Golder Associates

RECEIVED

NOV 04 2009

BUREAU OF AIR REGULATION

November 2, 2009

093-89570

Mr. Al Linero
Program Administrator, Special Projects Section
Florida Department of Environmental Protection
2600 Blairstone Rd.
Tallahassee, FL 32399-2400

RE: REQUEST FOR ADDITIONAL INFORMATION
DEP FILE NUMBER: 0450012-001-AC
47 MEGAWATT (MW) BIOMASS GASIFICATION AND COMBINED CYCLE POWER PLANT

Dear Mr. Linero:

The Northwest Florida Renewable Energy Center, LLC (NWFREC) submitted an application to the Department for the above-referenced project on September 2, 2009. The application is to construct a 47 MW (net) Biomass Integrated Gasification and Combined Cycle (BIGCC) Power Plant in Port St. Joe, Florida. Pursuant to Rule 62-4.055(1), Florida Administrative Code (F.A.C.), the Department has reviewed the application and by letter, dated October 2, 2009, has requested the following additional information. The Department's comments are addressed in the order in which they were received.

1. *The facility latitude and longitude noted on page 8 of the application long form does not correspond with the address on page 1 or the modeling file coordinates. Please verify the facility coordinates.*

Response: The latitude and longitude coordinates corresponding to the facility address on page 1 of the air application are as follows: 29° 50' 13.92" N and 85° 18' 03.00" W (29.8372°N, 85.3008°W).

2. *The particulate matter modeling analysis does not appear to have facility truck traffic emissions included in the source inventory. Please clarify or provide modeling with the truck emissions to ensure consistency with other biomass project applications the Department is currently reviewing.*

Response: Golder had made the decision initially not to model truck traffic, due to the low delivery rate of 4 trucks per hour and 12 hours per day. However, in order to not limit the facility's flexibility for truck deliveries and, based on the Department's desire to be consistent with other biomass projects, Golder has re-run the modeling to now include truck traffic. The modeled impacts are still well within acceptable limits, as documented by the modeled results presented in Attachment 1 to this letter response.

3. *The application states that the meteorological data have been approved for use by the Department. Please clarify if this particular set of files has been used and approved by the Department or just the station locations for this region. If Golder Associates created these files for this project and it is a new meteorological data set, please provide the Department with additional information regarding the land use, i.e. surface roughness values, land use map.*

Response: The AQQTLH data set has been available for several years, and was not created by Golder for the proposed project. However, since the meteorological data set had not been used since before January, 2008, Golder updated the land use for this data set (i.e., reprocessing AERMET Stage 3) using the EPA AERSURFACE tool. The updated AERMET files, including the AERSURFACE output, were provided to the Department in a June 24, 2009 email. A summary of the land use categories around the airport and a copy of the referenced email sent to the Department, are provided in Attachment 2.

4. *Table 5-4 in the application states that the emission rate for the PILE is 0.0928 grams per second (g/s). The modeled input is 0.02459 g/s. Please verify the emission rate for the PILE and correct either the table or modeling.*

Response: The total emissions from the pile were misreported. The emission rate for the PILE is actually estimated at 0.0048 g/s, which is lower than either of the two values referenced above. The revised emission rate has been input into the model as an area source, as 6.022E-07 grams per second per meter squared ($g/s/m^2$). The model was re-run with the new estimate, as well as the truck traffic impacts previously discussed and the results are presented in Attachment 1.

5. *Provide a clearer description of the biomass that will be gasified. For example, the Department summarized its understanding of the biomass to be used at the cancelled Biomass Gas and Electric project. Please review the attachment and update the actual plans for the purposes of the NWFREC. [Rule 62-4.070, F.A.C. Reasonable Assurance]*

Response: The feedstock will consist of woody biomass, which will be processed at a remote fuel preparation area. At this remote area, the feedstock will be sorted, screened and chipped to size. Although some leaves and small branches may inadvertently find their way into the feedstock, the focus is on producing wood chips from the woody biomass. Fuel availability appears to be both predictable and plentiful going forward, with the only real concern involving transportation costs. NWFREC is being somewhat opportunistic in their feed stock approach, meaning that they will contract for some supplies, but will also take advantage of more economic market opportunities when possible. The advantage of the gasification technique is that most biomass will react the same.

Some of the available feedstock types that are categorized as woody biomass, and that are proposed for the NWFREC, include the following:

- Saw Dust;
- Hogged Fuel;
- Processed Butt Cuts and;
- A Fuel Crop.

It should be noted that sander dust is no longer proposed as a potential feedstock. Sander dust, while an entirely acceptable fuel for a gasifier, would require a separate pneumatic handling system due to its extremely fine particle size and very low moisture content. It would also disperse more readily than the other feedstock types under windy conditions. Its deletion is a part of our Best Management Practice (BMP) to control fugitive dust. The hogged fuel is material that comprises land clearing debris that has either been pre-processed, run through a tub grinder, or a horizontal mill at a specific private forest clearing site. The butt cuts are round wood residues that are either of oversized or undersized non-processible materials from post or pole manufacturers. Finally, the fuel crop is a vegetative biomass being considered as a potential feedstock.

6. *Provide a clearer description of the extent to which materials that might be classified as solid waste will actually be used. In the application it is described as "a small percentage of it [i.e. the woody biomass] constituting "municipal solid waste" (e.g., yard trimmings)".*

Response: While the NWFREC initially proposed a small amount of yard trimmings (no more than 30 tons per day, quarterly average) as a possible feedstock source, the NWFREC has decided to eliminate yard trimmings as a proposed feedstock source for the Port St. Joe project. Therefore, none of the feed stocks proposed for the NWFREC constitute "municipal solid waste".

