain Power, LLC and had proposed a Combined Cycle turbine. Ross Bell of the Shasta County Air Quality Management District was contacted on January 25, 2010 to provide further details on this project. Mr. Bell stated that this project has not been constructed, and as such there is no performance data.

Comment 3

The cost analysis associated with the construction of an SCR system is flawed because the control efficiency for SCR is underestimated.

Plant Dahlberg has indicated that the control efficiency associated with the use of SCR, specifically hot SCR, to control NOx emissions from natural gas and distillate fuel oil combustion is 67 wt% and 79 wt% respectively. Literature indicates that efficiencies between 80% and 90% are technically feasible. While it is true that such efficiencies may require excess ammonia injection and the potential formation of catalyst poisons and fine particulate, ammonium sulfates, this can be minimized by minimizing distillate fuel oil combustion and the use of ultra low sulfur fuel oil, while complying with Georgia Air Toxic Guidelines and all state and federal requirements for fine particulate matter.

EPD Response

Control efficiencies are dependent on the inlet and outlet concentration values. Larger control efficiencies can be obtained if the starting concentration value is higher. For the SGT6-5000F turbine data supplied by Siemens, the starting concentration has a value of 9 ppmvd. This is an improvement over the 15 ppmvd seen for simple cycle machines over the past years. The reduction from 9 ppmvd to 3 ppmvd equates to a 67% reduction. A reduction from a starting concentration of 15 ppmvd to 3 ppmvd would equate to an 80% reduction. Therefore, the control efficiency provided in the application is accurate.

The applicant estimated a cost per ton of $20,554 to reduce the NOx emissions from 9 ppmvd to 3 ppmvd on natural gas. This outlet concentration value is similar to recent RBLC determinations, which range between 2.0 ppmvd and 3.5 ppmvd. Even if it was technically possible to reduce the outlet concentration value lower, the cost effectiveness, as estimated below, would not justify the installation of SCR on the simple cycle turbines.

Starting Concentration	Ending Concentration	Control Efficiency	Cost ($/ton)
9 ppmvd	3 ppmvd	67%	$20,554
9 ppmvd	1.8 ppmvd	80%	$17,213
9 ppmvd	0.9 ppmvd	90%	$15,301

Comment 4

The draft permit is flawed because Plant Dahlberg and EPD did not use sufficient receptors in determining the ambient impacts associated with the proposed construction.

Page 3-7 of the "Air Quality Dispersion Modeling Protocol – Class I Area Impacts," submitted by Plant Dahlberg and accepted by EPD, indicates that "the grid will consist of receptors spaced 50 meters apart starting at and extending 500 meters from the fenceline." However, no fenceline coordinates could be located in the input or output files provided to EPD or in the review files provided by EPD. Fenceline coordinates may be closer to sources of pollution than the receptors generated in a Cartesian grid. Plant Dahlberg must comply, and EPD must ensure compliance with, the National Ambient Air Quality Standards (NAAQS) at the closest facility locations that the public may access, or the fenceline.

EPD Response

Fenceline receptors have been included in the modeling analysis. A total of 3,547 receptors were used. The first 83 receptors are fenceline receptors. A complete list of the fenceline receptors is attached to the Greenlaw comments in Appendix C.

Comment 5

The draft permit is flawed because modeling was only carried out at loads as lows as 70% of full load for fuel oil combustion and the draft permit allows operation of each CTG at 60% of full load for fuel oil combustion.

At loads less than 70%, emissions of products of combustion, such as carbon monoxide (CO) increase on an hourly basis, the averaging period used for evaluation of ambient impacts. Draft Condition No. 3.3.28 allows emissions of volatile organic compounds at 5 ppmvd while burning fuel oil, a concentration that corresponds to operation at 60% of full load according to page 2 of the table to Appendix B whose footer is marked as "1 Gas Turbine Estimated Performance Data Sheet."

