Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

March 19, 2008

FILE COPY

The Honorable Bill Proctor
Leon County Commission
301 South Monroe Street
Tallahassee, Florida 32301

Dear Commissioner Proctor:

I received a copy of your letter to Governor Charlie Crist regarding the proposed waste-to-energy facility, Biomass Gas and Electric (BG&E). At the request of Secretary Michael Sole, I would like to update you on our interactions with the facility.

To date, the Florida Department of Environmental Protection (DEP) has not received any permit applications associated with this facility. However, on January 17, 2008 and February 19, 2008, representatives from DEP met with BG&E representatives to discuss the proposed project and DEP's permitting process. The 45 megawatt facility is proposed to be located near Innovation Park in Tallahassee. The facility is proposing to use wood waste, yard clippings and fuel crops as fuel sources, and anticipates using 800,000 to 900,000 gallons of water per day in their process. To satisfy the water demand, BG&E is currently evaluating the possibility of using reclaimed water from the City of Tallahassee as their water source.

BG&E's facility will produce less than 75 megawatts of electricity, so it is not subject to the State's Power Plant Siting Act process. However, the proposed project does require air, stormwater management and domestic wastewater permits from DEP. DEP's permitting process includes public notification of DEP actions, as well as a process for citizens to challenge agency actions. In addition, DEP's Division of Air Resource Management also requires the applicant to publish a notice upon filing of the application in a newspaper of local circulation and will post such applications on its webpage at: http://www.dep.state.fl.us/Air/permitting/construction.htm.

Whether a facility goes through the power plant siting process or DEP's permitting process, the ability to regulate where a facility is located rests with the local government. DEP's environmental permitting standards do not contain provisions to evaluate compliance with local land use regulations.

I am very sensitive to your concerns, and would be happy to meet with you if you have additional questions. I can be reached at (850) 245-2037.

Sincerely,

Mimi A. Drew
Deputy Secretary, Regulatory Programs and Energy

cc: Dick Fancher, Director, Northwest District, DEP
Joseph Kahn, Director, Division of Air Resource Management, DEP

BEFORE THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

John Gibby
4887 Gum Road
Tallahassee, FL
32304
Petitioner

Case No.
FDEP File No. 0730109-0001-AC

v.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Respondent
_____/

PETITION FOR ADMINISTRATIVE HEARING PURSUANT TO SECTIONS 120.569 AND 120.57(1), FLORIDA STATUTES

Petitioner, John Gibby , hereby petitions for an administrative hearing pursuant to Sections 120.569 and 120.57(1), Florida Statutes, challenging Respondent, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION'S ("FDEP"), approval of Biomass Gas & Electric of Tallahassee, LLC's ("BG&E") application for an air pollution construction permit which authorizes the construction of a nominal 42 megawatts biomass-fed integrated gasification and combined cycle power plant called the Tallahassee Renewable Energy Center. In support thereof, CONCERNED CITIZEN states as follows:

The Parties and Notice of Agency Action

(a). The name and address of the affected agency is the FDEP, 3900 Commonwealth Boulevard, MS 35, Tallahassee, Florida 32399-3000. The telephone number of the Agency is (850) 245-2118.

(b). The name, address, and telephone number of the petitioner:

John Gibby
4887 Gum Road
Tallahassee, FL
32304
The telephone number is (850) 576-2062.

The name, address, and telephone number of the petitioner's representative, if any:

None at this time.

The address for service purposes during the course of the proceeding:

John Gibby
4887 Gum Road
Tallahassee, FL
32304

The petitioner's substantial interests are affected by the agency determination:

1. As acknowledged by BG&E, this plant will release pollutants including particle pollution, which can increase my risk as well as the risk to other residents of Tallahassee to developing heart disease, stroke, brain inflammation, lung disease and increase risk of developing cancer. The more air pollution, the more medications I may have to pay for and the sicker I and others could become. I have a right to breathe clean air and to drink clean water. Glenn Farris's previous involvement with the McNeil Generating system in Burlington, Vermont indicates a history of poisonous emissions.

By approval of the air construction permit, BG&E's permitted facility will emit air pollutants that will have an immediate and real impact on the Petitioner's substantial interest.

2. For a party to have standing to challenge proposed agency action pursuant to Sections 120.569 and 120.57(1), Florida Statutes, the party must demonstrate its substantial interest are determined or affected by the proposed agency action. This requirement is met when a party demonstrates that, as a result of the agency action, it will suffer an injury in fact, of sufficient immediacy to entitle it to an administrative proceeding on the action and the substantial injury that would result from the agency action is of the type or nature the administrative proceeding is designed to protect.[Agrico Chemical Co. v. Department of Environmental Regulation, 406 So.2d 478 (Fla. 2d. DCA 1981).]

3. As a resident of Leon County and working in the vicinity of the proposed facility site, the Petitioner's substantial interest is being determined in this proceeding. Further, the substantial injury that will result by the presence in the outdoor atmosphere of the state of any one or more substances or pollutants in quantities which are or may be harmful or injurious to human health or welfare, animal or plant life, or property, or unreasonably interfere with the enjoyment of life or property, including outdoor recreation, §62.210.200(12), F.A.C., such injury that this administrative proceeding is designed to protect. Therefore, the Petitioner has standing to challenge FDEP's decision to approve BG&E's application for an air pollution construction permit.

(c). 1. FDEP issued a written notice of intent to issue draft air Construction Permit on October 27, 2008. The Petitioner received FDEP's written notice of intent to issue a Draft Air Construction Permit by electronic mail on or about October 28, 2008, pursuant to Florida Statue §120.60(3). By operation of law, this Petition is filed within a timely manner.

(d). A statement of all disputed issues of material fact

1. BG&E has not shown outside laboratory data, nor 3rd party independent verification of their emissions data nor any of the test data which they offer in support of their emission claims.

2. The Petitioner disputes the determination by FDEP that the applicant, BG&E, has shown that the installation is provided or equipped with pollution control facilities that will abate or prevent pollution to the degree that will comply with the standards or rules adopted by the department in accordance with Florida State Statute 403.087.

3. The applicant, BG&E failed to provide reasonable assurance that the operation of the proposed facility will not adversely impact air quality and failed to provide reasonable assurance that the project will not cause or contribute to a violation of a state or federal ambient air quality standard.

(e). A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action:

1. The applicant, BG&E, has not adequately demonstrated or proven that the proposed project will not adversely impact or exceed air quality standards set forth in Florida Statutes 403.087

2. BG&E has not demonstrated that they will not significantly pollute regional air quality as there is no successful biomass plant on which to model their claims

3. Reasonable assurance has not been demonstrated by the applicant, BG&E, in their Application and in the request for additional information.

4. Reasonable assurance has not been demonstrated by FDEP in the technical review due to technical errors.

5. The Proposed Draft Permit and Technical Evaluation and Preliminary Determination contain several provisions, information and data that warrant clarification.

(f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes:

The Petitioner contends that:
1. The 2008 Florida Statutes and
2. Current Air Rules
The Florida Administrative Code Chapters are: 62-4, 62-204, 62-210, 62-212, 62-213, 62-214, 62-242, 62-243, 62-252, 62-256, 62-257, 62-281, 62-296, and 62-297 may require reversal or modification of the agency's proposed action.
The alleged facts relate to the specific rules or statutes.

(g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

The Petitioner requests the following action to be taken:

Rule 28-106.209,F.A.C. Pre-hearing Conferences
At any time after a matter has been filed with the agency, the presiding officer may direct the parties to confer for the purpose of clarifying and simplifying issues, discussing the possibilities of settlement, examining documents and other exhibits, exchanging names and addresses of witnesses, resolving other procedural matters, and entering into a prehearing stipulation.

This request is filed as a protective measure to insure petitioner's substantial interests are NOT affected by the agency determination.

It is the petitioner's desire to avoid the need for a formal administrative hearing.

Respectfully submitted this 10th day of November, 2008.

Concerned Citizen

John Gibby 10/10/08

John Gibby
4887 Gum Road
Tallahassee, FL
32304

Certificate of Service

I HEREBY CERTIFY that a copy of the foregoing has been furnished to the following by U.S. Mail on this 10th day of November, 2008:

Mr. Glenn Farris, President and CEO
Biomass Gas and Electric of Tallahassee, LLC
3500 Parkway Lane, Suite 440
Atlanta, Georgia 30092

Ronni Moore
Office of General Counsel
Department of Environmental Protection
3900 Commonwealth Blvd.
Tallahassee, FL 32399-2600

Trina Vielhauer, Chief
Bureau of Air Regulation
Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

John Gibby 10/10/08.

John Gibby
4887 Gum Road
Tallahassee, FL
32304

THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

RECEIVED
NOV 10 2008
BUREAU OF AIR REGULATION

In the Matter of an
Application for Air Construction Permit by:

Biomass Gas and Electric of Tallahassee, LLC
3500 Parkway Lane, Suite 440
Atlanta, Georgia 30092

Tallahassee Renewable Energy Center
Air Permit No. 0730109-001-AC
Leon County, Florida

_____/

REQUEST FOR EXTENSION OF TIME

By and through undersigned counsel, Biomass Gas and Electric of Tallahassee, LLC (BG&E) hereby requests, pursuant to Florida Administrative Code Rule 62-110.106(4), an extension of time to and including November 18, 2008, in which to file a Petition for Administrative Proceedings in the above-styled matter. As good cause for granting this request, BG&E states the following:

1. On or about October 27, 2008, BG&E received from the Department of Environmental Protection (Department) a Technical Evaluation and Preliminary Determination, a Proposed Draft Permit, and a Written Notice of Intent to Issue Air Permit (Permit No. 0730109-001-AC) for the Tallahassee Renewable Energy Center located in Leon County, Florida.

2. The Proposed Draft Permit and Technical Evaluation and Preliminary Determination contain several provisions that warrant clarification or correction.

3. Representatives of BG&E will correspond with staff of the Department's Bureau of Air Regulation in an effort to resolve all issues.

4. This request is filed simply as a protective measure to avoid waiver of BG&E's right to challenge certain conditions contained in the Proposed Draft Permit and Technical Evaluation and Preliminary Determination. Grant of this request will not prejudice either party, but

will further their mutual interest and likely avoid the need to file a petition and proceed to a formal administrative hearing.

5. Counsel for BG&E contacted Ronni Moore with the Department's Office of General Counsel regarding this request.

WHEREFORE, BG&E respectfully requests that the time for filing a Petition for Administrative Proceedings with regard to the above-referenced Technical Evaluation and Preliminary Determination, Proposed Draft Permit, and Written Notice of Intent to Issue Air Permit (Permit No. 0730109-001-AC) be formally extended to and including November 18, 2008. If the Department denies this request, BG&E requests the opportunity to file a Petition for Administrative Proceedings within 10 days of such denial.

Respectfully submitted this 7th day of November, 2008.

HOPPING GREEN & SAMS, P.A.

Angela Morrison Uhland
Fla. Bar No. 0855766
123 South Calhoun Street
Post Office Box 6526
Tallahassee, FL 32314
(850) 222-7500

Attorney for BIOMASS GAS AND ELECTRIC
Of TALLAHASSEE, LLC

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing has been furnished to the following by U.S. Mail on this 7th day of November, 2008:

Ronni Moore
Office of General Counsel
Department of Environmental Protection
3900 Commonwealth Blvd.
Tallahassee, FL 32399-2600

Trina Vielhauer, Chief
Bureau of Air Regulation
Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attorney

289361

Golder Associates Inc.
5100 West Lemon Street
Suite 114
Tampa, FL USA 33609
Telephone: (813) 287-1717
Fax: (813) 287-1716

Golder Associates

July 25, 2008

07389628

Florida Department of Environmental Protection
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Attention: Mr. A. A. Linero

RE: RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION BIOMASS GAS AND ELECTRIC; FACILITY ID NO. 0730109

Dear Mr. Linero:

This letter is in response to your request for additional information regarding the Air Construction Permit application submitted by Golder Associates Inc. on behalf of Biomass Gas and Electric (BG&E) on April 3, 2008.

1. Material Handling. In the application, it is indicated that the wood fuel feedstock will be processed off-site and shipped by train to the facility location. The exact composition of the wood feedstock is not provided. Will the feedstock contain understory materials such as detritus material from the floor of forest areas and leaves and small branches or will it consist solely of chipped to size wood chunks from tree trunks? Detritus materials and leaves may contain mercury from dry and wet deposition which could affect the mercury emission estimates. [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. While BG&E initially proposed a small amount of yard trimmings (no more than 30 tons per day, quarterly average) as a possible feedstock source, BG&E has decided to eliminate yard trimmings as a proposed feedstock source for the Tallahassee Renewable Energy Center. Therefore, none of the feedstocks proposed for the Tallahassee Renewable Energy Center constitute "municipal solid waste". Fuel availability appears to be both predictable and plentiful going forward, with the only real concern involving transportation costs. BG&E is being somewhat opportunistic in their feedstock 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 Tallahassee Renewable Energy Center, include the following:

- *Sander Dust;*
- *Saw Dust;*

- *Georgia Pacific Fuel;*
- *Hogged Fuel;*
- *Knots and Shives;*
- *Processed Butt Cuts and;*
- *A Fuel Crop.*

The Georgia Pacific (GP) fuel is in essence the reject material off of the round wood debarking system at the GP OSB Hosford, Florida Mill. 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. Knots and shives are the unique residues from the specialty pulping operation at Florida Buckeye in Perry, Florida. 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.

Attachment 1 to this letter provides constituent analyses for the different types of woody biomass summarized above, including analyses for mercury. The Department has an interest in mercury emissions and has provided references for potential mercury emissions from combustion of biomass due to forest fires. The range that is given is 14 to 71 nanograms per gram of biomass. While the references are instructive, a comparison to potential emissions from the proposed project isn't valid for several reasons. The mercury emissions from forest fires include forest understory and volatilization of mercury in soils. In addition, the BG&E project is not combustion, but gasification of the feedstock. Nevertheless, using these mercury factors from the literature, and the proposed feedstock processing rate, an uncontrolled mercury emission estimate of 103 grams per year (0.23 lb/yr) was obtained. Finally, even as these uncontrolled levels are very low in the biomass feedstock to the gasifier, the mercury that might be present is effectively further controlled in the project's proposed gas cleanup system. More detail on this system is provided in the response to Comment No. 6 in this letter.

2. Startups/Shutdowns. In the application, it is estimated that there will be a total of 6 startups of the gasifier system per year. There is no request of provisions in the permit for additional startups for shakedowns during the initial operation of the facility. Does BG&E actually anticipate that the facility will not require additional startups and shutdowns of the gasifier system during the first year of the facility's operation? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- During initial operations, there will be a larger number of startups and shutdowns than the 6 anticipated after the startup and shakedown period. The 6 is based on annual operations after the shakedown period.

In addition, there is a major difference between a cold startup, which takes at least 18 hours, and a hot startup, which can take from as little as a few minutes to several hours. For definition purposes, hot startups are defined as ones where the gasifier is over 1,000 ^{0}F when the startup occurs.