7. *Provide a clearer description of the material handling and storage system to insure that materials are taken in and then used on a first-in/first-out basis. Include descriptions of the storage pile management system and reasonable precautions to avoid fugitive emissions, odors and spontaneous combustion such as by minimizing drop distances, misting of material if needed, etc. [Rule 62-4.070, F.A.C. Reasonable Assurance]*

Response: The wood-handling industry is well aware of the tendency of an un-managed pile of wood-waste to overheat and result in spontaneous combustion. Accordingly, NWFREC's Best Management Plan to manage the fuel pile will have as its goals:

1. Avoidance of conditions giving rise to spontaneous combustion, supported by the fire control systems to be provided after approval by State and insurance entities, which specifically will provide fuel pile fire control;

2. Minimization of fugitive dust emissions, also using fuel pile fire protection facilities for dust suppression as required; and

3. Blending of the various fuels received to ensure reasonably consistent fuel properties as delivered to the gasifier.

The following preliminary BMP for fuel handling dust control is subject to the provision of further detail and adjustment during the project's detailed design phase to reflect final equipment selection:

<u>Measures to Minimize Spontaneous Combustion.</u>

1. Daily inspection for fire hazards, plus video surveillance;

2. The stack-out/reclaim plan will ensure reclaim of older material to avoid accumulation of fuel with a significant age. The first-in/first-out (FIFO) procedure will be slightly modified to ensure blending of older and newer fuel for consistent fuel properties. The equipment is only capable of handling 20,000 wet tons or about a 12 day supply of fuel. This will ensure a quick turnover of feedstock in order to make more room for deliveries. Despite the available onsite storage space, the NWFREC does not have the necessary equipment to move fuel from another pile into the dryer and the gasifier storage bin;

3. Use of daily inspections and fire-water cannons, mounted on elevated structures, together with mobile equipment to uncover and rapidly extinguish any smoldering materials found; and

4. The size of the fuel storage pile will not exceed the design value – this is a primary control measure, based upon the limited on-site fuel storage of about 2 weeks' worth of fuel. Specifically, the stacker will build a pile in zones up to 40 feet high and the reclaimer will start with the first zone built and reclaim the pile down to within two inches of grade.

<u>Measures to Minimize Fugitive Dust.</u>

1. The size of the fuel storage pile, about 2 weeks' worth of fuel, minimizes the area subject to wind erosion and reduces the travel time required for mobile equipment;

2. Conveyor transfer points are enclosed or partially enclosed;

3. Drop points to the fuel storage areas are designed to minimize the exposed drop height;

4. Transfer points and fuel bins are equipped with vent filters;

5. Underpile fuel reclaimers do not generate fugitive dust;
6. Fuel handling equipment is observed daily for proper operation and for maintenance requirements;
7. Plant fuel handling personnel will implement a procedure for observing and controlling unplanned fugitive dust emissions, including truck handling and unloading, and dirt or fuel on roads; and
8. All major roadways will be paved. Plant personnel will spray, scrape, or otherwise remove dirt or spilled fuel on plant roads.

Storage Pile Management.

1. Operational plans will recognize conditions such as high winds likely to result in excessive fugitive dust and will curtail movement of fuel by mobile equipment under such conditions; and
2. Mobile equipment will be used to maintain the pile's design shape and to ensure adherence to FIFO in reclaim operations.

8. Describe measures to minimize emissions during the construction of the facility. In particular, please describe reasonable precaution to minimize evolution of dust related to scraping of the former coal storage area. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response: NWFREC has no plans to "scrape" the coal storage area, rather the plan is to store the wood chips directly over the insitu base. During construction activities, a water truck will be available to spray the site entrance road and other construction areas. The current site has a good stand of grass as existing cover and it is our intention to keep as much of this cover as possible to minimize the generation of fugitive dust.

9. Describe the handling of any tars and ashes generated in the process and requiring disposal. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response: The ash will be collected in a series of primary and secondary cyclones as the flue gas exits the gasifier combustor. It will drop through the cyclones into an ash hopper and will be quenched with water to both lower the temperature for handling and control (PM) dust emissions. When the hopper is full, the ash will exit the hopper from the bottom into a truck then covered to leave the site for disposal. The air application has accounted for emissions from these described activities. Tars that are recovered are recycled back to the combustor and are not "handled" (i.e., they are contained within a closed loop system) during normal operation.

10. According to the application, biomass will be delivered by truck. Please describe any plans for rail or barge delivery. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response: The NWFREC has no plans in the forseeable future for feedstock delivery by rail or by barge. However, should feedstock become available from more remote areas it would be more economical and environmentally friendly to move feedstock by rail and or barge. (We have been made aware of and are evaluating an opportunity to bring in feedstock by barge.)

11. Please provide a more complete analysis to show that emissions of no single hazardous air pollutant (HAP) will equal or exceed 10 tons per year (TPY) and that emissions of all HAP will not equal or exceed 25 TPY. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response: The only significant sources of HAPs from this project would result from combustion in the combustor associated with the gasifier, as well as from combustion within the combustion turbines in the power block. HAP emission estimates were previously provided in the air application for the combined cycle power block. These estimates were based on the use of natural gas emission factors in AP-42. The NWFREC has conducted further research on the availability of HAP emission data specific to this combustion technology and this product gas, including discussions with the turbine vendor. No data has been found that would be more representative than the estimates previously provided. As further background on this issue, Attachment 3 provides a letter from the turbine vendor (Solar Turbines) explaining how the criteria pollutant estimates were derived and how the factors used for HAPs are the most representative method currently available. As some organic HAPs, such as formaldehyde, correlate with CO emissions, a comparison was made between the CO emissions based on AP-42 natural gas-firing and the Solar estimates that were based on the combustion of the product gas, as follows:

AP42 -- uncontrolled CT natural gas emission factor = 0.082 lb/MMBtu.

Solar – 12.6 lb/hr CO / 232 MMBtu/hr = 0.054 lb/MMBtu

Therefore, as some of the organic HAPs, such as formaldehyde, are products of incomplete combustion, similar to CO, the above comparison could infer that the use of AP-42 emission factors, at least for organic HAPs, may provide a conservative emission estimate.

Finally, Attachment 3 provides an additional table (Table 3-4a) that presents HAP emission estimates from the combustor. These estimates, which were not previously included in the air application, are based on the use of emission factors for anthracite coal combustion, consistent with the approach used for the criteria pollutants.

12. *Describe the nitrogen oxides (NOx) control measures ahead of the selective catalytic reduction (SCR) system incorporated in the Solar Titan-130 combustion turbines (wet injection or dry Low NOx). Justify the use of the formaldehyde emission factor used for the project. [Rule 62-4.070, F.A.C. Reasonable Assurance]*

Response: The application refers to the use of "combustion technology and an SCR system" for NOx control and this system is more fully addressed in response to the Department's Request No. 15. The formaldehyde factor is 0.091 ppmvd, based on the use of natural gas, as was more fully discussed above in response to the Department's Request No. 11.

13. *Confirm whether oxidation catalyst will be used for carbon monoxide (CO) control for the combustion turbines (CT). [Rule 62-4.070, F.A.C. Reasonable Assurance]*

Response: Table 3-2 of the application clearly indicates that the assumed CO oxidation catalyst reduction rate is 50%. It also adds that 20% reduction was assumed for VOCs.