While Draft Condition No. 3.3.28 also limits CO to 30 ppmvd, there is no testing in Section 4 or any monitoring in Section 5 of the draft permit to ensure that this limit will be met. Furthermore, Section 6 of the permit does not establish an excess emission, exceedance, or excursion level or an averaging period for the limit in 3.3.28. In order for the limit to be practically enforceable, these Section 4, Section 5, and Section 6 conditions must be explicitly stated in the permit. Even though the general draft testing Condition No. 4.1.3 requires the use of test Method 10 should testing of CO ever be required, no testing is required as of yet. Moreover, such a test would allow an averaging of three hourly tests runs so that hourly emissions of CO could exceed 30 ppmvd and still comply with Draft Condition No. 3.3.28. At 60% load, CO emissions are reported by the vendor as **250 ppmvd @ 15% O_2**. Therefore, by virtue of Draft Condition No. 3.3.28.c and the absence of practically enforceable limits restricting the hourly CO emission rate, the draft permit allows hourly emissions of CO from fuel oil combustion in excess of 30 ppmvd. **In fact, the draft permit allows 250 ppmvd @ 15% O2 of CO per hour or 1254 lb/hr/turbine.**

Upon review of the air quality application and modeling files from Plant Dahlberg and EPD, it is evident that Plant Dahlberg only applied for, and both Plant Dahlberg and EPD only performed, an impact analysis for CO emissions from fuel oil combustion at operations as low as 70% of full load. The differences in CO concentrations and hourly emission rates between 60% and 70% of full load while combusting fuel oil are dramatic as shown below:

Comparison of Hourly CO emissions at 60 and 70% of Full Load			
60% of Full Load		**70% of Full Load**	
ppmvd@15% O_2	lb/hr/turbine	ppmvd@15% O_2	lb/hr/turbine
250	1254	30	150

CO has a 1-hour National Ambient Air Quality Standard of 35 ppm or 40 mg/m^3. Yet, Table II-3: "Project Pollutant Monitoring *De Minimis* Impacts" shows that EPD did not evaluate 1-hour concentrations of CO, at any load, against the 1-hour *de minimis* concentration for CO of 2000 ug/m^3.

Furthermore, Table 8-21 of the May 07, 2009 memorandum from Peter Courtney to Renee Browne indicates that EPD performed no Toxic Impact Analysis for CO. According to the Georgia Guidelines for Analysis of Toxic Air Pollutant Impacts, criteria pollutants, such as CO, are considered a toxic air pollutant.

EPD Response

Condition 3.3.19 limits operation of the proposed turbines between 70-100% when burning fuel oil. The draft permit does not allow for operation of combustion turbines at 60% load when burning fuel oil. The facility will demonstrate compliance with the CO limit of 30 ppm (while firing fuel oil) with an initial performance test required in Condition 4.2.2. This test shall be conducted at 70% and 100% of operating loads while firing fuel oil. Condition 4.2.2 is modified as follows:

> 4.2.2 Within 60 days after achieving the maximum production rate at which each combustion turbine (Source Codes: CT11-CT14) will be operated, but no later than 180 days after the initial startup of each turbine, the Permittee shall conduct performance tests for VOC, CO and PM on each combustion turbine. The Permittee shall conduct separate tests while firing natural gas <u>(at 60% and 100% operating loads)</u> and fuel oil <u>(at 70% and 100% operating loads)</u> in each turbine. The results of the performance tests shall be used to demonstrate compliance with the emission limits in Conditions 3.3.24 and 3.3.28. The Permittee shall furnish to the Division a written report of the results of such performance tests.
> [391-3-1-.02(3), 391-3-1-.03(2)(c) and 40 CFR 52.21]

The operating loads evaluated include the 70% operating load, 100% load with evaporative cooler (model scenario A), 100% load without evaporative cooler (model Scenario B), 80% load without evaporative cooler (model Scenario C), and Start-up (model Scenario E). The only fuel evaluated for CO impacts was fuel oil, since the emissions of CO were observed to be consistently 2-5 times greater than the emissions for the same condition firing natural gas. Also the exit velocities and exhaust temperatures were higher firing natural gas, which would tend to diminish ambient impacts relative to the fuel oil operations.