At another gasification facility, the Burlington facility, there were approximately 22 cold startups/shutdowns during the first year of operation. By 2001, this number had dropped to 7. Cold startups involve a transition period during the change from air-fired operation to pyrolysis, where smoke can be produced during the change from excess oxygen combustion to sub-stoichiometric oxygen combustion, and finally to pyrolysis. This period of operation at the flare has an expected initial duration of up to 30 minutes for cold startups. One of the operational objectives of the Tallahassee plant is to reduce the length of the cold startup transition to a minimum, with a target of 10 minutes achieved after the first year of operation. Flare design to help minimize sub-stoichiometric conditions

during burnoff are a part of the preliminary engineering design effort, with the objective of minimizing smoke production during the sub-stoichiometric transition.

Emissions from hot startups are minimal, since the wood still pyrolyzes at temperature, with low tar formation. During an electrical trip, gas production tapers off over about three minutes to a zero flow. The gas is flared during this period. Since the gas varies in composition rapidly during this three minute period, there will be events of a few seconds duration where the flared gas may transition through a substoichiometric range and produce smoke.

Therefore, in response to the Department's comment, BG&E would like to clarify that as many as 22 startup/shutdowns (either hot or cold starts) could occur during the initial 12 months of operation. Subsequent to this initial decommissioning period, BG&E expects that no more than an average of 6 startup/shutdowns would be required annually.

3. Volatile Organic Compounds (VOC) and Sulfur Dioxide (SO_2) Emissions during Shutdowns. On pages 12 to 15 of the application, emission estimates are provided for nitrogen oxides (NOx) and particulate matter (PM) during shutdowns, while none are given for VOC and SOx based on the argument that these emissions from the turbines are already low. What are the anticipated emissions of these pollutants during shutdowns? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- As previously stated, emissions during shutdown are anticipated to be low. Emission estimates were provided for NOx (0.075 tons per year or TPY) and PM (0.003 TPY) based on a material balance approach, engineering judgment and AP-42 emission factors. These estimates represented the total of annual planned shutdowns (about 6 per year) and emergency shutdowns (about 4 per year). Attachment 2 provides a tabular summary of all anticipated shutdown emissions, including estimates for VOC, CO and SO_2. These estimates are thought to be conservative and also rely on a material balance approach and AP-42 emission factors.

It should be noted that potential annual emissions for the project were estimated based on continuous operation (i.e., 8,760 hours per year). Therefore, in order for startup and shutdown emissions to occur, the unit would essentially be non-operational for periods of time. Any downtime of the unit would result in lower than estimated annual emissions, in spite of the fact that some emissions will occur during startup and shutdown conditions.

4. Startup and Shutdown Procedures. In Section 2.2.1 of the application, the startup and shutdown modes and procedures for the gasifier/power block are briefly described with the caveat that full descriptions of the procedures are not provided due to their proprietary nature. To effectively assess the proposed durations and associated emissions involved during the startup and shutdown of the gasifier/power block of the facility, the Department requires a full description of the procedures. Please indicate which submitted documents are considered proprietary. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The full description of the startup/shutdown procedure, which SilvaGas has currently developed, was included in the air application. SilvaGas has also developed a preliminary gasifier startup schedule (see Attachment 3, Figure 1), consistent with the cold startup duration described in the response to Comment No. 2 above. The figure presents a sequence of 16 discrete steps that comprise a typical cold startup (the worst case emissions impact). As part of Attachment 3, BG&E has provided additional detail on anticipated emissions due to startup operations (see Tables Attachment 3-1 through 3-6). The emission estimates do not rely on actual emission test data, but are based on worst-case

assumptions. Actual emissions test data during unit startups does not typically exist for many types of process operations. This is primarily because this mode of operation is typically of short duration, as well as the fact that certain required conditions (e.g., minimum threshold exhaust temperatures and flows) are necessary to conduct U.S. EPA reference method tests.

A more detailed procedure is undergoing development, to be provided to plant staff as the system Operating Manual. These procedures and associated manual are evolving as part of the detailed design phase of the engineering effort. It is not BG&E's intent to claim these procedures as proprietary. In fact, BG&E would be receptive to a permit condition that required appropriate staff training to minimize emissions during startup and shutdown events, per the procedures developed by BG&E.

5. Refractory Life. If the facility only requires 6 startups per year what is the anticipated life of the gasifier refractory? If additional startups are required, especially during the initial operation of the facility, how is the life of the refractory affected? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The refractory life varies substantially, depending on the location of the refractory in the vessel. SilvaGas obtained a patent on installing tees instead of elbows at 90 degree flow direction changes, in order to reduce the erosion rate at the ells (i.e., the critical point of circulation between the gasifier and the combustor). Improved materials suggest that the life of the refractory in straight sections of the vessels and ductwork will be approximately 5 years, although there are examples in similar services where the refractory has lasted in excess of 30 years. The worst case found at Burlington was for a vent pipe off of a seal pot, which had a gas velocity of 400 feet per second. This refractory lasted only two weeks, but was an isolated case compounded by design error.

Our cyclone vendors suggest an upper limit on gas flow velocity to minimize refractory wear in the cyclone impact zones. Hard facing of exotic materials such as silicon or tungsten carbide plates are planned for the worst impact zones. SilvaGas has used advanced computational fluid dynamics software, which can predict erosion locations and wear rates, and has incorporated the results into the project design. One of the ongoing maintenance programs for the Tallahassee plant is to verify and calibrate the computer prediction of refractory erosion locations and wear rates.

Startups and shutdown affect refractory life only if the heatup and cooldown rates result in thermal expansion-based stresses. The maximum heatup and cooldown rates for the Tallahassee plant are based on Burlington rates which successfully prevented thermal stress induced cracks. An additional factor is the refractory anchoring spacing and design. BG&E is working closely with our original refractory vendor, based out of Tampa, to provide the correct anchor spacing and design.

6. Syngas Cleanup. In Section 2.1.3 of the application, the syngas cleanup system proposed for the project is discussed. However, very few details of the proposed system are given. In previous meetings between the Department and BG&E, it was indicated by BG&E that the syngas cleanup system will be provided by Dahlman Filter Technology. Based on research done by the Department, the technology provided by Dahlman principally involves the removal of tar compounds from the syngas stream utilizing an oil wash. Details on the removal of other pollutants of concern (particulates, inorganic impurities such as sulfur compounds and volatile metals) were not available from research or in the application. Please provide to the Department a more detailed description of the syngas cleanup system proposed for the facility, including, if available, process schematics, which will allow the Department to make a comprehensive technical evaluation of the gas cleanup

system. If such information is deemed proprietary, please indicate on the submitted documents. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—A Technical Information Paper on Dahlman's gas cleanup technology, modified to reflect the proposed Tallahassee Renewable Energy center project, has been included as Attachment 4 to this letter. The paper provides a simplified process flow diagram of the product gas cleanup system. As described in the attachment, the gas cleanup system has no direct emissions to the atmosphere. Only condensate water leaves the closed system.

Further background on the gasifier is necessary in order to understand the operation of the gas cleanup system. The gasifier operates as a pyrolysis unit, under reducing conditions. For instance, organic sulfur and nitrogen in the feedstock are converted to H_2S and NH_3 in small amounts. In a similar fashion, it is expected that mercuric salts, methyl mercury organics or mercuric oxides would be reduced to elemental mercury, and be evaporated into the product gas. The wash oil scrubbers remove tars above the dew point of water, so the vapor pressure of the elemental mercury remains high, and at its very low concentration, is anticipated to remain in the vapor phase. The same is true of the H_2S and NH_3.

When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water. The removal level in such a system of mercury is quite low, due to the insolubility of mercury in the water, but the elemental mercury will react with the H_2S present to form mercuric sulfide, and be removed as a particulate in the main recirculating water loop. There is an additional separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H_2S by reaction with the caustic, making sodium sulfide.

This recirculating loop of caustic soda solution with sulfides in it also provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10^{-35}. Thus, the remaining mercury should be removed here, since the S^- ion concentration will be much higher here than in the main recirculating water loop.

This is the approach used at the mercury cell caustic chlorine plants for removing any traces (i.e., ppt) of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S^- ions, and the precipitated mercuric sulfide filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

The recirculating water at the water scrubber is blown down on a regular basis, where it is used in the cooling tower as part of the cooling tower makeup water. The design has not proceeded far enough yet to determine if this water needs filtration. Should detectable mercury concentrations be obtained in either this blowdown or the blowdown from the separate caustic circulating loop, then this could be filtered to remove the mercuric sulfide particulate.

Further, the combustor receives char and olivine from the gasifier at about 1,350 ^{0}F. At this temperature, and under the gasifier reducing conditions, mercury compounds would be separated out in the upstream cyclones as part of the product gas, described above. A negligible amount of mercury would enter the combustor, as there would be virtually no mercury present in the char. However, if any mercury was present, it would likely remain in the ash bound as a non-volatile inorganic salt rather

than be released as a vapor. The vast majority of any mercury in the feedstock should end up in the makeup water from the water scrubber going to the cooling tower, and in particular, the blowdown from the separate caustic loop in the water scrubber which contains S ions.

7. Volatile Metal Emissions. As indicated in No. 6 above, no details are provided on how volatile metals, such as mercury, are going to be removed from the syngas. In the application, it is stated that the mercury concentration in the wood fuel is minimal and consequently expected mercury emissions are negligible. However, if this is not the case, does the syngas cleanup system utilize an activated carbon bed or something similar to control volatile metal emissions such as mercury? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—This comment is addressed above.

8. Duct Burner Firing. Based on the application, it appears that the duct burners will only fire syngas (product gas). Will natural gas ever be fired in the duct burners? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—Only product gas will be fired in the duct burners.

9. Emissions Averaging. In Table 3-2 of the application, emissions in ppm at 15 percent oxygen (O_2) of NO_X, carbon monoxide (CO), volatile organic compounds (VOC), and ammonia (NH3) appear to be given for annual stack testing requirements. Please provide Continuous Emissions Monitoring System (CEMS) 24 hour block average and 12 month rolling average estimates of CO emissions and 24 hour block average and 30 day rolling average estimates of NO_X, emissions when firing the combustion turbine and the combustion turbine in combination with the duct burners for the temperatures and loads cited in the table. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- BG&E's requested emission limits, as well as associated averaging times and compliance methods, are provided in Attachment 5.

10. SO_2 Emissions. On page 19 of the application, it is stated that SO_2 emissions will be minimized through the utilization of natural gas during startups and the gas cleanup system on the product gas. Please provide estimates of the SO_2 concentration in the product gas before and after cleanup. In addition, provide estimates of SO_2 stack emissions when firing product gas for the same conditions described in No. 9 above. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—As stated earlier, the gasifier operates as a pyrolysis unit, under reducing conditions, converting organic sulfur in the feedstock to small amounts of H_2S. The H_2S is then reduced in the gas cleanup system. SO_2 emissions would result from the residual level of H_2S in the product gas (after the gas cleanup system), which is fired in the combustion turbines and duct burners, or, in the event of a system malfunction, when the product gas is flared. Attachment 6 provides an H_2S estimate in the post-gas cleanup scenario, as well as the resultant amount of SO_2 that is estimated to be emitted by firing of the product gas in the CT/DB. SO_2 emissions from the pre-gas cleanup scenario were addressed in Attachment 3 (i.e., flare emissions during startups).

11. Combustion Turbine and Duct Burner Emissions Estimates. When comparing the upper and lower portions of Table 3-2 of the application, the emissions of NO_X, CO, and VOC appear to be lower when firing the duct burners than when not, please clarify. In addition, pollutants and units given in

the table are not defined nor is the basis for the different emission concentrations for the various pollutants. Please redo this table and resubmit to address these issues and generally provide a clear overview of the expected emissions for the project as a function of turbine load, ambient air temperature, and duct burner firing. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response— A subsequent discussion between Golder and David Read of the Department has cleared up the confusion associated with the emission table. At times, emissions on a concentration basis (i.e., ppmvd) can be lower from combined firing of a combustion turbine and duct burner than from a combustion turbine alone. Further, as stated in the response to Comment No. 9 above, BG&E has provided a tabular summary of the requested emission limits, including averaging times and methods of compliance (see Attachment 5).

Please do not hesitate to call should you require additional information.

Sincerely,

GOLDER ASSOCIATES INC.

Scott Osbourn, P.E.
Senior Consultant

Enclosures

Cc: Glenn Farris, President & CEO, BG&E

SO/dcg

H:\PROJECTS\2007proj\073-89628 BG&E Air and Noise Support\RAI Response\RAI Response.docx

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 Date 7/25/08

(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**

APPLICATION INFORMATION

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name :
   Glenn Farris, President & CEO
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **BG&E**
   Street Address: **3500 Parkway Lane, Suite 400**
   City: **Atlanta** State: **GA** Zip Code: **30092**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: (**770**) **662-0256** ext. Fax: (**770**) **662-0287**
4. Owner/Authorized Representative Email Address: **glenn@biggreenenergy.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

   7·24·08
   Date

ATTACHMENT 1

FEEDSTOCK ANALYSES

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Sander Dust	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-002

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		100	
% Total Moisture	[ASTM D4442(METHOD A)]	4.89		
% Ash	[ASTM D1102]	0.75	0.79	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	7985	8395	8462
% Volatile Matter	[ASTM D3175]	74.94	78.79	
% Fixed Carbon	[ASTM D3172(Calc)]	19.42	20.42	
% Sulfur	[ASTM D4239(METHOD C)]	0.08	0.08	
% Carbon	[ASTM D5373]	47.66	50.10	
% Hydrogen	[ASTM D5373]	6.68	7.03	
% Nitrogen	[ASTM D5373]	4.33	4.56	
% Oxygen	[ASTM D5373(Calc)]	35.61	37.44	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.09	0.09	
Mercury, ug/g	[SW846-7471A]		0.09	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	1020 ug/g	ASTM D5600
Potassium, K	662 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	79 ug/g	ASTM D5600
Magnesium, Mg	252 ug/g	ASTM D5600
Barium , Ba	7 ug/g	ASTM D5600
Strontium, Sr	4 ug/g	ASTM D5600
Phosphorus, P	163 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Saw Dust	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-001

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	59.68		
% Ash	[ASTM D1102]	1.26	3.12	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	3410	8458	8730
% Volatile Matter	[ASTM D3175]	31.51	78.15	
% Fixed Carbon	[ASTM D3172(Calc)]	7.55	18.73	
% Sulfur	[ASTM D4239(METHOD C)]	0.01	0.02	
% Carbon	[ASTM D5373]	20.20	50.11	
% Hydrogen	[ASTM D5373]	2.43	6.01	
% Nitrogen	[ASTM D5373]	0.11	0.26	
% Oxygen	[ASTM D5373(Calc)]	16.31	40.48	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	<0.01	0.02	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	77 ug/g	ASTM D5600
Potassium, K	338 ug/g	ASTM D5600
Cerium, Ce	1.30 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	178 ug/g	ASTM D5600
Magnesium, Mg	179 ug/g	ASTM D5600
Barium , Ba	8 ug/g	ASTM D5600
Strontium, Sr	6 ug/g	ASTM D5600
Phosphorus, P	73 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	GP Fuel	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-005

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	36.14		
% Ash	[ASTM D1102]	1.15	1.80	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5786	9061	9228
% Volatile Matter	[ASTM D3175]	47.99	75.15	
% Fixed Carbon	[ASTM D3172(Calc)]	14.72	23.05	
% Sulfur	[ASTM D4239(METHOD C)]	0.04	0.06	
% Carbon	[ASTM D5373]	35.37	55.38	
% Hydrogen	[ASTM D5373]	4.16	6.51	
% Nitrogen	[ASTM D5373]	0.17	0.27	
% Oxygen	[ASTM D5373(Calc)]	22.97	35.98	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.01	0.02	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	5 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	368 ug/g	ASTM D5600
Potassium, K	733 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	193 ug/g	ASTM D5600
Magnesium, Mg	477 ug/g	ASTM D5600
Barium , Ba	7 ug/g	ASTM D5600
Strontium, Sr	6 ug/g	ASTM D5600
Phosphorus, P	251 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Hogged Fuel	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-004