14. *Describe how dioxin and furan (D/F) formation will be controlled through selection of the raw materials, combustion practices, temperature management and/or any add-on control equipment. Estimate the likely levels of D/F to be achieved from char/tar combustion. [Rule 62-4.070, F.A.C. Reasonable Assurance]*

Response: Three factors are required in proper concentrations and conditions to form dioxins and furans (D/F): a carbon source, usually any products of incomplete combustion (PIC); elevated temperature, though at sufficiently high temperatures dioxins spontaneously decompose; and a source of chlorine whether organic or inorganic. Although the expected dioxin levels should be very low for the discussed system, the potential exists for dioxin emissions from the combustor and gas turbine exhaust gases. The control of the D/F formation and emissions will be through the following three areas:

1. Proper feedstock management practices-- biomass has very low and, in a great many cases, no chlorine. NWFREC will use only forest residue and waste wood from the forest products industry. There will be no chemically treated wood used. This should ensure that feedstock with the lowest and, in many cases, no chlorine will be used.

2. The OLGA gas filtration system-- dioxins can be formed in the gasifier at the levels that should not exceed 0.45 ng I-TEQ/m3n upstream of the OLGA system, under regular operating conditions. Downstream of OLGA we expect them to be 0.09 ng I-TEQ/m3n as D/F are chemically very much like the tars that are collected by OLGA and will be collected with the tars and dropped by 80% on a conservative basis. The tars and any D/F's collected in them will be sent to the gasifier combustor for destruction.

3. The gasifier combustor is an effective D/F control device-- dioxins are destroyed when exposed to temperatures of greater than 850 °C with a residence time of greater than 2 seconds. The gasifier exceeds both of these levels by a comfortable margin. Also the combustion conditions in the turbine burners should ensure sufficiently low dioxin emission levels, from the combustion of the purified product gas.

If dioxins and furans are formed and escape capture in the OLGA unit and/or survive the high temperature conditions of the boiler and the turbine, they will exit the system in the combustor flue gas and the turbine exhaust gas. Nonetheless the expected concentrations should comply with the most stringent emissions limits found, which are in Europe of 0.1 ng I-TEQ/m3n. By comparison a fireplace using wood logs will produce between 0.25 and 1.5 ng I-TEQ/m3n.

15. Provide any additional information regarding the pollution control equipment and its planned operation. Refer to the attachment for typical design or operational parameters. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response: The NWFREC has previously submitted detailed descriptions of the proprietary Dahlman gas clean-up system that will be used to clean the product gas prior to firing in the combined cycle power block. In addition to that control system, various controls are proposed for other process units for control of emissions of NOx, CO/VOCs and PM. A more detailed description is provided below on a pollutant-by-pollutant basis.

<u>NOx Control</u> --is accomplished in three stages at NWFREC. The first stage is removal of fuel bound nitrogen, which has been converted to ammonia in the gasifier, in the Dahlman gas scrubbing equipment. In the Dahlman aqueous scrubbing column, the fuel gas is cooled to about 110 degrees F by a recirculating water flow in a packed bed scrubber. Dahlman has provided exit ammonia guarantees for this scrubber. The second stage of NOx control is provided by Solar's water injection system, which is an integral part of Solar's gas turbine combustor, as described in Solar Gas Turbine Inc's letter dated October 22nd 2009 by their Environmental Program Manager (Attachment 3). Third and last, NOx is controlled to stack limits by 19% aqueous ammonia injection to a Selective Catalytic Reactor system, with the following characteristics:

SCR Catalyst Supplier: Cormetech
Type: Homogenous Extruded Ceramic Honeycomb
Composition: Titanium DiOxide, Vanadium Pentoxide, Tungsten
PressureDrop: ~ 3 to 3.5" w.c.

NOx emissions from the gasifier combustor, as listed in the permit application, are controlled by the inherent characteristics of the fluidized bed combustor with its relatively low, and very uniform, bed temperature.

<u>CO and VOC Control</u> --The first stage of CO and VOC control is the removal of heavy and light tars, including naphthalenes, phenols, and similar heavy hydrocarbons in the Dahlman OLGA 2-stage tar removal equipment. This is described in the permit application report. Together with the subsequent aqueous gas scrubbing stages, this ensures a fuel gas of synthesis gas quality for combustion. Solar Gas Turbine's standard combustor then provides consistent CO and VOC levels based on their many years and many units of experience. The gas turbine exhaust CO and VOC levels provided by Solar are the design basis for the guaranteed removal of CO and VOC's to stack levels by the oxidation catalyst, which has the following characteristics:

CO Catalyst Supplier: Emerachem or equal
Type & Composition: The Catalyst is a 100% diffusion bonded Stainless Steel Metal monolith, with diesel foil substrate and alumina/Platinumcatalytic coating
Pressure Drop: ~ 1.5" w.c.

CO and VOC emissions from the gasifier combustor are controlled by the inherent characteristics of the fluidized bed combustor. This is a refractory lined unit. Compared with the more common water-wall fluidized bed steam generating boilers, refractory lined fluidized bed combustors have exceptionally low levels of CO and VOCs due to the absence of colder than average regions along the water-cooled walls of conventional fluidized beds, which can cause higher levels of CO and VOC's due to incomplete combustion. There is extensive experience of low CO and VOC levels in such units burning biomass in the forest products industry.

<u>Particulate Matter Control</u> -- The gasifier fuel gas stream undergoes particulate matter removal first in two stages of cyclones, similar to many fluidized bed systems, where most of the solid material leaving the gasifier is removed. The first stage of cyclones recirculates gasifier char and sand/olivine to the gasifier combustor. The second stage of cyclones removes residual ash and sand fines for disposal or for agricultural use. After reduction of the fuel gas temperature to 700 F, the fuel gas is cleaned of both tars and particulate matter in hot oil scrubbers and a wet ESP, with the recovered tars and particulate being recirculated to the gasifier combustor for energy recovery. Lastly, the fuel gas is cooled to 110 F and subjected to two stages of aqueous scrubbing and a demister before fuel gas compression and combustion. The predicted particulate levels leaving the gas turbine are, as with natural gas firing, consistent with observed gas turbine emissions for this class of unit.

Particulate matter emissions from the gasifier combustor are controlled first, by the combustor cyclones, and, after flue gas cooling, secondly by a high-efficiency baghouse. Dozens of such baghouses, and ESPs are in service on fluidized combustors consistent with the requested stack emission limits. Details of the selected particulate control devices will be provided upon completion of the detailed design phase.