No toxic modeling for CO is required. Georgia's Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions excludes any pollutant that is covered by a state or federal ambient air quality standard. CO has a 40 mg/m^3 one-hour standard and 10 mg/m^3 eight-hour national ambient air quality standard.

Comment 6

Conclusion

EPD should not issue the final permit without:

1. A proper evaluation of Plant Dahlberg's potential formaldehyde emissions at loads less than 80%(60%) of full load;
2. A proper evaluation of criteria and toxic air pollutant impacts for the permitted 60% of full load; and
3. Requiring the installation of SCR with oxidation catalyst to control NOx, CO, and volatile organic hazardous air pollutants (VOHAPs) including formaldehyde emissions.

EPD Response

Please refer to the Division's responses to Greenlaw Comments 1 to 5.

MICAH'S MISSION COMMENTS

In addition to the comments received from Greenlaw, EPD also received comments from Jill McElheney (founder of Micah's Mission). Some of these comments are not relevant to the Plant Dahlberg air quality permit application or the draft permit. Please refer to Appendix B to view the entire comments. EPD will only address the comments relevant to the draft permit and application below.

Comment 1

2. This permit also is for one (1) fuel oil above ground fixed roof storage tank. Please identify what will be stored in this tank, how that fuel will be transported to the tank, how the tank will be inspected by leaks, cleaned, and how often? Where will tank sludges go? Please also give what emissions come from storage tanks and how they are regulated.

   As you may not be aware, this has a timely and fascinating twist. My son, who was diagnosed with childhood leukemia, at age 4, was exposed to air toxicants from above ground fixed and floating roofs. The fugitive emissions from these storage tanks are known to emit chemicals associated with chromosomal changes responsible for childhood leukemia. My son's first name is Jarrett. Plant Dahlberg is located on Jarrett Road. I had asked for a public hearing for the most recent permit of Southeast Terminals in Athens involving these types of storage tanks associated with my son's exposures, but was denied. Referencing that, I ask that you read the link, and comment on how close the nearest residents in Nicholson will be to this storage tank?

   http://www.salem-news.com/articles/february212010/lejeune_tk.php

3. Please break down the VOCs into specific chemical emissions.

4. In all categories of air toxic emissions increase, please give what negative health impacts these chemicals are associated with.

5. In light of Georgia EPD's Toxicologist, Dr. Randy Manning, making the public statement that Athens had an increased risk of cancer, is there a scientific way to explain to residents near this facility if they have an even greater increased risk of cancer when this facility is in operation? Since air toxics migrate, please explain which counties this facility would impact in addition to Jackson?

6. In light of the proposed air toxic emissions increase scheduled as well from Huber, and knowing we have asked Georgia EPD to look in the community's sickness from Nicholson Baptist Church and the biological impairments known in that area, what impact will this Nicholson facility as well have on those sick residents?

7. What impact will this facility have on Sandy Creek Nature Park? Will any signs be posted during peak facility demand to inform park?

EPD Response 1

Georgia EPD ran the TANKS 4.0 software for the 2.05 million capacity ultra-low sulfur fuel oil storage tank FOT3 and determined that the total VOC emissions annually from this tank would be 3567 lbs/year (see summary page of Annual Emissions Report in Appendix B) or 1.8 tons/year. This amount has been included in the potential VOC emissions from the project.

EPD conducted a toxic impact assessment in accordance with Georgia's Toxic Guideline and has determined that Plant Dahlberg's impact on pollutant concentrations outside of the plant property, including any parks, nearby residences, and other counties, is not significant. In fact, the assessment predicted that most pollutant concentrations, at their highest level, are less than 1 percent of the acceptable ambient concentration. For a description of toxic compounds reviewed in the assessment, see Attachment C of the preliminary determination. Health impact information on these toxic compounds can be found using the following resources:

http://www.epa.gov/iris/subst/index.html
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

Comment 2

12. Finally, it is unclear how much fluoride is being emitted from this facility. Please consult with the department responsible for regulating water fluoridation in NE GA municipalities and let us know how much cumulative fluoride this would be for anyone exposed to it, including vulnerable populations like infant and children, kidney patients, and pregnant women. We know these are sub populations that visit the park regularly.