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	34.54		
% Ash	[ASTM D1102]	1.10	1.67	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5403	8254	8394
% Volatile Matter	[ASTM D3175]	51.96	79.37	
% Fixed Carbon	[ASTM D3172(Calc)]	12.40	18.96	
% Sulfur	[ASTM D4239(METHOD C)]	0.02	0.03	
% Carbon	[ASTM D5373]	30.89	47.20	
% Hydrogen	[ASTM D5373]	3.64	5.56	
% Nitrogen	[ASTM D5373]	0.22	0.34	
% Oxygen	[ASTM D5373(Calc)]	29.59	45.20	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.02	0.02	
[illegible] ug/g	[SW846-7471A]		0.03	

Analyte	Result	Method
Arsenic, As	4 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	3 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	0.69 mg/Kg	ASTM D5600
Sodium, Na	89 ug/g	ASTM D5600
Potassium, K	1146 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	212 ug/g	ASTM D5600
Magnesium, Mg	411 ug/g	ASTM D5600
Barium , Ba	8 ug/g	ASTM D5600
Strontium, Sr	5 ug/g	ASTM D5600
Phosphorus, P	466 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	2 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Knots & Shives	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-007

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		29	
% Total Moisture	[ASTM D4442(METHOD A)]	61.59		
% Ash	[ASTM D1102]	3.26	8.48	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	2940	7655	8364
% Volatile Matter	[ASTM D3175]	28.31	73.71	
% Fixed Carbon	[ASTM D3172(Calc)]	6.84	17.81	
% Sulfur	[ASTM D4239(METHOD C)]	0.14	0.36	
% Carbon	[ASTM D5373]	17.76	46.25	
% Hydrogen	[ASTM D5373]	2.20	5.74	
% Nitrogen	[ASTM D5373]	0.04	0.11	
% Oxygen	[ASTM D5373(Calc)]	15.01	39.06	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.03	0.09	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	2 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	640 ug/g	ASTM D5600
Potassium, K	52 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	107 ug/g	ASTM D5600
Magnesium, Mg	318 ug/g	ASTM D5600
Barium , Ba	<1 ug/g	ASTM D5600
Strontium, Sr	2 ug/g	ASTM D5600
Phosphorus, P	10 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Processed Butt Cuts	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-006

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	31.52		
% Ash	[ASTM D1102]	0.33	0.48	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5708	8336	8376
% Volatile Matter	[ASTM D3175]	57.01	83.25	
% Fixed Carbon	[ASTM D3172(Calc)]	11.14	16.27	
% Sulfur	[ASTM D4239(METHOD C)]	0.01	0.01	
% Carbon	[ASTM D5373]	35.37	51.65	
% Hydrogen	[ASTM D5373]	4.18	6.10	
% Nitrogen	[ASTM D5373]	0.13	0.19	
% Oxygen	[ASTM D5373(Calc)]	28.46	41.57	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.02	0.03	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	26 ug/g	ASTM D5600
Potassium, K	126 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	41 ug/g	ASTM D5600
Magnesium, Mg	117 ug/g	ASTM D5600
Barium , Ba	2 ug/g	ASTM D5600
Strontium, Sr	2 ug/g	ASTM D5600
Phosphorus, P	22 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

AS-RECEIVED BIOMASS FUEL CROP ANALYSIS

Dry Analysis		mang lab 1	P'cola (unmang) lab 2	SC (unmang) lab 2	generic near ocean lab 3	site expected	Avg	Range	standard deviation
Ash	% wt	2.61	3.80	3.16	3.43	3.80	3.25	1.19	0.43
Carbon	% wt	47.39	47.42	47.60	47.06	47.42	47.37	0.54	0.19
Fixed Carbon	% wt	9.79	20.34	22.97	16.38	20.34	17.37	13.18	4.96
Hydrogen	% wt	5.51	5.73	5.85	5.84	5.73	5.73	0.34	0.14
Nitrogen	% wt	0.88	0.44	0.47	0.60	0.44	0.60	0.44	0.17
Oxygen	% wt	43.45	42.50	42.71	42.95	42.50	42.90	0.95	0.35
Volatiles	% wt	87.60	75.75	73.66	80.19	75.75	79.30	13.94	5.34
Sulfur	% wt	0.16	0.11	0.21	0.12	0.11	0.15	0.10	0.04
Chlorine	% wt		0.00	0.00	0.20	0.00	0.07	0.20	0.09
Heat of Comb, LHV	Btu/lb	8,180	8,070	8,100	8,104	8,070	8,114	110	40.58
lb / MMBtu		122.2	123.9	123.5	123.4	123.9	123.3		
Normal Moisture, As Received Analysis									
Moisture	% wt	**40.00**	**39.42**	**31.47**	**42.01**	**23.35**	38.23	10.54	4.02
Ash	% wt	1.57	2.30	2.17	1.99	2.91	2.01	0.74	0.28
Carbon	% wt	28.43	28.73	32.62	27.29	36.35	29.27	5.33	2.01
Fixed Carbon	% wt	5.87	12.32	15.74	9.50	15.59	10.86	9.87	3.63
Hydrogen	% wt	3.31	3.47	4.01	3.39	4.39	3.54	0.70	0.28
Nitrogen	% wt	0.53	0.27	0.32	0.35	0.34	0.37	0.26	0.10
Oxygen	% wt	26.07	25.75	29.27	24.91	32.58	26.50	4.36	1.66
Volatiles	% wt	52.56	45.89	50.48	46.50	58.06	48.86	6.67	2.77
Sulfur	% wt	0.10	0.07	0.14	0.07	0.08	0.09	0.08	0.03
Heat of Comb, LHV	Btu/lb	4,908	4,889	5,551	4,700	6,186	5,012	851	321.75
lb / MMBtu		203.7	204.5	180.1	212.8	161.7	199.5		
Major/Minor Oxides in Ash									
Aluminum Oxide	% wt	0.70	0.11	0.11	0.80	0.10	0.43	0.69	0.32
Calcium Oxide	% wt	5.27	9.42	6.20	2.78	8.23	5.92	6.64	2.38
Iron Oxide	% wt	0.29	0.63	0.52	0.86	0.55	0.58	0.57	0.21
Magnesium Oxide	% wt	3.75	7.69	6.32	3.07	6.72	5.21	4.62	1.88
Phos. Pentoxide	% wt	5.43	7.30	5.11	6.16	6.38	6.00	2.19	0.84
Potassium Oxide	% wt	30.43	21.47	29.85	30.00	18.76	27.94	8.96	3.74
Silicon Dioxide	% wt	22.81	32.39	29.80	44.21	**45.00**	32.30	21.40	7.72
Sodium Oxide	% wt	1.50	4.14	2.12	0.49	3.62	2.06	3.65	1.33
Sulfur Trioxide	% wt	4.47	4.90	8.63	4.82	4.28	5.71	4.16	1.70
Titanium Oxide	% wt	0.03	0.01	0.01	0.10	0.01	0.04	0.09	0.04
Undetermined		25.32	11.94	11.33	6.71	10.43	13.83	18.61	6.94
Alkali, Lb/MMBtu		1.31	1.91	1.69	1.68	1.67	1.65	0.60	0.22
Percent S in Ash		39%	90%	69%	73%	79%	68%	0.51	0.19
Ash Fusion									
CaO (lb/MMBtu, dry)		0.17	0.44	0.24	0.12	0.39	0.24		
K2O (lb/MMBtu, dry)		0.97	1.01	1.16	1.27	0.88	1.12		
SiO2 (lb/MMBtu, dry)		0.73	1.53	1.16	1.87	2.12	1.29		
Ternary CaO		9%	15%	9%	4%	11%	9%		
Ternary K2O		52%	34%	45%	39%	26%	42%		
Ternary SiO2		39%	51%	45%	57%	63%	49%		
ASPEN Inputs									
C (moles / 10-lb dry)		39.46	39.48	39.63	39.18	39.48	39.44		
H2 (moles / 10-lb dry)		27.33	28.43	29.02	28.97	28.43	28.44		
N2 (moles / 10-lb dry)		0.31	0.16	0.17	0.21	0.16	0.21		
O2 (moles / 10-lb dry)		13.58	13.28	13.35	13.42	13.28	13.41		
C6H10O5 (moles / 10 lb)		6.58	6.58	6.61	6.53	6.58	6.57		
H2 excess of C6H10O5		21.85	22.94	23.52	23.53	22.94	22.96		
O2 excess of C6H10O5		10.84	10.54	10.60	10.70	10.54	10.67		

ATTACHMENT 2

SHUTDOWN EMISSIONS SUMMARY

Table Attachment 2-1. Shutdown Emissions Summary

Emission Component	Pollutant *	Planned ** Shutdowns, TPY	Emergency ** Shutdowns, TPY	**Total Annual Emissions (TPY)**
Gasifier Island/Flare	NOX	0.0500	0.0250	**0.075**
	PM/PM10	0.0025	0.0005	**0.003**
	CO	0.0011	0.0008	**0.002**
	VOC	0.0003	0.0002	**0.001**
	SO2	0.0090	0.0060	**0.015**

* Based upon information from SilvaGas and AP-42 Section 1.1 for Cyclone Furnace, Bituminous

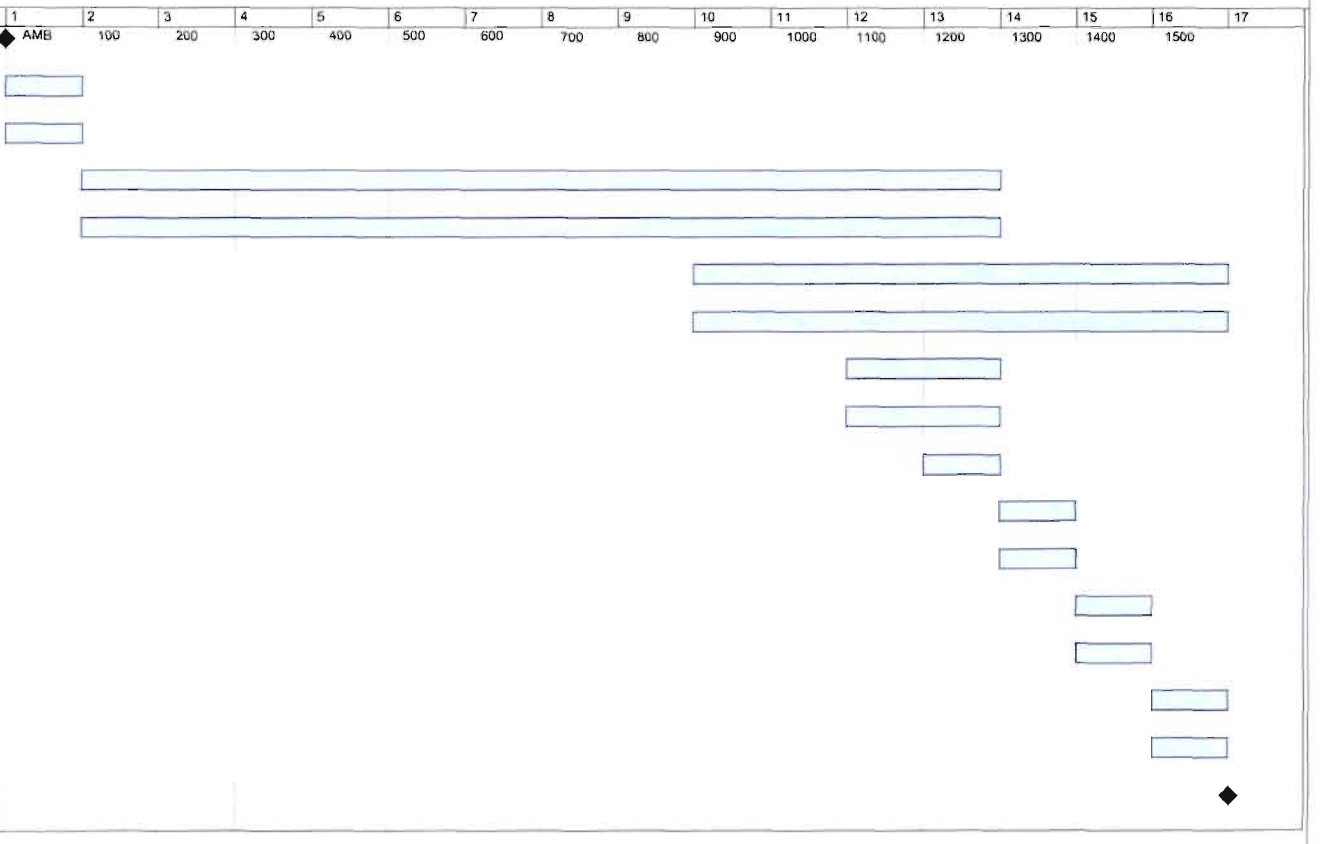
** Based on an estimated 6 planned shutdowns/yr and an estimated 4 emergency shutdowns/yr

ATTACHMENT 3

STARTUP SCHEDULE AND EMISSIONS

Preliminary
Gasifier Start-Up Schedule

ID	Task Name	Duration
1	**Temperature, deg F**	0 hrs
2	*Start Combustion Blower*	1 hr
3	Start Gasifier Blower	1 hr
4	Start Combustion Duct Burner	12 hrs
5	Start gasifier duct burner	12 hrs
6	Start combustor seal pot fluidizing flow	7 hrs
7	Start gasifier seal pot fluidizing flow	7 hrs
8	Increase combustor heatup rate	2 hrs
9	Increase gasifier heatup rate	2 hrs
10	Start combustor overbed burner	1 hr
11	Start wood and steam flowrate	1 hr
12	Start combustor overbed burner	1 hr
13	Ramp up wood to full rates	1 hr
14	Reduce / stop gasifier blower	1 hr
15	Stabilize at full rates	1 hr
16	Reduce / stop combustor overbed burner	1 hr
17	Operational	0 hrs



Project: Master BG&E Shell_r
Date: January 8, 2008

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Table Attachment 3-1

Natural Gas Firing (CT Only)				
Sulfur Content		**2**	**gr/100 scf**	
Heat Input	CT	147	MMBtu/hr	
	DB	--	MMBtu/hr	
	Total	147	MMBtu/hr	
Heating value		1040	btu/cf	
Fuel use		141,346.15	cf/hr	
		1,413.46	100 cf/hr	
S		0.40	lb/hr	
SO2		**0.81**	**lb/hr**	
Emission Factors	CO	8.2E-02	lb/MMBtu	AP-42 Table 3.1-1
	VOC	2.1E-03	lb/MMBtu	AP-42 Table 3.1-2a
	PMtot	6.6E-03	lb/MMBtu	AP-42 Table 3.1-2a
CO		**0.00**	**lb/hr**	
VOC		**0.00**	**lb/hr**	
PMtot		**0.00**	**lb/hr**	
NOx Conc.		25	ppm	
Volumetric flowrate		142,444.90	acfm	
Stack Temperature		1,074	F	assumed
MW		46		
NOx		**8.78**	**lb/hr**	