16. *Provide information on material acceptance/rejection criteria. For example, some operators provide a very detailed wood fuel quality control plan. Refer e.g. to the style of one filed (for a different fuel slate) for the Robbins Community Power project in Illinois that was incorporated in the air permit available at: <u>www.epa.state.il.us/public-notices/2008/robbins-power/draft-permit.pdf</u>*
[Rule 62-4.070, F.A.C. Reasonable Assurance]

Response: The Department's RAI letter contained an attachment, referred to as the *Woody Biomass Feedstock Properties and Control Plan.* This plan was based on input to the Department related to a similar project in Tallahassee and was to become part of the final air permit, when issued. The NWFREC is willing to accept a similar plan for the Port St. Joe project.

Rule 62-4.050(3), F.A.C., requires that all applications for a construction permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. Therefore, this RAI response package includes a new certification statement by the authorized representative, as well as a new P.E.

certification statement by the professional engineer. Where appropriate, new calculations, assumptions, reference material and appropriate revised pages of the application form have also been included.

If you should have any questions, please contact me at (813) 287-1717.

Sincerely,

GOLDER ASSOCIATES INC.

Scott Osbourn, P.E.
Project Manager

cc: Kenn Davis, NWFREC
Glenn Farris, NWFREC

Attachments

APPLICATION INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1.	Owner/Authorized Representative Name : **Kenn Davis, Manager**
2.	Owner/Authorized Representative Mailing Address... Organization/Firm: **Northwest Florida Renewable Energy Center, LLC.** Street Address: **P.O. Box 249, 11993 South St. Rt. 63** City: **Clinton** State: **IN** Zip Code: **47842**
3.	Owner/Authorized Representative Telephone Numbers... Telephone: **(765) 832-8526** ext.**2526** Fax: **(765) 832-1860**
4.	Owner/Authorized Representative Email Address: **: kdavis@whiteconstruction.com**
5.	Owner/Authorized Representative Statement: *I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.* [signature] Oct 28, 2009 Signature Date

APPLICATION INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: **Scott H. Osbourn** Registration Number: **57557**
2.	Professional Engineer Mailing Address... Organization/Firm: **Golder Associates Inc.**** Street Address: **5100 West Lemon Street, Suite 114** City: **Tampa** State: **FL** Zip Code: **33609**
3.	Professional Engineer Telephone Numbers... Telephone: **(813) 287-1717** ext.**53304** Fax: **(813) 287-1716**
4.	Professional Engineer Email Address: **sosbourn@golder.com**
5.	Professional Engineer Statement: *I, the undersigned, hereby certify, except as particularly noted herein*, that:* *(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and* *(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.* *(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.* *(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.* *(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.* [signature] 11/2/09 Signature Date (seal) SCOTT OSBOURN LICENSE NO. 57557 STATE OF FLORIDA PROFESSIONAL ENGINEER

* Attach any exception to certification statement.
**** Board of Professional Engineers Certificate of Authorization #00001670**

ATTACHMENT 1

TABLE 3-1
BG&E PROJECT SUMMARY OF POTENTIAL AIR EMISSIONS

Pollutant (TPY)	CTs/DBs (1A & 1B)*	Gasifier Combustor	Cooling Tower	Material Handling	Auxiliary Boiler	Flare	Dryer	Total Emissions
SO_2	7.9	13.1	NA	NA	0.09	0.05	NA	21
PM	22.8	2.5	1.03	12.4	0.03	neg	0.10	39
PM_{10}	22.8	2.5	0.73	7.00	0.03	neg	0.01	33
NO_x	120.0	41.7	NA	NA	1.47	1.58	NA	165
CO	110.4	13.9	NA	NA	1.24	8.59	NA	134
VOC (as methane)	13.7	6.9	NA	NA	0.08	3.25	NA	24
Fluoride	neg	neg	NA	NA	NA	neg.	NA	0
Lead	neg	neg	NA	NA	NA	neg.	NA	0
Total HAPs			NA	NA			NA	5

* Based on emissions at 59F.
Source: Golder, 2009

TABLE 3-5
SUMMARY OF PM EMISSIONS FROM THE MATERIAL HANDLING OPERATIONS
Project: BGE Power Plant Port St. Joe

Operation Scenario	Emission Rate (lb/hr) PM 24-hour Rate	Emission Rate (TPY) PM Annual Rate	Emission Rate (lb/hr) PM10 24-hour Rate	Emission Rate (TPY) PM10 Annual Rate	Emission Rate (lb/hr) PM2.5 24-hour Rate	Emission Rate (TPY) PM2.5 Annual Rate
Fuel Delivery (Paved Road Emissions)	9.02	6.58	0.29	1.28	0.04	0.19
Stack Out Operations	0.23	0.10	0.11	0.05	0.02	0.01
Relcaim Operations	0.016	0.028	0.007	0.013	0.001	0.002
Screen and Hog Mill	0.095	0.067	0.036	0.025	0.0275	0.019
Sand Handling System	0.64	2.82	0.64	2.82	0.64	2.82
Ash Handling System	0.64	2.82	0.64	2.82	0.64	2.82
Total Net Emissions	10.65	12.41	1.73	7.00	1.37	5.85

Source: Golder, 2009

TABLE 5-3
SOURCE STACK PARAMETERS

Point Sources	MODEL ID	UTM Coordinates[a] East (m)	UTM Coordinates[a] North (m)	Physical Height (ft)	Physical Height (m)	Physical Diameter (ft)	Physical Diameter (m)	Operating Temperature (°F)	Operating Temperature (K)	Operating Velocity (ft/s)	Operating Velocity (m/s)
CT/DB 1A	HRSG1	664,154	3,301,779	75	22.9	6.5	1.98	352	450.9	65.7	20.03
CT/DB 1B	HRSG2	664,150	3,301,762	75	22.9	6.5	1.98	352	450.9	65.7	20.03
Gasifier/Combustor	GASIFIER	664,074	3,301,791	100	30.5	3.8	1.17	300	422.0	60	18.29
Steam Cooling Tower	COOLTOW1	664,199	3,301,755	42.3	12.89	21.5	6.55	114	318.5	28.1	8.56
Steam Cooling Tower	COOLTOW2	664,195	3,301,742	42.3	12.89	21.5	6.55	114	318.5	28.1	8.56
Gasifier Condenser Cooling Tower	GASCOOL1	664,122	3,301,757	22.7	6.92	9.0	2.74	95	308.2	30	9.14
Gasifier Condenser Cooling Tower	GASCOOL2	664,129	3,301,755	22.7	6.92	9.0	2.74	95	308.2	30	9.14
Gasifier Condenser Cooling Tower	GASCOOL3	664,136	3,301,753	22.7	6.92	9.0	2.74	95	308.2	30	9.14
Feed Stock Dryer	DRYER	664,055	3,301,803	50	15.24	0.6	0.18	ambient	ambient	60	18.29
Fuel Silo Baghouse (R6)	FS007	664,056	3,301,805	50	15.24	0.6	0.18	ambient	ambient	60	18.29
Sand System Baghouse	FS009	664,083	3,301,796	50	15.24	0.5	0.15	ambient	ambient	0	0.00
Ash System Baghouse	FS010	664,090	3,301,794	50	15.24	0.5	0.15	ambient	ambient	0	0.00
Baghouse (S6, S7, R3, and Hog Mill)	BAGHS	664,055	3,301,848	50.0	15.2	0.6	0.2	ambient	ambient	60.0	18.3