EPD Response 2

EPA's emissions factor database AP-42 does not list any emission factors for HF from natural gas or distillate fuel oil combustion, either in Section 1 or Section 3. The only data that Georgia EPD found on HF from natural gas and distillate oil combustion comes from the boiler_emissiondatasev3_.020510.zip boiler database available at http://www2.ergweb.com/projects/combustion/combustiontesting.html recently assembled for the new revisions to the Boiler MACT. Of all the testing data EPA considered in the database, the majority indicates that HF concentrations were below source test detection levels. While this data may go through statistical analysis and be used in future AP-42 emission factor estimates, Georgia EPD is unsure of its accuracy at in its present form.

PUBLIC HEARING COMMENTS

Comments were received during the Public Hearing held on February 18, 2010. Please refer to Appendix B for all of the comments received during the comment period. Only one comment was relevant to the permit and will be discussed in this section.

Comment 1

Citizen Lance McCravy asked why the facility does not plan on installing a SCR or a hot SCR on the combustion turbines.

EPD Response

As mentioned in the preliminary determination, conventional (low temperature) SCR is not applicable to simple-cycle turbines due to materials temperature limitations that preclude its application in high-temperature simple-cycle turbine exhaust.

High temperature SCR (i.e. hot SCR) is technically feasible for simple-cycle turbines, but has not been demonstrated in practice for large (F-Class) frame turbines. Even if high temperature SCR was an option capable of reducing NOx emissions, this technology would cost between $10,000-$20,000/ton of NOx removed per Siemens SGT6-5000F turbine. Consequently, high temperature SCR would not be cost effective on the simple-cycle turbines proposed for the expansion at Plant Dahlberg. Please refer to the NOx BACT in the preliminary determination for details.

EPD CHANGES

MODIFIED CONDITIONS

GA EPD modified condition 3.3.19 to addresses the requirement that startups shall be limited to 3 startups per rolling 8-hour period as used in the modeling analysis.

3.3.19 For purposes of this permit, the following definitions of startup and shutdown shall apply to each combustion turbine (Source Codes: CT11-CT14);
[40 CFR 52.21(j)(2)]

The time allocated to a startup are zero to 30 minutes or the time for reception of a signal from the turbine control system designating that the turbine load has reached 114 megawatts when firing natural gas and 133 megawatts when firing fuel oil, whichever is less. Time allocated to a shutdown is zero to 30 minutes. Startups shall be limited to 3 start-ups per rolling 8-hour period.

Typos were corrected to replace units for heat input from Btu to MMBtu in Conditions 3.3.21 and 3.3.22. Also the term "each combustion turbine"or "any combustion turbine" was corrected to state "the combustion turbines".

3.3.21 The Permittee shall limit the burning of fuel(s) in the combustion turbines (Source Codes: CT11-CT14) such that the heat input from the burning of all such fuel(s) in the combustion turbines does not exceed 3.536×10^7 MMBtu (approximately equivalent to 16,000 hours combined) during any twelve consecutive months. For purposes of this condition, the heat input of the fuel oil burned in a turbine shall be calculated by multiplying the fuel oil (in gallons) consumed by the turbine by 140,000 Btu per gallon. The heat input of the natural gas burned in a turbine shall be calculated by multiplying the natural gas (in cubic feet) consumed by the turbine by 1,022 Btu per cubic feet.
[40 CFR 52.21(j)(2)]

3.3.22 The firing of fuel oil shall be limited such that the total consumption does not exceed 8.516×10^6 MMBtu (approximately equivalent to 4,000 hours) during any twelve consecutive months in the combustion turbines (Source Codes: CT11-CT14). For purposes of this condition, the heat input of the fuel oil burned in a combustion turbine shall be calculated by multiplying the fuel oil (in gallons) consumed by the turbine by 140,000 Btu per gallon.
[40 CFR 52.21(j)(2)]

APPENDIX A

AIR QUALITY PERMIT
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APPENDIX B

WRITTEN COMMENTS
RECEIVED DURING
COMMENT PERIOD

APPENDIX C

ADDITIONAL
SUPPORTING DOCUMENTATION