Table Attachment 3-2. Auxiliary Boiler Emissions

Performance	
Fuel Usage (scf/hr-gas)	60,713
Heat Input (mmBtu/hr-HHV)	62.00
Hours per Year	500
Maximum Fuel Usage (mmscf/yr)	30.36
Stack Parameters	
Diameter (ft)	2.75
Height (ft)	50
Temperature (^{o}F)	296
Velocity (ft/sec)	81
Flow (acfm)	29,000
Emissions	
SO_2 -Basis (grains S/100 scf-gas; %S diesel)	2.00
(lb/hr)	0.35
(tpy)	0.01
NO_x - (lb/mmBtu)	0.095
(lb/hr)	5.89
(tpy)	0.09
CO - (lb/mmBtu)	0.08
(lb/hr)	4.96
(tpy)	0.08
VOC - (lb/mmBtu)	0.005
(lb/hr)	0.31
(tpy)	0.00
PM/PM10 - (lb/10^6 ft^3)	1.90
(lb/hr)	0.12
(tpy)	0.00

* Based on AP-42 Section 1.4

Table Attachment 3-3. Combustor & Gasifier Burner Emissions

Performance	
Fuel Usage (scf/hr-gas)	41,176
Heat Input (mmBtu/hr-HHV)	42.00
Hours per Year	72
Maximum Fuel Usage (mmscf/yr)	2.96
Stack Parameters	
Diameter (ft)	TBD
Height (ft)	TBD
Temperature (^{o}F)	TBD
Velocity (ft/sec)	TBD
Flow (acfm)	TBD
Emissions	
SO_2 -Basis (grains S/100 scf-gas; %S diesel)	2.00
(lb/hr)	0.24
(tpy)	0.00
NO_x - (lb/mmBtu)	0.098
(lb/hr)	4.12
(tpy)	0.00
CO - (lb/mmBtu)	0.08
(lb/hr)	3.36
(tpy)	0.00
VOC - (lb/mmBtu)	0.005
(lb/hr)	0.21
(tpy)	0.00
PM/PM10 - (lb/10^6 ft^3)	1.90
(lb/hr)	0.08
(tpy)	0.00

* Based on AP-42 Section 1.4

Table Attachment 3-4. Gasifier Combustor Startup Emissions

Performance	
Product Gas Produced (MMBtu/hr)	376
Quantity of Residual Char (%)	33.0
Heat Input from Residual Char (MMBtu/hr)	124
Char Heating Value (Btu/lb)	14,500
Hours of Operation	72
Stack Parameters	
Diameter (ft)	TBD
Height (ft)	TBD
Temperature (°F)	TBD
Velocity (ft/sec)	TBD
Flow (acfm)	TBD
Emissions	
SO_2 -Basis is feedstock organic sulfur (%)	0.004
Feedstock Rate (dry TPD)	730
(lb/hr)	0.0
(tpy)	0.01
NO_x - with tar recycle (10 hr/SU * 6 SU/yr)	60.00
(lb/hr)	9.9
(tpy)	0.0
NO_x - w/out tar recycle (12 hr/SU * 6 SU/yr)	72.00
(lb/hr)	99.9
(tpy)	0.0
CO - (lb/ton) AP-42, Table 1.2-2	0.6
Char produced (ton/hr)	4.3
(lb/hr)	2.6
(tpy)	0.1
VOC - (lb/ton) AP-42, Table 1.2-6	0.3
Char produced (ton/hr)	4.3
(lb/hr)	1.3
(tpy)	0.0
PM/PM10-(lb/ton) AP-42, Table 1.2-3	71.2
Char produced (ton/hr)	4.3
(lb/hr)	304.6
Cyclone/Baghouse Efficiency (%)	98.0
(tpy)	0.2

Table Attachment 3-5. Flare System Emissions

Parameter		Value	Units	Source/Description
Fuel Flow		19,627	lbm/hr	Gas Analysis 18-Oct -07, Solar
Energy Density		7,337	Btu/lbm	Gas Analysis 18-Oct -07, Solar, Low Heating Value of fuel
Energy Input to Flare		144	MMBtu/hr	Energy Input = Fuel Flow * Energy Density / 1,000,000
Emissions				
TOC -	Emission Factor	0.14	lb/MMBtu	AP-42 Table 13.5-1
	Emission Rate	-	lb/hr	Emission Rate = Emission Factor * Energy Input
	Emission Rate	-	tpy	Emission Rate (tpy) = Emission Rate (lb/hr) * 144 /2000 (144 hr/yr is assumed to be 6 SU/yr @ 24 hr/SU)
CO -	Emission Factor	0.37	lb/MMBtu	AP-42 Table 13.5-1
	Emission Rate	-	lb/hr	Emission Rate = Emission Factor * Energy Input
	Emission Rate	-	tpy	Emission Rate (tpy) = Emission Rate (lb/hr) * 144/2000
NO_x -	Emission Factor	0.068	lb/MMBtu	AP-42 Table 13.5-1
	Emission Rate	-	lb/hr	Emission Rate = Emission Factor * Energy Input
	Emission Rate	-	tpy	Emission Rate (tpy) = Emission Rate (lb/hr) * 144/2000
	Heating Value	435.0	Btu/scf	Heating Value of Syngas @ 14.7 psia & 60°F
SO_2 (Based on Mass Balance) -	Syngas Flow	331,042.1	scf/hr	144 MMBtu * 1,000,000 / 435 btu/scf
	H2S in syngas	0.10	% by vol	Based on untreated gas H2S value of ~ 50 ppm
	H2S Flow	331.0	scf/hr	86687 scfm * 0.0002 vol %
	gas constant	0.0029	cf-atm/mol-K	Constant
	H2S Molar Flow	395.7	g-mol/hr	n= (1 atm) * (17.34 scfm) / (0.0029 cf-atm/mol-K) / (288.7K)
	MW SO2	64.1	g/g-mol	1 mol of H2S forms 1 mol of SO2
	SO2 Mass Flow	25,364.1	g/hr	20.7 gmol/hr * 64.1 g/gmol
	SO2 Mass Flow	**55.9**	lb/hr	5072 g/hr / 453.59 g/lb
	SO2 Mass Flow	**4.0**	tpy	11.2 lb/hr * 144/ 2000
Soot (PM) -	AP-42, Table 13.5-1--- fuels with a C:H ratio of less than 0.33 tend not to soot. The average C:H ratio in the syngas is less than 0.33.			

Table Attachment 3-6. Total Startup Emissions

	Emission Units					Total Emissions
Pollutant	Gasifier/Combustor Burners	Boiler	Combustor	Flare	Combustion Turbines	
NOX	0.15	1.47	3.89	0.7	0.0088	6.2
CO	0.12	1.24	0.09	3.8	0.0121	5.3
PM	0.00	0.03	0.22	Neg	0.0010	0.3
SO2	0.01	0.09	0.01	4.0	0.0008	4.1
VOC	0.01	0.08	0.05	1.5	0.0003	1.6

ATTACHMENT 4

DAHLMAN GAS CLEANUP SYSTEM

DAHLMAN
FILTER TECHNOLOGY

Technical Information Paper *OLGA Technology*

OLGA Tar Removal

- Biomass gasification to electricity and more.. –

Revision spring 2008

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DAHLMAN
FILTER TECHNOLOGY

Note: The information below reflects proposed operation of the Tallahassee Renewable Energy Center project.

1 Gas Purification Overview

Purification of product gas is an important aspect of operation for the Tallahassee Renewable Energy Center project. The gas purification steps that are necessary and how efficient they should be are dependent upon:

1 Feedstock (e.g. biomass) and its chemical components
2 Gasification technology & operational conditions of the gasifier
3 The application and downstream equipment; how clean should the gas be?

In general, we can identify the following gas treatment steps, summarized in their most logical order

- Particulate removal
  -Cyclones, filters, electrostatic filters
- Removal of organic impurities
  -Tar removal is the most important: OLGA
- Removal of inorganic impurities
  - Removal of nitrogen, halogens (mainly NH_3 and HCl) and low quantities of sulfur (H_2S), by scrubber (water) technology
- Sulfur removal (H2S) by a caustic polishing step
- Removal of volatile (alkali / heavy) metals (e.g. mercury)
  - Mercuric sulfide removed as particulate in the water scrubber; vapor phase mercuric compounds removed in a caustic polishing step.

In general, we can say that the particulates and tars are produced by the gasifier. Gasifier type and operation determine the concentration and composition. OLGA combines the particulate and tar removal and is thus always a close match with the gasifier.

2 Tar Removal From Biomass Product Gas

The presence of tars in the biomass product gas is seen as the biggest issue in its smooth commercial application as a source of sustainable energy. Tar is formed in the gasifier and comprises a wide spectrum of organic compounds, generally consisting of several aromatic rings. The tar concentration

and composition is mostly determined by gasifier type and operation. Simplified tars can be distinguished as "heavy tars" and "light tars":

Heavy tars

Heavy tars condense out as the gas temperature drops and cause major fouling, efficiency loss and unscheduled plant stops. The tar dew point is a critical factor.


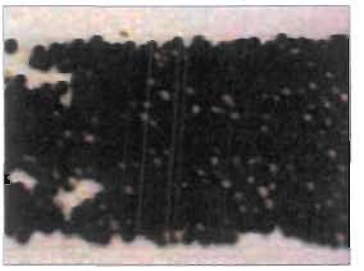


Figure 2.1, 2.2 & 2.3. Heavy tar fouls equipment, left to right:
a water scrubber grid, soot formation on catalyst & a gas engine intercooler

Light tars

Light tars, like phenol or naphthalene, have limited influence on the tar dew point, but are not less of an issue. Light heterocyclic tars, like phenol, are very water soluble. These tars will be easily absorbed into water and chemically affect the bleed water of downstream condensers and aqueous scrubbers. Purification of this water is very cost- intensive and will jeopardize the plant's economic feasibility. Naphthalene is important, as it is known to crystallize at the inlet of gas engines causing a high service demand.

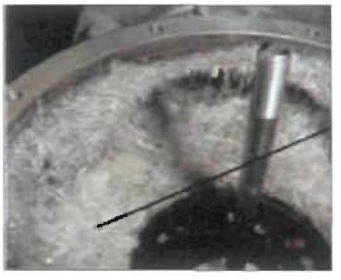


Figure 2.4 & 2.5: light tar fouls equipment & seriously contaminates condense water,
Left- a gas engine control valve fouled with naphthalene crystals
Right- contaminated condense water samples

Tar defined

A well accepted definition states that tars are all organic compounds with a molecular weight bigger than benzene. BTX (benzene, toluene and xylene) are components which are not considered to be as important, as they are not likely to influence the tar dew point nor to affect waste water treatment. A better and more detailed tar description is given by the classification of tars (see Appendix A).

The tar dew point, a critical parameter

The lowest temperature in the process is determined by downstream equipment and the application of the product gas. As typical tar dew points are between 150°C and 350 °C, and the lowest process temperature is typically 30-40 °C, tar condensation and tar issues are inevitable. It is important to realize that the actual tar concentration is not the most important parameter. It is the tar dew point which defines the point at which tars start to be a concern. One of the most important goals for the OLGA technology is to lower the tar dew point to a level at which such concerns can be excluded.

3 OLGA's Gas Cleaning Process

To introduce you to the OLGA technology, it is important to first show its position in a generic line-up of an integrated air blown gasification system with a gas engine for combined heat & power (CHP) production:

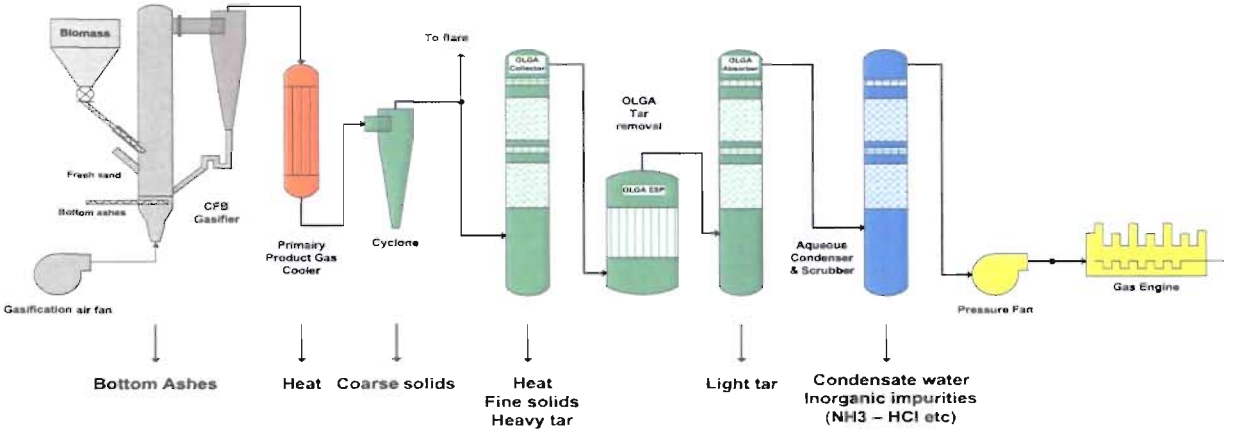

Figure 2.6 Generic line up

Product gas cleaning can be split into the following logical steps:

1. **Solids/dust removal**
2. **Removal of organic impurities (tar)**
3. **Removal of inorganic impurities (e.g., NH3, HCl, H2S)**

Product gas produced by the gasifier contains solids (dust), tars and inorganic impurities (depending on biomass feedstock). It is very important to consider the logical order for cleaning the product gas. In principle, mixing dust, tar and water is to be avoided.

Dust removal with OLGA

Solid particles (dust) can be separated from the product gas upstream OLGA by a cyclone or a hot gas filter (HGF). It is best to separate the dust first, as dust can be removed at a temperature in which water and tars are not present (>400 C). For the Tallahassee Renewable Energy Center project, it was decided to remove the coarse particles with a cyclone. The fine particles which pass this cyclone are captured by the Collector column and the ESP. A very high efficiency on particle capture can be ensured.

Removal of Organic Impurities

The philosophy of OLGA is based on dew point control. Tars have to be removed above the water dew point to a level at which the tar situation cannot occur in downstream equipment (minimal process temperature > tar dew point). In the figure below, the tar and water dew points are shown, together with the logical process steps.