Volume Sources	MODEL ID	East (m)	North (m)	Release Height (ft)	Release Height (m)	Side length (ft)	Side length (m)	Initial Sigma y (ft)	Initial Sigma y (m)	Initial Sigma Z (ft)	Initial Sigma Z (m)
Covered Conveyor to Screen (S4) and Screen to Conveyor (S5)	VOL_S4S5	664,058	3,301,850	20	6.1	16.4	5.0	3.8	1.2	4.7	1.4
Reclaim conveyor 1 to reclaim conveyor 2 (R2)	VOL_R2	664,003	3,301,892	32	9.8	10.0	3.0	2.3	0.7	4.7	1.4
Supply conveyor 3 to dryer (R4) and Dryer to conveyor (R5)	VOL_R4R5	664,050	3,301,804	20	6.1	10.0	3.0	2.3	0.7	4.7	1.4
Conveyor to stacker (S8) and stacker to pile (S9)	VOL_S8S9	663,989	3,301,900	20	6.1	10.0	3.0	2.3	0.7	4.7	1.4
Fuel and Ash Trucks	TRUCKSxx	[b]	[b]	7.9	2.4	39.4	12.0	[c]	[c]	7.3	2.2

Area Sources	MODEL ID	East (m)	North (m)	Release Height (ft)	Release Height (m)
Truck Dump Platforms (S2)	AREA_S2	664,085	3,301,830	0	0
Hopper to covered conveyor transfer point (S3)	AREA_S3	664,098	3,301,820	0	0
Open Pile (S10) and Chain drag to reclaim conveyor (R1)[d]	PILE	663,989	3,301,900	20.0	6.71

[a] UTM Zone 16, North American Datum 83.

[b] Line source comprised of 49 volume sources.

[c] Initial sigma y varies and is based on center-to-center distance between non-overlapping volume sources divided by 2.15.

[d] Pile release height set equal to half the pile height.

TABLE 5-4
SOURCE EMISSIONS

MODEL ID	POINT SOURCES	PM_{10} (lb/hr)	PM_{10} (g/s)	SO_2 (lb/hr)	SO_2 (g/s)	NOx (lb/hr)	NOx (g/s)	CO (lb/hr)	CO (g/s)
HRSG1	CT/DB 1A	2.6	0.3	0.9	0.1	13.7	1.7	12.6	1.6
HRSG2	CT/DB 1B	2.6	0.3	0.9	0.1	13.7	1.7	12.6	1.6
GASIFIER	Gasifier/Combustor	0.6	0.1	3.0	0.4	9.5	1.2	3.2	0.4
COOLTOW1	Steam Cooling Tower	0.087	0.011	--	--	--	--	--	--
COOLTOW2	Steam Cooling Tower	0.087	0.011	--	--	--	--	--	--
GASCOOL1	Gasifier Condenser Cooling Tower	0.079	0.010	--	--	--	--	--	--
GASCOOL2	Gasifier Condenser Cooling Tower	0.079	0.010	--	--	--	--	--	--
GASCOOL3	Gasifier Condenser Cooling Tower	0.079	0.010	--	--	--	--	--	--
DRYER	Feed Stock Dryer	0.0020	0.0003	--	--	--	--	--	--
FS007	Fuel Silo Baghouse (R6)	7.2E-05	9.1E-06	--	--	--	--	--	--
FS009	Sand System Baghouse	0.6429	0.0810	--	--	--	--	--	--
FS010	Ash System Baghouse	0.6429	0.0810	--	--	--	--	--	--
BAGHS	Baghouse (S6, S7, R3, and Hog Mill)	0.0362	0.0046	--	--	--	--	--	--
VOL_S4S5	Covered Conveyor to Screen (S4) and Screen to Conveyor (S5)	0.0178	0.0022	--	--	--	--	--	--
VOL_R2	Reclaim conveyor 1 to reclaim conveyor 2 (R2)	0.0015	0.0002	--	--	--	--	--	--
VOL_R4R5	Supply conveyor 3 to dryer (R4) and Dryer to conveyor (R5)	0.0036	0.0005	--	--	--	--	--	--
VOL_S8S9	Conveyor to stacker (S8) and stacker to pile (S9)	0.0178	0.0022	--	--	--	--	--	--
AREA_S2	Truck Dump Platforms (S2)	0.0297	0.0037	--	--	--	--	--	--
AREA_S3	Hopper to covered conveyor transfer point (S3)	0.0089	0.0011	--	--	--	--	--	--
PILE	Open Pile (S10) and Chain drag to reclaim conveyor (R1)d	**0.0382**	**0.0048**	--	--	--	--	--	--
TRUCKSxx	**Ash Truck**	**0.012**	**0.002**						
	Fuel Truck	**0.293**	**0.037**						

[a] HRSG emissions based on 25°F ambient temperature, after SCR and 90% NO_X reduction.

TABLE 5-9
SUMMARY OF MAXIMUM CONCENTRATIONS PREDICTED FOR PROPOSED PROJECT COMPARED TO EPA CLASS II SIGNIFICANT IMPACT LEVELS

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$)[a]	EPA Class II Significant Impact Levels ($\mu g/m^3$)
SO_2	Annual	0.2	1
	24-Hour	2.6	5
	3-Hour	3.7	25
PM_{10}	Annual	4.1	1
	24-Hour	16.5	5
NO_2[b]	Annual	0.8	1
CO	8-Hour	17.6	500
	1-Hour	26.3	2,000

[a] Concentrations are based on highest predicted concentrations from AERMOD using five years of meteorological data for 2001 to 2005 consisting of surface and upper air data from the National Weather Service stations at Apalachicola and Tallahassee Municipal Airports, respectively.

[b] NO_x to NO_2 conversion factor of 0.75 applied to modeled NOx impacts based on EPA Modeling Guidelines.

TABLE 5-10
SUMMARY OF MAXIMUM CONCENTRATIONS PREDICTED FOR PROPOSED PROJECT COMPARED TO EPA CLASS I SIGNIFICANT IMPACT LEVELS

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$)[a]	EPA Class I Significant Impact Levels ($\mu g/m^3$)
St. Marks Wilderness Area			
SO_2	Annual	0.001	0.1
	24-Hour	0.025	0.2
	3-Hour	0.142	1
PM_{10}	Annual	0.002	0.2
	24-Hour	0.05	0.3
NO_2[b]	Annual	0.02	0.1
Bradwell Bay Wilderness			
SO_2	Annual	0.001	0.1
	24-Hour	0.031	0.2
	3-Hour	0.140	1
PM_{10}	Annual	0.002	0.2
	24-Hour	0.07	0.3
NO_2[b]	Annual	0.01	0.1

[a] Concentrations at St. Marks Wilderness Area and Bradwell Bay Wilderness are based on highest predicted concentrations from AERMOD using five years of meteorological data for 2001 to 2005 consisting of surface and upper air data from the National Weather Service stations at Apalachicola and

[b] NO_x to NO_2 conversion factor of 0.75 applied to modeled NOx impacts based on EPA Modeling Guidelines.

TABLE 5-11
MAXIMUM PREDICTED IMPACTS FOR ALL SOURCES COMPARED TO THE NAAQS

Averaging Time and Rank	Concentration ($\mu g/m^3$)[a] Total (a+b)	Modeled Sources (a)	Background[b] (b)	UTM Coordinate, NAD83 East (m)	North (m)	Time Period (YYMMDDHH)	AAQS ($\mu g/m^3$)
PM_{10}							
Annual	26.1	4.1	22.0	663,994	3,301,729	01123124	50
	25.9	3.9	22.0	663,994	3,301,729	02123124	
	25.8	3.8	22.0	663,994	3,301,729	03123124	
	25.8	3.8	22.0	663,994	3,301,729	04123124	
	25.9	3.9	22.0	663,994	3,301,729	05123124	
24-Hour, H6H	97.2	14.2	83.0	664,000	3,301,700	01110424	150

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, second-highest predicted concentration for any year
H6H = Highest, sixth-highest predicted concentration in 5 years

[a] Concentrations are predicted using AERMOD with 5 years of meteorological data for 2001 to 2005 consisting of surface and upper air soundings from the weather stations at Apalachicola and Tallahassee, FL, respectively.
[b] Background concentrations are summarized in Table 5-8.

TABLE Appendix B-1
MATERIAL HANDLING EMISSION ESTIMATES (STACK-OUT)
Project: Port St. Joe