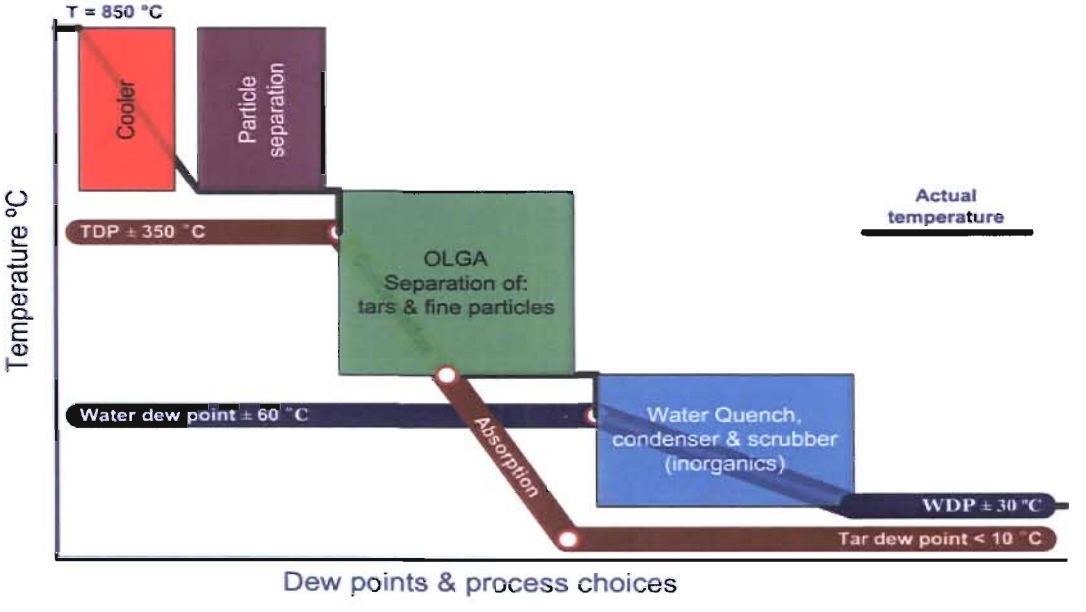

Figure 2.7 Dew points are important for equipment selection

Logical equipment with typical temperatures:

1. Product gas cooler; gasifier exit 700-900 °C– OLGA inlet 380 °C
2. Separation of solids; 380 °C
   - coarse solids by a cyclone (OLGA for fine solid aerosols)
   - all solids by a hot gas filter
3. OLGA tar separation; inlet 380 °C outlet 70-90 °C (safe above water dew point)
4. Water condenser; 70-90 °C to 30 °C
5. Water scrubber; 30 °C

OLGA operates above the water dew point, but decreases the tar dew point to a level under the lowest process temperature. Tar and water are not mixed. The tar removal principle of OLGA is based on a multiple stage scrubber in which the gas is cleaned by special scrubbing oil. In the first section of OLGA (the Collector) the gas is gently cooled down by the scrubbing oil. Heavy tar condenses, is collected, and is separated from the scrubbing oil. The heavy tar condensate, together with the fine solids, is recycled to the gasifier as a liquid. In the second stage (the Absorber / Stripper) lighter gaseous tars are absorbed by the scrubbing oil resulting in a product gas practically free from tars and solids.

In the absorber column, the scrubbing oil is saturated by these lighter tars. This saturated oil is regenerated in a stripper. Hot air is used to strip the tars of the scrubbing oil. This air, loaded with light tars, is recycled to the gasifier for combusting and as a fluidization medium. Hence, the stripper column design is not only based upon tar removal, but also upon the amount of air that can be used by the gasifier.

All heavy and light tars can be recycled to the gasifier where they are destructed and contribute to the overall energy efficiency. Tar waste streams are efficiently recycled this way.

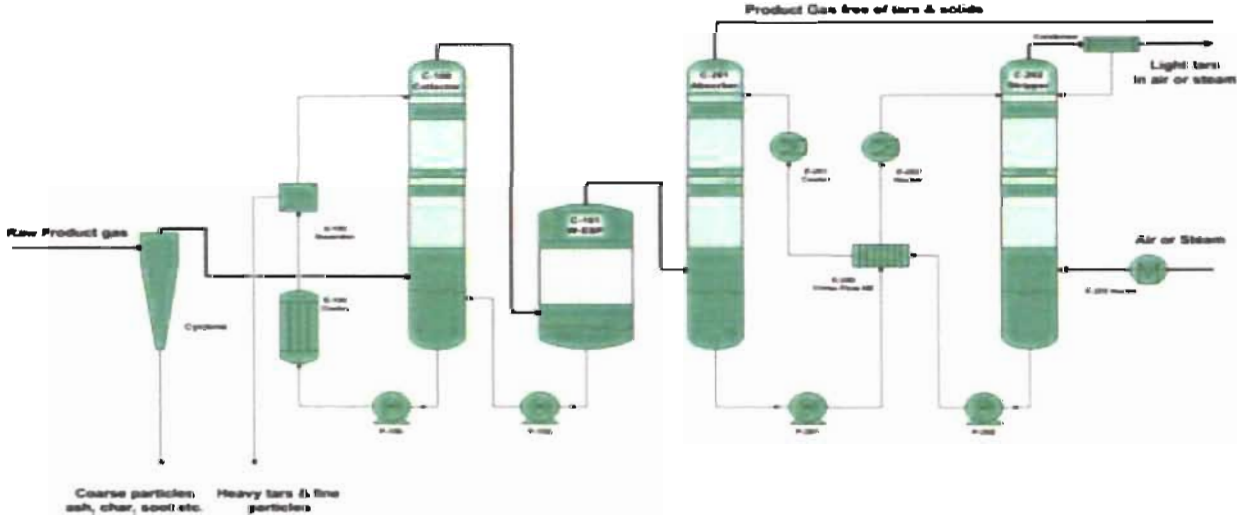

Figure 2.8 Simplified Process Flow Diagram of OLGA

Aqueous Scrubbers, Condensers and Caustic Polishing Downstream of OLGA

When gas is free of tar, an aqueous scrubber column can be operated more efficiently. This aqueous scrubber is normally used for:

1. Cooling the gas by quenching;
2. Further cooling of the gas and removal of the bulk of the water vapor by condensation;
3. Removal of water soluble components like NH_3, HCl, H_2S, if applicable.

The inorganic scrubber system is built as one column which is split into two sections. In section one, the gas will enter the column at the bottom and is scrubbed with cooling water. A large part of the water in the gas will condense and NH3 and HCl will dissolve in the water and be removed from the gas. Also, part of the H2S will dissolve in the water, but not enough to meet the gas turbine specification. Therefore, the inorganic scrubber system is executed with a second section. In this section, the remaining H2S is removed by a caustic polishing step. Diluted sodium hydroxide is the preferred caustic for this use. There is an additional separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H2S by reaction with the caustic, making sodium sulfide.

The following paragraphs provide more detail on the chemistry of mercury within the process and its removal from the system. When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water. The removal level in such a system of mercury is probably low, due to the insolubility of mercury in the water, but the elemental mercury reacts with the H2S present to make mercuric sulfide, and drops out as a particulate in the main recirculating water loop. The recirculating loop of caustic soda solution with sulfides in it provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10-35. Thus, all of the remaining mercury will likely be removed here, since the S- ion concentration should be much higher here rather than in the main recirculating water loop.

This is the approach used at mercury cell caustic chlorine plants for removing any traces (i.e., ppt) of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S- ions, and the precipitated mercuric sulphide is filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

Summarized Advantages of OLGA

The principal advantage of OLGA is that it offers a reliable and sensible solution for the tar problem. The advantages can be summarised as follows:

- Minimal tar related problems
  - Increased system stability and availability
  - Minimization of waste water treatment costs
  - No tar waste streams
- Better gas quality compared to a thermal tar cracker
- More reliable and less vulnerable than a catalytic tar cracker
- No waste water impacts as with tar removal in an aqueous scrubber

Appendix A: Tar Classification system

According to the ECN definition, tar comprises all organic components having a molecular weight higher than benzene. Benzene is not considered to be a tar. ECN uses a tar classification system comprising six classes (see Table B.1). This classification system is in particular developed to provide 'easy' insight in the general composition of tar. Trends are easier recognised on the basis of these classes. However, for more specific problems or issues the detailed data will remain necessary.

Class	Type	Examples
1	GC undetectable tars.	Biomass fragments, heaviest tars (pitch)
2	Heterocyclic compounds. These are components that generally exhibit high water solubility.	Phenol, cresol, quinoline, pyridine
3	Aromatic components. Light hydrocarbons, which are important from the point view of tar reaction pathways, but not in particular towards condensation and solubility.	Toluene, xylenes, ethylbenzene (excluding benzene)
4	Light poly aromatic hydrocarbons (2-3 rings PAHs). These components condense at relatively high concentrations and intermediate temperatures.	Naphthalene, indene, biphenyl, antracene
5	Heavy poly aromatic hydrocarbons (≥4-rings PAHs). These components condense at relatively high temperature at low concentrations.	Fluoranthene, pyrene, crysene
6	GC detectable, not identified compounds.	Unknowns

Table B.1: Tar classification system

From the practical viewpoint, the classification comprises only tar components that can be measured. Classes 2 to 6 are sampled using the solid phase adsorption (SPA) method and measured by gas chromatography (GC). Although class 6 tars are sampled and measured (a peak is found in the chromatogram), it is unknown what the individual components are. In principle components in this class belong to the other classes, but are here lumped to a single concentration representing the 'unknowns'. Class 1 represents the heavy tar fraction (roughly ≥7-ring PAHs). These components cannot be determined by the combination of SPA and GC. The components are measured by weight and thus represent the gravimetric tars.

Appendix B: OLGA vs. other tar removal systems

Tars from biomass product gases can be removed with a thermal tar cracker, a catalytic tar cracker or a physical process. The thermal and catalytic tar cracker are installed directly downstream the gasifier and operate at high temperature. The physical processes like an aqueous scrubber or OLGA are installed downstream a product gas cooler. The inlet temperature of a tar cracker is typically 850°C and of a physical process 400°C.

Thermal tar cracking

A thermal tar cracker heats up the product gas to a temperature of 1200°C. At this temperature the tars are removed almost completely leading to a very low tar concentration (<100 mg/m_n^3) and tar dew point (<10°C). The disadvantage of this application of a thermal cracker is the reduction in efficiency. To increase the temperature of the product gas a part of the product gas is combusted with oxygen. Consequently, the system efficiency (biomass to electricity) is reduced as well as the calorific value of the product gas. The reduction in calorific value makes the application of the product gas from a direct air blown gasifier in a gas engine difficult.

Catalytic tar cracking

A catalytic tar cracker does not heat up the product gas and thus eliminates the disadvantages of a thermal cracker. In theory the tar removal efficiency can be complete. However, soot formation and deactivation of the catalyst is a serious problem to be dealt with, resulting in limitations in the process. At the moment, the tar concentration at the inlet of the cracker should remain below 2 g/m_n^3 and the presence of alkali metals and sulphur should be controlled. Several projects have shown that a catalytic tar cracker can be a vulnerable part of the system. Bad tar removal by e.g. catalyst deactivation directly leads to heavy tar problems downstream. In principle the tar removal efficiency is less compared with a thermal cracker but good enough for the application of the product gas in a gas engine.

Tar removal by aqueous scrubbers

Aqueous tar removal systems cool down the product gas and remove the tars by condensation. In most aqueous systems dust and tars are collected simultaneously. The product gas is cooled down and aerosols of dust and tars are collected with a wet ESP downstream. Some systems use a dry hot gas filter (HGF) upstream for dust removal instead of a wet ESP. The HGF reduces the risk of fouling of the aqueous system with dust. The tar dew point downstream an aqueous system is similar to or higher than the operating temperature of the system. Therefore, the total tar content downstream an aqueous system can exceed 1 g/m_n^3. To avoid tar condensation and fouling of piping the gas should not cool down. In the aqueous scrubber system a tar/water problem is created. Mixing (heavy) tars with water will lead to operational difficulties in the scrubber and huge maintenance costs. The most important disadvantage is formed by waste water handling. Waste water handling is often so expensive that the plants economical feasibility is at stake.

ATTACHMENT 5

REQUESTED EMISSION STANDARDS

TABLE ATTACHMENT 5-1

REQUESTED EMISSIONS

Pollutant	*Fuel*	*Method of Operation* [a]	*Stack Test* [b] *(3-Run Average)*		*CEMS* [c] *Compliance*	*Estimated Emissions (Informational purposes only)*
			ppmvd @ 15% O_2	*lb/hr* [d]	*ppmvd @ 15% O_2*	*lb/hr* [d]
NO_X	Product Gas	CT	32.5	--	32.5	18.4
		CT/DB	32.5	--	32.5	19.2
	Natural Gas [e]	CT	25.0	--	25.0	8.8
		CT/DB	--	--	--	--
CO	Product Gas	CT	50.0	--	50.0	17.2
		CT/DB	50.0	--	50.0	21.4
	Natural Gas [e]	CT	--	--	--	12.1
		CT/DB	--	--	--	--
VOC	Product Gas	CT	--	--	--	4.9
		CT/DB	--	--	--	6.5
	Natural Gas [e]	CT	--	--	--	0.4
		CT/DB	--	--	--	--
PM	Product Gas	CT	--	--	--	6.7
		CT/DB	--	--	--	7.2
	Natural Gas [e]	CT	--	--	--	1.0
		CT/DB	--	--	--	--
SO_2 (lb/MMBtu)	Product Gas	CT	0.06	--	--	8.8
		CT/DB	0.06	--	--	11.3
	Natural Gas [e]	CT	0.06	--	--	8.8
		CT/DB	0.06	--	--	11.3

a. CT means operation of CT in combined cycle mode without use of the DB. CT & DB means operation in combined cycle mode and using the DB.

b. The initial and annual U.S. EPA Reference Method tests associated with the certification of the NOx and CO CEMS instruments may also be used to demonstrate compliance with the individual standards for product gas and natural gas. Compliance with the NOx standards will be demonstrated by conducting tests in accordance with EPA Method 7E. Compliance with the CO standards will be demonstrated by conducting tests in accordance with EPA Method 10.

c. CEMS for NO_X and CO will be installed on the HRSG stacks. Correction to 15% O_2 is required for NOx, consistent with the provisions of 40 CFR 60, Subpart KKKK. Compliance with the continuous NO_X and CO standards will be demonstrated based on data collected by the required CEMS. NOx compliance will be based on a 4- hour rolling average for natural gas firing and a 30-day rolling average for product gas firing. CO compliance will be based on a 30-day rolling average. Compliance will be based on all periods, except startup, shutdown, fuel switching or documented malfunction. The CTs will operate above 80% load, or the lowest load at which compliance is demonstrated during initial testing.

d. The mass emission rate estimates are based on a turbine inlet condition of 59° F and may be adjusted to actual test conditions in accordance with the performance curves and/or equations on file with the Department.

e. Limits for natural gas firing are imposed for NOx and SO_2 only, as required by the New Source Performance Standards pursuant to 40 CFR 60, Subpart KKKK. The natural gas fired values provided for other pollutants are for informational purposes only.