Parameters		Units	TRUCK PAVED ROADS Delivery of wood	TRUCK DUMP TO HOPPER	HOPPER TO CONVERED CONVEYOR	COVERED CONVEYOR TO SCREEN	SCREEN TO COVERED CONVEYOR	SCREEN TO HOG MILL	HOG MILL TO COVERED CONVEYOR	COVERED CONVEYOR TO STACKER	STACKER TO PILE	OPEN PILE Wind Erosion
		Flow Diagram ID	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Emission Point/Area												
Operational Data												
Activity, hours	Daily	(hrs/day)	4	4	4	4	4	4	4	4	4	24
days	Annual	(days/yr)	365	365	365	365	365	365	365	365	365	365
Material Handling Data												
Material type			Wood Chips	Wood Chips	Wood Chips	Wood Chips	Wood Chips	Wood Chips	Wood Chips	Wood Chips	Wood Chips	Wood Chips
Material throughput, ton/hr (design)			300	300	300	300	200	100	100	300	300	300
ton/day	Daily	(tons/day)	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152
ton/yr	Annual	(tons/yr)	420,480	420,480	420,480	420,480	280,320	140,160	140,160	420,480	420,480	420,480
Moisture content (M), % (nominal)		%	30	30	30	30	30	30	30	30	30	30
Number of transfers		No.		1	1	1	1	1	1	1	1	
Miles per day of road transport	Daily Avg = Annual Avg	No.	35	NA	NA	NA	NA	NA	NA	NA	NA	
Miles per truck round trip	Daily Avg = Annual Avg	No.	0.61	NA	NA	NA	NA	NA	NA	NA	NA	
Number of truck trips	Daily Avg = Annual Avg	No.	58	NA	NA	NA	NA	NA	NA	NA	NA	
Storage Pile Data												
Pile Description (shape)												Circular
Average Pile Height (ft)												40
Pile Diameter (ft)												330
Uncovered Conveyor												
Description (shape)												
Average Pile Height (ft)												
Conveyor Length (ft)												
Conveyor Width (ft)												
Size, ft^2												85,487
Size, acres												1.97
General/ Site Characteristics												
Mean wind speed, mph	Daily	mph	14.76	14.76	14.76	14.76	14.76	14.76	14.76	14.76	14.76	14.76
	Annual	mph	7.38	7.38	7.38	7.38	7.38	7.38	7.38	7.38	7.38	7.38
Particle size multiplier, PM (k)			0.082	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	1.00
Particle size multiplier, PM10 (k)			0.016	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.50
Particle size multiplier, PM2.5 (k)			0.002	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.075
Days of precipitation greater than or equal to 0.01 inch (p)	Short term											0
	Annual											61
Time (%) that unobstructed wind speed exceeds 5.4 m/s at mean pile height (f)	Short term											76.5
	Annual	61										15.3
Silt content (s), %												0.25
Emission Control Data												
Emission control method			None	Open	Low drop Point	Low drop Point	Low drop Point	Baghouse Control	Baghouse Control	Low drop Point	Height of the stacker discharge onto the pile is automatically controlled to keep the drop to a minimum	Open Pile with water sprays
Emission control removal efficiency, %		%	0	0	70	70	70	99	99	70	70	60
Emission Factor (EF) Equations for Transfer Operations												
Uncontrolled EF (UEF) Equation	UEF (lb/ton) = k x (0.0032) x (U / 5)$^{1.3}$/[(M / 2)$^{1.4}$]	(lb/ton)										
Controlled EF (CEF) Equation	CEF (lb/ton) = UEF (lb/ton) x [100% - Removal efficiency (%)]	(lb/ton)										
Emission Factor (E) Equation for Unpaved Roads (Front End Loaders)												
Uncontrolled EF (UEF) Equation	UEF=k x (s/12)^a x (w/3)^b; where a = 0.7 and b= 0.45, k = 4.9 for TSP w = 55 tons (e.g., CAT 988); a=0.9 for PM10 and PM2.5	(lb/mile)										
Controlled EF (CEF) Equation	CEF=k x (s/12)a x (w/3)^b x [100% - Removal efficiency (%)] Accounting for rainfall using (1-P/(4 x365)) Where: P = 61, therefore control = (1-61/4/365) = 0.958											
Emission Factor (E) Equation for Paved Roads												
Uncontrolled EF (UEF) Equation	UEF=[k x (sl/2)^a x (w/3)^b -C] where a = 0.65 and b = 1.5, k = 0.082 for TSP, C = 0.00047 sl = 1 based on Golder 2001 Port Transportation Study w = 32.5 tons full truck, 12.5 tons empty truck	(lb/mile)										
Controlled EF (CEF) Equation	CEF=[k x (sl/2)^a x (w/3)^b -C] x (1-P/(4 x365)) x [100% - Removal efficiency (%)] Accounting for rainfall using (1-P/(4 x365)) Where: P = 61, therefore control = (1-61/4/365) = 0.958											
Emission Factor (E) Equation for Wind Erosion												
Uncontrolled EF (UEF) Equation	UEF (lb/day/acre) = k x 1.7 x (s/1.5) x ((365 - p)/235) x (f/15)											
Controlled (Final) EF (CEF) Equation	CEF (lb/day/acre) = UEF (lb/day/acre) x (100 - Removal efficiency (%))											
Calculated PM Emission Factor (EF)												
Uncontrolled EF	Short term		1.072867 (lb/mile)	0.00022 (lb/ton)	0.00022 (lb/ton)	0.00022 (lb/ton)	0.00022 (lb/ton)	0.00022 (lb/ton)	0.00022 (lb/ton)	0.00022 (lb/ton)	0.00022 (lb/ton)	2.2 (lb/day/acre)
	Annual		1.072867 (lb/mile)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.00009 (lb/ton)	0.4 (lb/day/acre)
Controlled EF	Short term		1.027807 (lb/mile)	0.00022 (lb/ton)	0.00007 (lb/ton)	0.00007 (lb/ton)	0.00007 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00007 (lb/ton)	0.00007 (lb/ton)	0.9 (lb/day/acre)
	Annual		1.027807 (lb/mile)	0.00009 (lb/ton)	0.00003 (lb/ton)	0.00003 (lb/ton)	0.00003 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00003 (lb/ton)	0.00003 (lb/ton)	0.1 (lb/day/acre)
Calculated PM10 Emission Factor (EF)												
Uncontrolled EF, lb/ton	Short term		0.208962 (lb/mile)	0.00010 (lb/ton)	0.00010 (lb/ton)	0.00010 (lb/ton)	0.00010 (lb/ton)	0.00010 (lb/ton)	0.00010 (lb/ton)	0.00010 (lb/ton)	0.00010 (lb/ton)	1.1 (lb/day/acre)
	Annual		0.208962 (lb/mile)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.00004 (lb/ton)	0.2 (lb/day/acre)
Controlled EF, lb/ton	Short term		0.200185 (lb/mile)	0.00010 (lb/ton)	0.00003 (lb/ton)	0.00003 (lb/ton)	0.00003 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00003 (lb/ton)	0.00003 (lb/ton)	0.4 (lb/day/acre)
	Annual		0.200185 (lb/mile)	0.00004 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.1 (lb/day/acre)
Calculated PM2.5 Emission Factor (EF)												
Uncontrolled EF, lb/ton	Short term		0.031055 (lb/mile)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.00002 (lb/ton)	0.2 (lb/day/acre)
	Annual		0.031055 (lb/mile)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.00001 (lb/ton)	0.0 (lb/day/acre)
Controlled EF, lb/ton	Short term		0.029750 (lb/mile)	0.00002 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.1 (lb/day/acre)
	Annual		0.029750 (lb/mile)	0.00001 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.00000 (lb/ton)	0.0 (lb/day/acre)
Estimated Emission Rate (CER)												
PM ER	lb/hr (daily basis)		9.019006	0.06266	0.01866	0.01866	0.01866	0.0006288	0.0006288	0.01886	0.01886	0.07351
	TPY		6.583874	0.01864	0.00559	0.00559	0.00373	0.0000621	0.0000621	0.00559	0.00559	0.05363
PM10 ER	lb/hr (daily basis)		0.292771	0.02974	0.00892	0.00892	0.00892	2.97E-04	0.0002974	0.00892	0.00892	0.03676
	TPY		1.282337	0.00882	0.00265	0.00265	0.00176	0.0000294	0.0000294	0.00265	0.00265	0.02682
PM2.5 ER	lb/hr (daily basis)		0.043510	0.00450	0.00135	0.00135	0.00135	4.50E-05	0.0000450	0.00135	0.00135	0.00551
	TPY		0.190574	0.00134	0.00040	0.00040	0.00027	0.0000045	0.0000045	0.00040	0.00040	0.00402

Source: USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles. Section 13.2.1.3 for Paved Roads. Seciton 13.2.2 for Unpaved Roads. USEPA, 1993; Emission Factor Documentation for AP-42, Section 13.2.1 Paved Roads..
USEPA, 1992 (Fugitive Dust Background and Technical Information Document for Best Available Control Measures, Section 2.3.1.3.3, Wind Emissions from Continuously Active Piles). USEPA, 2006 13.2.5 for k factors.

ATTACHMENT 2

LAND USE DATA

Land Cover Counts (With 10 km of AQQ ASOS Tower): Bowen Ratio and Albedo

Category	Description	Count	Percent
11	Open Water:	45845	41.1
12	Perennial Ice/Snow:	0	0.0
21	Low Intensity Residential:	2041	1.8
22	High Intensity Residential:	249	0.2
23	Commercial/Industrial/Transp:	768	0.7
31	Bare Rock/Sand/Clay:	68	0.1
32	Quarries/Strip Mines/Gravel:	0	0.0
33	Transitional:	765	0.7
41	Deciduous Forest:	2089	1.9
42	Evergreen Forest:	10797	9.7
43	Mixed Forest:	4742	4.3
51	Shrubland:	0	0.0
61	Orchards/Vineyard/Other:	0	0.0
71	Grasslands/Herbaceous:	0	0.0
81	Pasture/Hay:	319	0.3
82	Row Crops:	577	0.5
83	Small Grains:	0	0.0
84	Fallow:	0	0.0
85	Urban/Recreational Grasses:	1458	1.3
91	Woody Wetlands:	24984	22.4
92	Emergent Herbaceous Wetlands:	16854	15.1
99	Missing Data:	0	0.0
	Total:	*111556*	100