ATTACHMENT 6

SO_2 EMISSION ESTIMATES FROM PRODUCT GAS FIRING

Table Attachment 6-1

Product Gas Firing (CT Only, HI = 147 MMBtu/hr) SO2

Based on 5ppm H2S concentration

Conc.	5	ppm	
stack flow rate	403,569	lb/hr	@ 364 deg. F
Heating Value of prod	435	btu/cf	
Temperature	823.67	deg. R	
Heat Input	1.47E+08	Btu/hr	
Volumetric flowrate	########	acfm	@ 364 deg. F
			Assumed MW gas 28.4
SO2	**4.55**	**lb/hr**	
	0.03	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular \ =	64	SO2
T =	temperature of gas in	R= F +459.67	

Product Gas Firing (CT/DB, HI= 189 MMBtu/hr) SO2

Based on 5ppm H2S concentration

Conc.	5	ppm	
stack flow rate	410,210	lb/hr	@ 364 deg. F
Heating Value of prod	435	btu/cf	
Temperature	823.67	deg. R	
Heat Input	1.89E+08	Btu/hr	
Volumetric flowrate	########	acfm	@ 364 deg. F
			Assumed MW gas 28.4
SO2	**4.62**	**lb/hr**	
	0.02	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular \ =	64	SO2
T =	temperature of gas in	R= F +459.67	

ATTACHMENT 6

SO_2 EMISSION ESTIMATES FROM PRODUCT GAS FIRING

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Volumetric flowrate	########	acfm	@ 364 deg. F
			Assumed MW gas 28.4
SO2	**4.55**	**lb/hr**	
	0.03	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

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Product Gas Firing (CT/DB, HI= 189 MMBtu/hr) SO2

Based on 5ppm H2S concentration

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stack flow rate	410,210	lb/hr	@ 364 deg. F
Heating Value of prod	435	btu/cf	
Temperature	823.67	deg. R	
Heat Input	1.89E+08	Btu/hr	
Volumetric flowrate	########	acfm	@ 364 deg. F
			Assumed MW gas 28.4
SO2	**4.62**	**lb/hr**	
	0.02	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular	= 64	SO2
T =	temperature of gas in	R= F +459.67	

Al
Elizabeth

RECEIVED

SEP 08 2008

BUREAU OF AIR REGULATION

CAPITAL MEDICAL SOCIETY

1204 Miccosukee Road
Tallahassee, FL 32308
850-877-9018
Fax 850-878-0218
www.capmed.org

September 3, 2008

Ms. Trina L. Vielhauer, Bureau Chief
Bureau of Air Regulation, Division of Air Resources Mgmt.
Florida Department of Environmental Protection
2600 Blairstone Road - MS 5500
Tallahassee, FL 32399-2400

Re: Biomass Gas & Electric's application for Tallahassee plant

Dear Ms. Vielhauer,

Please be aware that the Capital Medical Society, an organization comprised of more than 535 medical doctors in Tallahassee strongly urges that any building of the proposed biomass gas electric plant in Tallahassee, utilize the most advanced technology to lower potential health risks.

We are concerned that the proposed biomass electric plant will emit soot, known as particle pollution. Tallahassee's particle pollution level exceeds the annual threshold recommended by the American Medical Association. Many view particle pollution as the most dangerous form of pollution and a health risk. We are concerned that pollutants from the plant will adversely affect our patients with respiratory and cardiac conditions and will increases the incidence of respiratory conditions in children.

We understand that DEP requires low levels of emissions when permitting these biomass plants. We urge you to set low levels with the plant proposed by Biomass Gas & Electric and if approved, that you monitor the plant to ensure that Biomass Gas & Electric make good on their claim that the new plant in Tallahassee will not emit dioxins. Dioxins have been shown in numerous studies to be highly carcinogenic.

Sincerely,

Andres Rodriguez, M.D.
President

cc: Mayor John Marks, Tallahassee, Florida

LEON COUNTY SCHOOLS

November 13, 2008

Michael W. Sole, Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, M.S. 49
Tallahassee, Florida 32399

Re: Proposed Project and Air Pollution Construction Permit for BG&E
Bio Mass Plant Located at Roberts Avenue, Tallahassee, Florida

Dear Secretary Sole:

It has come to my attention that the Florida Department of Environmental Protection is preparing to issue what is called an air pollution construction permit that will permit the further development of a biomass-fed integrated gasification combined cycle power plant called the "Tallahassee Renewable Energy Center" to be located in Leon County along Lipona Road at Roberts Avenue, in Tallahassee, Florida. It appears that this location is also within the Florida State University's Southwest Campus.

The Leon County School Board and I have not been briefed or involved on this matter, nor have we had any input on the development of the Biomass plant itself. Given the close proximity of this proposed biomass plant to at least five of our Leon County Schools, I have developed a series of questions in which myself and the Leon County School Board would like to have answered by the Florida Department of Environmental Protection as soon as possible. It is my understanding that a waiting period is currently in effect and that a permit may be issued as soon as November 18th, therefore I request that the answers to my questions be provided to me before the waiting period expires. The air permit number of this application is 0730109-001-AC. The applicant is: Tallahassee Renewable Energy Center.

The series of questions are set forth in the attachment to this correspondence and I would appreciate your prompt consideration and response thereto.

Sincerely yours,

Jackie Pons

Jackie Pons, Superintendent
Leon County School District

2757 West Pensacola Street • Tallahassee, Florida 32304-2998 • Phone (850) 487-7147 • Fax (850) 487-7141 •
www.leon.k12.fl.us

Draft

INQURIES CONCERNING BIOMASS-FED INTEGRATED
GASIFICATION COMBINED CYCLE PLANT
AIR PERMIT NO. 0730109-001-AC

With regard to the construction of the plant and the air permit, I have the following questions:

1. Please list the approved fuel sources that will be used at the plant.

2. In regards to the fuel source, what process will be in place to insure only approved fuels are used in the gasification process?

3. What process is in place to insure that there are no accompanying toxic materials in the saw dust, especially in materials from out of state?

4. What safeguards are in place to prohibit the use of municipal solid waste at the plant?

5. What process insured that no harmful gases escape in excess of the amount permitted by Florida Law?

6. Are objectionable odors from the stockpile of fuel, or the gasification process expected, if so what would be the expected extent or range?

7. What are the potential dangers of the supposed "inert" residue that results from the process? What will be the method of disposal for this residue?

8. What is the expected truck traffic increase in the area, as it pertains to school start and school bus pickup and drop off in the vicinity?

Walker, Elizabeth (AIR)

From: Read, David
Sent: Friday, May 30, 2008 11:17 AM
To: Osbourn, Scott
Cc: Vielhauer, Trina; Walker, Elizabeth (AIR); Arif, Syed
Subject: Public Notice of BG&E Application
Attachments: BG&E_App_Notice.pdf

Scott attached is the Public Notice of an Application for the BG&E facility. The Public Notice shall be published one time only as soon as possible in the legal advertisement section of a newspaper (Tallahassee Democrat) of general circulation in the area affected by this project. Once published please send Elizabeth Walker (Elizabeth.Walker@dep.state.fl.us) proof of publication. Scott, if you have any questions please give me a call.

Have a great weekend.

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

NOTICE OF APPLICATION

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No.0730109-001-AC

Biomass Gas & Electric (BG&E)
Tallahassee Renewable Energy Center
Leon County

The Department of Environmental Protection announces receipt of an application for an air construction permit from Biomass Gas & Electric (BG&E). The project is to construct the Tallahassee Renewable Energy Center to be located on the Florida State University (FSU) campus adjacent to Roberts Avenue and Lipona Road in Tallahassee, Leon County. The application was received on April 3, 2008. The requested permit is for one nominal 42 megawatt woody biomass (including some yard clippings) gasification electrical generation facility. The Energy Center will consist of the gasification unit, two combustion turbines (CT), two heat recovery steam generators (HRSG), one steam electric generator (SEG), and associated facilities.

This application is under review for completeness by the Bureau of Air Regulation in Tallahassee. Key portions of the application and additional information can be accessed at the Department's website at:

http://www.dep.state.fl.us/Air/permitting/construction/tallahassee.htm

The application is also available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following Department office:

Department of Environmental Protection
Bureau of Air Regulation
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32399-2400
Telephone: 850/488-0114
Fax: 850/921-9533.

Florida Department of Environmental Protection

Bob Martinez Center
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

December 5, 2008

Electronically Sent – Received Receipt Requested.

Mr. Glenn Farris glenn@biggreenenergy.com
President and Chief Executive Officer
Biomass Gas and Electric (BG&E) of Tallahassee, L.L.C.
3500 Parkway Lane
Suite 4000
Atlanta, Georgia 30092

Re: Comments on the Draft Permit
BG&E Tallahassee Renewable Energy Center (TREC)
Project Number: 0730109-001-AC

Dear Mr. Farris:

The Department received your comments dated November 12 and November 17, 2008 regarding the draft air construction permit distributed by the Department on October 27, 2008. We are also in receipt of your petition for administrative hearing that was filed on December 4, 2008. As this draft permit is now the subject of an administrative proceeding, the Department will not be sending a written response to your comment letters at this time.

If you should have any questions, please contact Mr. David Read at 850/414-7268 or Al Linero at 850/921-9523.

Sincerely,

Trina L. Vielhauer
Chief
Bureau of Air Regulation

cc: Dick Fancher, DEP NWD: dick.fancher@dep.state.fl.us
Scott Osbourn, P.E., Golder: sosbourn@golder.com
Kathy Forney, EPA Region 4: forney.kathleen@epamail.epa.gov
Heather Abrams, EPA Region 4: Abrams.Heather@epa.gov
Jane Sauls, Chair, Leon County Board of County Commissioners: saulsj@leoncountyfl.gov
Bill Proctor, Commissioner, Leon County: proctorb@leoncountyfl.gov
John Marks, Mayor, City of Tallahassee: john.marks@talgov.com
Anita Favors Thompson, Manager, City of Tallahassee: anita.favors.thompson@talgov.com
Vickie Gibson, DEP BAR: Victoria.Gibson@dep.state.fl.us (for read file)

John Gibby, Citizen: gibbyj@earthlink.net
Joy Towles Ezell, Citizen: hopeforcleanwater@yahoo.com
Deb Swim, Citizen: daswim@gmail.com
Joe Cain, Citizen: joecain1@comcast.net
Dr. Ronald Saff, Floridians Against Incinerators in Disguise: ronsaff@aol.com
Vincent Salters, Professor of Geology, FSU: salters@magnet.fsu.edu
Dr. Scott Hannahs, Director of DC Field Instrumentation & Operations, FSU: sth@magnet.fsu.edu
Dr. Heinz Luebkemann, Retired Professor, FSU: hluebkemann@comcast.net
Shereitte C. Stokes IV, Environmental Science Institute, FAMU: shereitte@gmail.com
Richard Gragg, Environmental Science Institute, FAMU: richard.gragg@famu.edu
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Bob Fulford, Citizen: bobfulford@nettally.com
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Dave Ciplet: Global Alliance for Incinerator Alternatives: dave@no-burn.org
Bradley Angel: bradley@greenaction.org
Neil Seldman, Institute for Self-Reliance: nseldman@ilsr.org
Donald L. Mellman, Vice-President, Physicians for Social Responsibility: dmellman@post.harvard.edu
Lynn Ringenberg, President, Physicians for Social Responsibility: ring@tampabay.rr.com
Dr. Andres Rodriguez, Capital Medical Society: by U.S. Mail
Anita Franklin, Citzen: by U.S. Mail
Rainey Gibson, Citzen: by U.S. Mail
Willie Dupree, Citzen: by U.S. Mail
Erwin Jackson, Citzen: by U.S. Mail
Gerald Losey, Citzen: by U.S. Mail
Regina Harden, Citzen: by U.S. Mail
Barbara Musgray, Citzen: by U.S. Mail
Rahni Spencer, Citzen: by U.S. Mail
Reverend Roger Wells, Citzen: by U.S. Mail

Anita Franklin
1503 Coleman Street
32310

Rainey Gibson
1511 Coleman Street
32310

Willie Dupree
1442 Coleman Street
32310

Erin Jackson
1341 Jackson Bluff Road
32304

Gerald Losey
3379 Lakeview Drive
32310

Regina and Jesse Lee Harden
1914 Dale Street
32310

Barbara and Joe Musgray
1412 Coleman Street
32310

Rahni Spencer
1612 Levy Avenue
32310

Reverend Roger Wells
1320 Levy Avenue
32310

ANITA FRANKLIN
1503 COLEMAN STREET
TALLAHASSEE, FL 32310

RAINEY GIBSON
1511 COLEMAN STREET
TALLAHASSEE, FL 32310

WILLIE DUPREE
1442 COLEMAN STREET
TALLAHASSEE, FL 32310

ERIN JACKSON
1341 JACKSON BLUFF ROAD
TALLAHASSEE, FL 32304

GERALD LOSEY
3379 LAKEVIEW DRIVE
TALLAHASSEE, FL 32310

REGINA AND JESSE LEE HARDEN
1914 DALE STREET
TALLAHASSEE, FL 32310

BARBARA AND JOE MUSGRAY
1412 COLEMAN STREET
TALLAHASSEE, FL 32310

RAHNI SPENCER
1612 LEVY AVENUE
TALLAHASSEE, FL 32310

REVEREND ROGER WELLS
1320 LEVY AVENUE
TALLAHASSEE, FL 32310

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WILLIE DUPREE
1442 COLEMAN STREET
TALLAHASSEE, FL 32310

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A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Willie Dupree | C. Date of Delivery 12/8/08

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☐ Registered ☐ Return Receipt for Merchandise
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1. Article Addressed to:

ANITA FRANKLIN
1503 COLEMAN STREET
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) [signature] | C. Date of Delivery 12-6-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

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1. Article Addressed to:

RAINEY GIBSON
1511 COLEMAN STREET
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) RAINEY GIBSON | C. Date of Delivery 12.8.08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 5827

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1. Article Addressed to:

REGINA AND JESSE LEE
HARDEN
1914 DALE STREET
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery 12-6-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 5810

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1. Article Addressed to:

GERALD LOSEY
3379 LAKEVIEW DRIVE
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) G Losey | C. Date of Delivery 12/8/8

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 5803

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1. Article Addressed to:

BARBARA AND JOE MUSGRAY
1412 COLEMAN STREET
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery 12-6-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 5773

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

REVEREND ROGER WELLS
1320 LEVY AVENUE
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Frances Wells ☐ Agent ☐ Addressee

B. Received by (Printed Name) FRANCES WELLS | C. Date of Delivery 12-6-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 5780

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SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

ERIN JACKSON
1341 JACKSON BLUFF ROAD
TALLAHASSEE, FL 32304

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery 12/08/08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 5834

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

RAHNI SPENCER
1612 LEVY AVENUE
TALLAHASSEE, FL 32310

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Rahni Spencer ☐ Agent ☐ Addressee

B. Received by (Printed Name) Rahni Spencer | C. Date of Delivery 12-20-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

WESTSIDE STATION FL 32304 DEC 20 2008

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1160 0004 3034 6831

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

Livingston, Sylvia

From: Donald Mellman [dmellmanmd@verizon.net] **Sent:** Sun 12/7/2008 6:27 PM
To: Livingston, Sylvia
Cc:
Subject: Re: BG&E Tallahassee Renewable Energy Center; 0730109-001-AC Comments on Draft Permit
Attachments:

On 12/5/08 4:07 PM, "Livingston, Sylvia" <Sylvia.Livingston@dep.state.fl.us> wrote:

> Dear Sir/Madam:
> Please send a "reply" message verifying receipt of the attached document(s); this may be done by selecting "Reply" on the menu bar of your e-mail software, *noting that you can view the document(s)*, and then selecting "Send". This electronic process takes the place of sending documents via U.S. Postal Service with a Return Receipt Requested. We must receive verification of receipt and your reply will preclude subsequent e-mail transmissions to verify receipt of the document(s).
>
> The document(s) may require immediate action within a specified time frame. Please open and review the document(s) as soon as possible.
>
> The Bureau of Air Regulation is issuing electronic documents for permits, notices and other correspondence in lieu of hard copies through the United States Postal System, to provide greater service to the applicant and the engineering community. Please advise this office of any changes to your e-mail address or that of the Engineer-of-Record.
>
> Thank you,
>
> Sylvia Livingston
> Bureau of Air Regulation
> Division of Air Resource Management (DARM)
> 850/921-9506
> sylvia.livingston@dep.state.fl.us
>
> **Note:** The document is in Adobe Portable Document Format (pdf). Adobe Acrobat Reader can be downloaded for free at the following internet site:
> <http://www.adobe.com/products/acrobat/readstep.html
> <http://www.adobe.com/products/acrobat/readstep.html> > .
>
> <<BG&E Tallahassee Renewal Energy Center.pdf>>
>
> *The Department of Environmental Protection values your feedback as a customer. DEP Secretary Michael W. Sole is committed to continuously assessing and improving the level and quality of services provided to you. Please take a few minutes to comment on the quality of service you received. Simply click on this link to the DEP Customer Survey <http://survey.dep.state.fl.us/?refemail=Sylvia.Livingston@dep.state.fl.us> . Thank you in advance for completing the survey.*

Livingston, Sylvia

From: Joe Cain [joecain1@comcast.net]
Sent: Friday, December 05, 2008 4:21 PM
To: Livingston, Sylvia
Subject: Re: BG&E Tallahassee Renewable Energy Center; 0730109-001-AC Comments on Draft Permit

Verifying

Sent from my iPhone

On Dec 5, 2008, at 4:07 PM, "Livingston, Sylvia" <Sylvia.Livingston@dep.state.fl.us> wrote:

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> <<BG&E Tallahassee Renewal Energy Center.pdf>>
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>
> <BG&E Tallahassee Renewal Energy Center.pdf>

Livingston, Sylvia

From: Bill Proctor [PROCTORB@leoncountyfl.gov]
Sent: Monday, December 08, 2008 3:09 PM
To: Livingston, Sylvia
Subject: Re: BG&E Tallahassee Renewable Energy Center; 0730109-001-ACComments on Draft Permit

The attached documents have been received.
thank you,
Bill Proctor

Bill Proctor
Leon County Commission
District 1
(850) 606-5361
(850) 606-5303 fax

>>> "Livingston, Sylvia" <Sylvia.Livingston@dep.state.fl.us> 12/5/2008 4:07 PM >>>

Dear Sir/Madam:
Please send a "reply" message verifying receipt of the attached document(s); this may be done by selecting "Reply" on the menu bar of your e-mail software, *noting that you can view the document(s)*, and then selecting "Send". This electronic process takes the place of sending documents via U.S. Postal Service with a Return Receipt Requested. We must receive verification of receipt and your reply will preclude subsequent e-mail transmissions to verify receipt of the document(s).

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Thank you,

Sylvia Livingston
Bureau of Air Regulation
Division of Air Resource Management (DARM)
850/921-9506
sylvia.livingston@dep.state.fl.us

Note: The document is in Adobe Portable Document Format (pdf). Adobe Acrobat Reader can be downloaded for free at the following internet site: <http://www.adobe.com/products/acrobat/readstep.html> .

<<BG&E Tallahassee Renewal Energy Center.pdf>>

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Livingston, Sylvia

From: deb swim [daswim@gmail.com]
Sent: Friday, December 05, 2008 6:31 PM
To: Livingston, Sylvia
Subject: Re: BG&E Tallahassee Renewable Energy Center; 0730109-001-AC Comments on Draft Permit

I received and can view the document. Thanks.

On Fri, Dec 5, 2008 at 4:07 PM, Livingston, Sylvia <Sylvia.Livingston@dep.state.fl.us> wrote:

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> Sylvia Livingston
> Bureau of Air Regulation
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> 850/921-9506
> sylvia.livingston@dep.state.fl.us
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--
Deb Swim, Attorney
Tallahassee, FL
(850) 656-0448

Livingston, Sylvia

From: Fancher, Dick
Sent: Tuesday, December 09, 2008 6:26 PM
To: Livingston, Sylvia
Subject: RE: BG&E Tallahassee Renewable Energy Center; 0730109-001-AC Comments on Draft Permit

Got it-thanks!

From: Livingston, Sylvia
Sent: Friday, December 05, 2008 3:08 PM
To: 'glenn@biggreenenergy.com'
Cc: Fancher, Dick; 'sosbourn@golder.com'; 'forney.kathleen@epamail.epa.gov'; 'Abrams.Heather@epa.gov'; 'saulsj@leoncountyfl.gov'; 'proctorb@leoncountyfl.gov'; 'john.marks@talgov.com'; 'anita.favors.thompson@talgov.com'; Gibson, Victoria; 'gibbyj@earthlink.net'; 'hopeforcleanwater@yahoo.com'; 'daswim@gmail.com'; 'joecain1@comcast.net'; 'ronsaff@aol.com'; 'salters@magnet.fsu.edu'; 'sth@magnet.fsu.edu'; 'hluebkemann@comcast.net'; 'shereitte@gmail.com'; 'richard.gragg@famu.edu'; 'richardgraggiii@mac.com'; 'bobfulford@nettally.com'; 'anitald@embarqmail.com'; 'susiecaplowe@comcast.net'; 'dave@no-burn.org'; 'bradley@greenaction.org'; 'nseldman@ilsr.org'; 'dmellman@post.harvard.edu'; 'ring@tampabay.rr.com'; Linero, Alvaro; Read, David; Vielhauer, Trina; Walker, Elizabeth (AIR)
Subject: BG&E Tallahassee Renewable Energy Center; 0730109-001-AC Comments on Draft Permit

Dear Sir/Madam:

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Thank you,

Sylvia Livingston
Bureau of Air Regulation
Division of Air Resource Management (DARM)
850/921-9506
sylvia.livingston@dep.state.fl.us

Note: The document is in Adobe Portable Document Format (pdf). Adobe Acrobat Reader can be downloaded for free at the following internet site: <http://www.adobe.com/products/acrobat/readstep.html> .

<< File: BG&E Tallahassee Renewal Energy Center.pdf >>

Livingston, Sylvia

From: SHEREITTE STOKES IV [shereitte@gmail.com]
Sent: Friday, December 05, 2008 5:00 PM
To: Livingston, Sylvia
Subject: Re: BG&E Tallahassee Renewable Energy Center; 0730109-001-AC Comments on Draft Permit

I can view the document

On Fri, Dec 5, 2008 at 4:07 PM, Livingston, Sylvia <Sylvia.Livingston@dep.state.fl.us> wrote:

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--
Shereitte C. Stokes IV, MPH, MIAD
Ph.D. Candidate, Policy & Risk Management Concentration
Environmental Sciences Institute
Florida A&M University
Future Secretary of Housing and Urban Development

RECEIVED
FEB 04 2009
BUREAU OF AIR REGULATION

February 2nd, 2009

Via Electronic Mail

Trina Vielhauer, Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399

RE: Tallahassee Renewable Energy Center
Withdrawal of Permit Application
Project Number: 0730109-001-AC

Dear Ms. Vielhauer:

By this letter, Biomass Gas and Electric of Tallahassee, LLC (BG&E), withdraws its air construction permit application for the above-referenced Tallahassee Renewable Energy Center submitted to the Department on April 3, 2008. As you know, following submittal of our application, the Department issued a proposed air construction permit for the project on October 24, 2008, and BG&E subsequently filed a Petition for Administrative Hearing on December 4, 2008. The Department then forwarded the Petition to the Division of Administrative Hearings, and the hearing was scheduled for mid-June, 2009.

BG&E recently made a decision to no longer pursue the Tallahassee Renewable Energy Center project and is therefore withdrawing the air construction permit application filed last April. We understand that upon withdrawal of the application, the pending matter before the Division of Administrative Hearings will be considered moot and that case closed.

BG&E sincerely appreciates the Department's assistance with this project. If we need to do anything further or if you have any questions, please do not hesitate to contact me at the number provided below.

Sincerely,

Glenn Farris
President and CEO

3500 PARKWAY LANE • SUITE 440 • NORCROSS, GA 30092 • 770.662.0256

November 10, 2008

Ms. Lea Crandall, Agency Clerk
FDEP Office of General Counsel
3900 Commonwealth Blvd MS 35
Tallahassee, FL 32399-3000

Re: DEP File No. 0730109-001-AC
Biomass Gasification Combined Cycle Unit
Biomass Gas and Electric of Tallahassee, LLC

Dear Ms. Crandall,

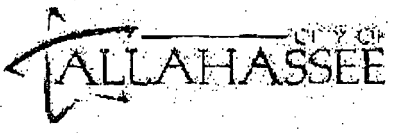
I am a person whose substantial interests are affected by this proposed permitting decision and am requesting an EXTENSION OF TIME of 90 days to file a petition for an administrative hearing in accordance with Sections 120.569 and 120.57, F.S., so that I may compile the material facts required for the petition.

Sincerely,

Rahni Spencer Rahni Spencer
1612 Levy Ave
Tallahassee, FL 32310

c: Mr. Glenn Farris
Biomass Gas and Electric of Tallahassee, LLC
3500 Parkway Lane, Suite 440
Altanta, GA 30092

Tallahassee-Leon County GIS
Leon County Courthouse
P3 Level, 301 S Monroe St
Tallahassee, FL 32301



City of Tallahassee
Growth and Environmental Management
Land Use and Environmental Services
100 W. Virginia St.
Tallahassee, FL 32301

IMPORTANT ADDRESS CHANGE NOTICE

SPENCER RAHNI BENETTA NOTICE DATE: 10/25/2007

1520 LEVY AVE
TALLAHASSEE FL 32310

The City of Tallahassee, in cooperation with Leon County, established a street naming and property addressing system in 1995. The purpose of the addressing system is to aid our emergency services (fire, ambulance, and law enforcement) in quickly finding residences and places of business, in case of an emergency. The Postal Service has also adopted this property addressing system as the official mailing addresses. Below is your NEW Address and Street NAME which REPLACES your previous street address. "IF THE PROPERTY LISTED BELOW IS RENTAL PROPERTY, IT IS YOUR RESPONSIBILITY AS THE PROPERTY OWNER TO ADVISE THE RENTER OF THE CHANGE IN ADDRESS." This new address will become your permanent property address for the parcel listed. If your mail is delivered to your home, the new address will become your mailing address. If you receive mail at the Post Office, the new address will not affect your mailing address and will only be used to locate your property in an emergency. THE UNIFORM ORDINANCE ADOPTED BY BOTH THE CITY AND COUNTY REQUIRES THAT YOU POST YOUR ADDRESS NUMBER IN A VISIBLE LOCATION AND THE ADDRESS NUMBERS BE A MINIMUM OF 3" HIGH FOR RESIDENTIAL AND MINIMUM 7" HIGH FOR COMMERCIAL PROPERTIES. This request is made to ensure that all numbers are visible for any 9-1-1 Emergency Response Team. We are also asking the numbers be posted on the front of your home or business. If your home or business is not visible from the street, the address should be posted on a sign post or mailbox leading to your home or business. Please post your new address number to your home or business within forty-five (45) days from the date of this notice and remember to notify all correspondents of your new address. In an effort to make the transition as smooth as possible, the Postal Service will continue to deliver mail to your old and new address for one year from the date of this notice. However, after one (1) year, the old address will be eliminated from the Postal Service Database.

YOUR ADDRESS CHANGE WILL BECOME EFFECTIVE FOURTY-FIVE (45) DAYS FROM THE DATE OF THIS NOTICE. PLEASE CONVERT TO YOUR NEW STREET ADDRESS NUMBER AT THAT TIME. PLEASE ALSO BE AWARE THAT AFTER THE FOURTY-FIVE (45) DAY PERIOD YOUR ADDRESS CHANGE WILL BE REFLECTED IN THE 9-1-1 DATABASE. YOUR ADDRESS SHOULD ALSO BE POSTED AT THIS TIME TO AID AND ASSIST EMERGENCY RESPONDERS.

BELOW IS YOUR CORRECT ADDRESS NUMBER AND STREET NAME:

1612 LEVY AVE

YOUR OLD ADDRESS WAS: **1520 LEVY AVE**

FOR PROPERTY TAX NUMBER: **41-02-30- P-0081**

IF THE ABOVE IS NOT YOUR ADDRESS OR PROPERTY TAX ID NUMBER, AS FOUND ON YOUR PROPERTY TAX STATEMENT OR FOR INFORMATION ABOUT THIS NOTICE, PLEASE CALL THE GIS MAPPING SPECIALIST AT (850) 606-5504.

COMPLIANCE DATE FOR THIS NOTICE IS: **12/09/2007**

BIOMASS GAS & ELECTRIC, LLC
BIG GREEN ENERGY
BG&E

Trina Vielhauer,
Chief - Bureau of Air Regulation
F.D.E.P.
2600 Blair Stone Road,
MS #5505
Tallahassee, FL 32399-2400

Subject: Public Notice of Intent to issue draft Air Construction Permit
DEP File No. 0730109-001-AC

Dear Trina,

With reference to the above mentioned and your communication with Glenn Farris and my email to you of today, November 11th, please find enclosed the original documents as discussed:

- Original Legal Notice (published on November 4th, 2008
- Confirmation from Legal Advertising Representative, Cassandra Moore

Should you have any questions or require any further assistance from me, please do not hesitate to contact me.

Sincerely,

Sue LaFleur
Office Manager

3500 PARKWAY LANE • SUITE 440 • NORCROSS, GA 30092 • 770.662.0256

TALLAHASSEE DEMOCRAT
PUBLISHED DAILY
TALLAHASSEE-LEON-FLORIDA

RECEIVED NOV 07 2008

STATE OF FLORIDA COUNTY OF LEON:
Before the undersigned authority personally appeared Cassandra Moore, who on oath says that she is a Legal Advertising Representative of the Tallahassee Democrat, a daily newspaper published at Tallahassee in Leon County, Florida; that the attached copy of advertising being a Legal Ad in the matter of

NOTICE OF INTENT

In the Second Judicial Circuit Court was published in said newspaper in the issues of:

NOVEMBER 4, 2008

Affiant further says that the said Tallahassee Democrat is a newspaper published at Tallahassee, in the said Leon County, Florida, and that the said newspaper has heretofore been continuously published in said Leon County, Florida each day and has been entered as second class mail matter at the post office in Tallahassee, in said Leon County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she has never paid nor promised any person, firm or coporation any discount, rebate, commission or refund for the purpose of securing this publication in the said newspaper.

CASSANDRA MOORE
LEGAL ADVERTISING REPRESENTATIVE
Sworn To or Affirmed and Subscribed Before Me.
This 4th Day of November 2008, by
Cassandra Moore, Cassandra Moore
Personally Known ✓
OR Produced Identification _____
Type of Identification Produced _____

(SEAL) R Vicks — Notary Public
State of Florida
County of Leon

RACHEL VICKERS
Commission DD 685817
Expires August 28, 2011
Bonded Thru Troy Fain Insurance 800-385-7019

RECEIVED
NOV 14 2008
BUREAU OF AIR REGULATION

PUBLIC NOTICE OF INTENT TO ISSUE DRAFT AIR CONSTRUCTION PERMIT

(Public Notice to be Published in the Newspaper)
Florida Department of Environmental Protection
Division of Air Resource Management, Bureau of Air Regulation
DEP File No. 0730109-001-AC
Biomass Gas and Electric of Tallahassee, LLC
Tallahassee Renewable Energy Center
Biomass Integrated Gasification Combined Cycle Unit
Leon County

Applicant: The applicant for this project is Biomass Gas and Electric of Tallahassee, LLC (BG&E). The applicant's authorized representative and mailing address is: Mr. Glenn Farris, President and Chief Executive Officer, BG&E, 3500 Parkway Lane, Suite 440, Atlanta, Georgia 30092.