Land Cover Counts (Within 1 km of AQQ ASOS Tower): Surface Roughness

		WD SECTOR:	1	2	3	4	5	6	7	8	9	10	11	12		
Category	Description	Starting Direction:	0	30	60	90	120	150	180	210	240	270	300	330	Total	Percent
11	Open Water:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Perennial Ice/Snow:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Low Intensity Residential:		0	1	0	0	0	0	21	0	0	0	0	0	22	0.6
22	High Intensity Residential:		0	0	0	0	0	0	9	0	0	0	0	0	9	0.3
23	Commercial/Industrial/Transp:		11	4	2	7	30	47	47	78	81	28	11	4	350	10.0
31	Bare Rock/Sand/Clay:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	Quarries/Strip Mines/Gravel:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Transitional:		4	5	3	12	16	9	6	6	16	12	11	8	108	3.1
41	Deciduous Forest:		21	16	7	15	28	8	16	8	37	39	99	99	393	11.2
42	Evergreen Forest:		22	137	124	117	63	40	63	21	0	0	0	3	590	16.9
43	Mixed Forest:		41	29	39	50	60	16	24	18	20	15	6	14	332	9.5
51	Shrubland:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	Orchards/Vineyard/Other:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	Grasslands/Herbaceous:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	Pasture/Hay:		1	1	2	1	7	2	2	0	2	0	0	0	18	0.5
82	Row Crops:		18	0	3	3	16	4	7	4	9	10	17	1	92	2.6
83	Small Grains:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	Fallow:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	Urban/Recreational Grasses:		161	20	14	18	31	118	62	67	101	138	97	49	876	25.1
91	Woody Wetlands:		12	71	93	66	35	43	34	90	25	50	50	113	682	19.5
92	Emergent Herbaceous Wetlands:		0	6	6	0	5	3	1	0	0	0	0	2	23	0.7
99	Missing Data:		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total:		*291*	*290*	*293*	*289*	*291*	*290*	*292*	*292*	*291*	*292*	*291*	*293*	3495	100

From: smarks@golder.com
Sent: Wednesday, June 24, 2009 4:32 PM
To: cleve.holladay@dep.state.fl.us; Deborah.Nelson@dep.state.fl.us
Subject: Stage 3 reprocessing for Apalachicola/Tallahassee Met data 2001 to 2005

Cleve and Debbie,

Please find attached all the AERMET files used for the Stage 3 reprocessing of Apalachicola/Tallhassee met data with AERSURFACE. The Stage 1 and 2 results, that the DEP already has, were not revised. The updated Apalachicola record will be used for the upcoming BG&E modeling. Please acknowledge whether or not you have successfully downloaded the attached data. Thank you.

Steve

File(s) will be available for download until **14 July 2009**:

Attachment: APALACHICOLA STAGE3.zip, 2,875.53 KB [Fingerprint: fc8dd20c6b76800fbd96c83e9066fd92]

You have received attachment link(s) within this email sent via Golder Associate's Secure File Transfer. To retrieve the attachment(s), please click on the link(s).
Accellion File Transfer

ATTACHMENT 3

Solar® Turbines

A Caterpillar Company

Solar Turbines Incorporated

9330 Sky Park Court
San Diego, CA 92123
Tel: (858) 694-1616

Submitted Electronically

October 22, 2009

Glenn Farris
Biomass Gas & Electric
glenn@biggreenenergy.com

RE: Emissions Estimates for Port St. Joe Biogas Facility

Dear Mr. Farris:

Biomass Gas & Electric (BG&E) is proposing to install two *Titan*™ 130 20501 combustion turbines fueled by a gasified biomass fuel at the Port St. Joe facility. The *Titan* 130 will be equipped with water injection. Emissions will be further reduced via Selective Catalytic Reduction and CO Oxidation catalysts.

Solar Turbines Incorporated supplied BG&E with emissions estimates (NOx, CO, UHC) based on the fuel composition of the proposed fuel. The emissions estimates were derived based on our natural gas combustion experience coupled with experience on other projects with fuels having similar Wobbe Index and chemical constituents. Based on our alternative fuel experience, Solar is confident in our ability to warrant the NOx, CO, and UHC estimates.

Solar isn't aware of any published turbine, burning gasified biomass, emissions testing data to use to estimate emissions of formaldehyde and other air toxics. Solar has recommended that BG&E extrapolate EPA natural gas emission factors or estimate emissions from data that may exist from biomass boilers (using a ratio based on expected CO emissions).

BG&E asked that Solar provide detail on the water injection technology. Water is injected into the combustor via a water circuit in the fuel injector. The effect of water injection is to increase the thermal mass by dilution and thereby reduce peak temperatures in the flame zone. Water is typically injected at a water-to-fuel weight ratio of less than one. Depending on the initial NOx levels, such rates of injection may reduce NOx by 60 percent or higher. Both CO and VOC emissions are increased by water injection, with the amount of increase dependent on the amount of water injected and operating load.

Please feel free to contact me at 858.694.6609 if you have any questions or need any additional information.

Sincerely,
Leslie Witherspoon
Environmental Program Manager
Solar Turbines Incorporated
witherspoon_leslie_h@solarturbines.com

cc: Chris Lyons, Solar Turbines Incorporated
Chris Burns, Solar Turbines Incorporated

C:\LESLIE\CUST_QS AND PROJECTS\2007\#07-264 BIOMASS GAS AND ELECTRIC\EMISSIONS LETTER.DOC

Table 3-4a. Hazardous Air Pollutant Emission Factors and Emissions Gasifier Combustor

Performance			
Heat Input from Residual Char (MMBtu/hr)	153	Hours of Operation	8,760
Char Heating Value (Btu/lb)	14,500		
Char produced (ton/hr)	5.3		

HAPs (Section 112(b) of Clean Air Act)	Emission Factor (lb/ton)	Emissions (lb/hr)	Emissions (TPY)
Biphenyl	0.025	0.132	0.579
Naphthalene	0.130	0.687	3.008
Phenanthrene (PAH)	0.007	0.036	0.157
Arsenic	1.9E-04	0.0010	0.004
Antimony	BDL	BDL	BDL
Beryllium	3.1E-04	0.0016	0.007
Cadmium	7.1E-05	0.0004	0.002
Chromium	2.8E-02	0.1479	0.648
Manganese	3.6E-03	0.0190	0.083
Mercury	1.3E-04	0.0007	0.003
Nickel	2.6E-02	0.1374	0.602
Selenium	1.3E-03	0.0069	0.030
HAPs (Total)		1.2	5.1

Note:

Phenanthrene is a polycyclic aromatic hydrocarbon (PAH).

BDL = Below detection limit

Source:

Emission rates based upon information from AP-42 Section 1.2.

Golder, 2009