Facility Location: The proposed Tallahassee Renewable Energy Center (TREC) will be located in Leon County on a 21.2 acre site that lies north of Roberts Avenue. The property is bounded on the north, west and south sides by CSX railroad tracks and on the east side by an extension of Lipona Road.
The title is held by the State of Florida Board of Trustees of the Internal Improvement Trust Fund. The premises are managed by Florida State University who subleased it to BG&E.

Project: On April 3, 2008, BG&E submitted an air permit application to construct the TREC consisting of a nominal 42 megawatts (MWnet) biomass integrated gasification combined cycle unit and ancillary equipment. Details of the project are provided in the application and the enclosed Technical Evaluation and Preliminary Determination.

Municipal solid waste (MSW) is expressly prohibited as a fuel source for the facility. The fuel source for the facility will be exclusively woody biomass that consists primarily of wood chips but may also include agricultural crops and byproducts, logging and lumber mill residues, untreated wood materials, and other non-fossil organic materials. The material will be dried and fed into a vessel containing a heated bed of circulating olivine (sand) where the woody biomass will be converted to biomass product gas (BPG).

BG&E's estimates of emissions in tons per year (TPY) from the proposed TREC project are summarized in the following table. The permitted emissions representing theoretical potential to emit are also included.

Pollutants	Estimated Emissions (TPY)	Potential Emissions (TPY)
Carbon Monoxide (CO)	204	231
Nitrogen Oxides (NOX)	197	214
Particulate Matter (PM/PM10)	114/114	156/156
Sulfur Dioxide (SO2)	83	83
Volatile Organic Compounds (VOC)	18	18
Hazardous Air Pollutants (HAP)	<5	<5

The BPG will be cleaned, compressed and used as fuel in two nominal 14.8 MW (gross) combustion turbine-electrical generators (CT). Heat from the CT exhaust gas will be recovered in two heat recovery steam generators (HRSG) equipped with BPG-fueled duct burners. The resulting steam will drive a single nominal 20.7 MW (gross) steam turbine-electrical generator (STG). NOX emissions (concentrations) from BPG combustion in the CT and DB will be limited to achieve 32.5 parts per million by volume, dry, at 15 percent oxygen (ppmvd @15% O2). CO concentrations will be limited to 50.0 ppmvd @15% O2. Emissions of PM/PM10, SAM, SO2, and VOC will be controlled to very low levels by good combustion and the cleanup of the BPG prior to combustion. Ammonia emissions (NH3) generated due to NOX control will be limited to 10 ppmvd. The draft permit includes a dioxin/furan design standard of 0.15 toxic equivalent (TEQ) nanograms per dry standard cubic meters at @7% O2.

]The BPG cleanup system includes: particulate removal; tar removal; and scrubbing to remove other impurities such as ammonia (NH3), hydrogen chloride (HCl), hydrogen sulfide (H2S) and alkali metals. The CT exhaust gas cleanup consists of a selective catalytic reduction (SCR) system for NOX. The Department also requires continuous emissions monitoring systems (CEMS) for NOX and CO and fuel analysis for sulfur to limit SO2 and sulfuric acid mist (SAM) emissions.

Char removed from the BPG and tar from the BPG cleanup system will be combusted in a separate vessel to provide additional heat to the gasification process. The resulting char combustion exhaust gas will pass through two cyclones and then be filtered in a baghouse and exhausted to the atmosphere. A continuous opacity monitor will be required and also a process monitor for CO. It will be periodically tested for emissions of PM/PM10, NOX and dioxin/furan.

There will be an exhaust stack for the char combustor, two exhaust stacks for the CT/HRSG trains, cooling towers, two flares; a natural gas-fueled auxiliary boiler and natural gas-fueled startup burners for the gasifier and char combustor.

This project did not trigger the rules for the prevention of significant deterioration (PSD) regulations. Therefore, air quality impact modeling was not required. The Department reviewed ambient air monitoring records and has reasonable assurance that the proposed project will not cause or contribute to a violation of any state or federal ambient air quality standard.

Permitting Authority: Applications for air construction permits are subject to review in accordance with the provisions of Chapter 403, Florida Statutes (F.S.) and Chapters 62-4, 62-210 and 62-212 of the Florida Administrative Code (F.A.C.). The proposed project is not exempt from permitting requirements and an air construction permit is required to perform the proposed work. The Bureau of Air Regulation is the Permitting Authority responsible for making a permit determination for this project. The Permitting Authority's physical address is: 111 South Magnolia Drive, Suite 4, Tallahassee, Florida. The Permitting Authority's mailing address is: 2600 Blair Stone Road, Mail Station (MS) 5505, Tallahassee, Florida 32399-2400. The Permitting Authority's telephone number is 850/488-0114.

Project File: A complete project file is available for public inspection during the normal business hours of 8:00 a.m. to 5:00 p.m., Monday through Friday (except legal holidays), at address indicated above for the Permitting Authority. The complete project file includes the Draft air construction permit, the Technical Evaluation and Preliminary Determination, the application, and the information submitted by the applicant, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Permitting Authority's project review engineer for additional information at the address or phone number listed above. In addition, electronic copies of key documents are available at the following web link:

www.dep.state.fl.us/Air/permitting/construction/tallahassee.htm .

Notice of Intent to Issue Air Construction Permit: The Permitting Authority gives notice of its intent to issue an air construction permit to the applicant for the project described above. The applicant has provided reasonable assurance that operation of the proposed equipment will not adversely impact air quality and that the project will comply with all appropriate provisions of Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297, F.A.C. The Permitting Authority will issue a final air construction permit in accordance with the conditions of the proposed draft air construction permit unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, F.S. or unless public comment received in accordance with this notice results in a different decision or a significant change of terms or conditions.

Comments: The Permitting Authority will accept written comments concerning the proposed draft air construction permit for a period of 14 days from the date of publication of the Public Notice. Written comments must be received by the Permitting Authority by close of business (5:00 p.m.) on or before the end of this 14-day period. If written comments received result in a significant change to the draft air construction permit, the Permitting Authority shall revise the draft air construction permit and require, if applicable, another Public Notice. All comments filed will be made available for public inspection.

Petitions: A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative hearing in accordance with Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed with (received by) the Department's Agency Clerk in the Office of General Counsel of the Department of Environmental Protection at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), F.S. must be filed within 14 days of publication of this Public Notice or receipt of a written notice, whichever occurs first. Under Section 120.60(3), F.S., however, any person who asked the Permitting Authority for notice of agency action may file a petition within 14 days of receipt of that notice, regardless of the date of publication.

A petitioner shall mail a copy of the petition to the applicant at the address indicated above, at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

A petition that disputes the material facts on which the Permitting Authority's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner; the name, address and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of when and how each petitioner received notice of the agency action or proposed decision; (d) A statement of all disputed issues of material fact. If there are none, the petition must so state; (e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action including an explanation of how the alleged facts relate to the specific rules or statutes; and, (g) A statement of the relief sought by the petitioner, stating precisely the action the petitioner wishes the agency to take with respect to the agency's proposed action. A petition that does not dispute the material facts upon which the Permitting Authority's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Permitting Authority's final action may be different from the position taken by it in this Public Notice. Persons whose substantial interests will be affected by any such final decision of the Permitting Authority on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation: Mediation is not available in this proceeding.

NOVEMBER 4, 2008

Elizabeth ✓
al

September 10, 2008

Trina Vielhauer
Chief, Bureau of Air Regulation
Department of Environmental
2600 Blair Stone Road, MS 5505
Tallahassee, FL 32399-2400

Dear Trina,

Please accept this letter as a commitment from Biomass Gas & Electric, LLC, that their Subsidiary BG&E of Tallahassee, LLC d/b/a/ the Tallahassee Renewable Energy Center, will use any necessary financial assurance/bond funds that are required as a part of our sub lease from the Board of Trustees of the Internal Improvement Trust Fund to do the following if the site and project are abandoned by BG&E of Tallahassee. We will remove the following items, including but not limited to any and all wood, reagents such as ammonia and any other fuel elements. Please let me know if I can be of further service.

Sincerely,

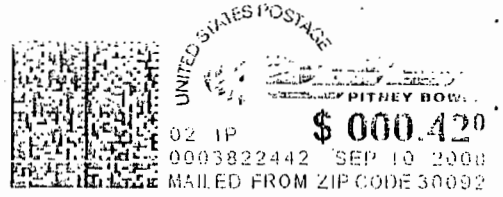
S. Glenn Farris
President and CEO
Biomass Gas & Electric, LLC

Cc: Virginia Wetherell
Robert Ashburn

3500 Parkway Lane • Suite 440 • Norcross, GA 30092 • 770.662.0256

BIOMASS GAS & ELECTRIC, LLC
BIG GREEN ENERGY
BG&E

3500 PARKWAY LANE
SUITE 440
NORCROSS, GA 30092



Trina Vielhauer
Chief, Bureau of Air Regulation
Department of Environmental
2600 Blair Stone Road, MS 5505
Tallahassee, FL 32399-2400

32399@2400 C001

Walker, Elizabeth (AIR)

From: Read, David
Sent: Monday, July 21, 2008 1:08 PM
To: Walker, Elizabeth (AIR)
Subject: FW: BG&E Air Permit - Proof of Publication of Public Notice
Attachments: Tallahassee Air Permit Publication.pdf; image001.jpg

Proof of publication of Public Notice

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM) Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

-----Original Message-----
From: Vielhauer, Trina
Sent: Thursday, June 19, 2008 11:43 AM
To: Linero, Alvaro; Walker, Elizabeth (AIR); Read, David
Subject: Fw: BG&E Air Permit - Proof of Publication of Public Notice

Trina Vielhauer

Sent from my BlackBerry Wireless Handheld

----- Original Message -----
From: gfarris <glenn@biggreenenergy.com>
To: 'Angela Morrison Uhland' <AngelaM@hgslaw.com>
Cc: Vielhauer, Trina
Sent: Thu Jun 19 10:06:37 2008
Subject: RE: BG&E Air Permit - Proof of Publication of Public Notice

Angela,

Thanks for the heads up.

Trina,

please find the proof of publication notice attached.

Glenn

S. Glenn Farris

President & CEO

Biomass Gas & Electric, LLC

770-662-0256

www.biggreenenergy.com

From: Angela Morrison Uhland [mailto:AngelaM@hgslaw.com]
Sent: Thursday, June 19, 2008 9:34 AM
To: Glenn Farris; Sue Lafleur
Subject: BG&E Air Permit - Proof of Publication of Public Notice

Glenn and Sue:

I saw the legal notice regarding the filing of the air permit application for the Tallahassee Renewable Energy Center in the Tallahassee Democrat. We must file a "proof of publication" with the Department. This is supposed to be filed with the Department within 7 days of publication, so if you have not already submitted this to the Department, we should do so now. It can be sent to Trina Vielhauer. If you have any questions or would like my assistance, please let me know.

Thanks,

Angela

Angela Morrison Uhland
Hopping Green & Sams, P.A. | Attorneys and Counselors | P.O. Box 6526 | Tallahassee, FL 32314 | <http://www.hgslaw.com> www.hgslaw.com
850.425.2258 | 850.224.8551 (fax) | auhland@hgslaw.com | Legal Assistant: Melanie Gilbert | mgilbert@hgslaw.com

RECEIVED JUN 1 6 2008

TALLAHASSEE DEMOCRAT
PUBLISHED DAILY
TALLAHASSEE-LEON-FLORIDA

RECEIVED JUN 0 1 2008

STATE OF FLORIDA COUNTY OF LEON:
Before the undersigned authority personally appeared Daniel Serrano, who on oath says that he is a Legal Advertising Representative of the Tallahassee Democrat, a daily newspaper published at Tallahassee in Leon County, Florida; that the attached copy of advertising being a Legal Ad in the matter of

NOTICE OF APPLICATION

in the Second Judicial Circuit Court was published in said newspaper in the issues of:

JUNE 8, 2008

Affiant further says that the said Tallahassee Democrat is a newspaper published at Tallahassee, in the said Leon County, Florida, and that the said newspaper has heretofore been continuously published in said Leon County, Florida each day and has been entered as second class mail matter at the post office in Tallahassee, in said Leon County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she has never paid nor promised any person, firm or coporation any discount, rebate, commission or refund for the purpose of securing this publication in the said newspaper.

DANIEL SERRANO
LEGAL ADVERTISING REPRESENTATIVE
Sworn To or Affirmed and Subscribed Before Me.
This 10 Day of June 2008, by
Daniel Serrano,
Personally Known
OR Produced Identification
Type of Identification Produced

(SEAL) Notary Public
State of Florida
County of Leon

RACHEL VICKERS
Commission DD 685817
Expires August 28, 2011
Bonded Thru Troy Fain-Insurance 800-385-7019

1 Legal Notices 1 Legal Notices 1 Legal Notices

NOTICE OF APPLICATION
STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEP File No.0730100-001-AC
Biomass Gas & Electric (BG&E) of Tallahassee, L.L.C
Tallahassee Renewable Energy Center
Leon County

The Department of Environmental Protection announces receipt of an application for an air construction permit from Biomass Gas & Electric (BG&E) of Tallahassee, L.L.C. The project is to construct the Tallahassee Renewable Energy Center to be located on the Florida State University (FSU) campus adjacent to Roberts Avenue and Lipona Road in Tallahassee, Leon County. The application was received on April 3, 2008. The requested permit is for one nominal 42 megawatt woody biomass (including some yard clippings) gasification electrical generation facility. The Energy Center will consist of the gasification unit, two combustion turbines (CT), two heat recovery steam generators (HRSG), one steam electric generator (SEG), and associated facilities.
This application is under review for completeness by the Bureau of Air Regulation in Tallahassee. Key portions of the application and additional information can be accessed at the Department's website at:
http://www.dep.state.fl us/Air/permitting/construction/tallahassee.htm
The application is also available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following

Department office:
Department of Environmental Protection
Bureau of Air Regulation
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32399-2400
Telephone: 850/488-0114
Fax: 850/921-9533.

JUNE 8, 2008

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Friday, July 11, 2008 11:12 AM
To: Read, David; Linero, Alvaro
Subject: BG&E Draft Documents
Attachments: Emissions Standards rev2.doc; RAI Emission Calcs rev2.xls

These are the remaining attachments referred to in the draft RAI response package. We can also touch on these during our 2 PM call, if you've had time to review.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | **D**: +1 (813) 769-5304 | **F**: +1 (813) 287-1716 | **C**: +1 (727) 278-3358 | **E**: Scott_Osbourn@golder.com | **www.golder.com**

BG&E TALLAHASSEE RENEWABLE ENERGY CENTER

ESTIMATED EMISSIONS

Pollutant	*Fuel*	*Method of Operation* [a]	*Stack Test* [b] *(3-Run Average)*		*CEMS* [c] *Compliance*	*Estimated Emissions (Informational purposes only)*
			ppmvd @ 15% O_2	*lb/hr* [d]	*ppmvd @ 15% O_2*	*lb/hr* [d]
NO_X	Product Gas	CT	32.5	--	32.5	18.4
		CT/DB	32.5	--	32.5	19.2
	Natural Gas [e]	CT	25.0	--	25.0	8.8
		CT/DB	--	--	--	--
CO	Product Gas	CT	50.0	--	50.0	17.2
		CT/DB	50.0	--	50.0	21.4
	Natural Gas [e]	CT	--	--	--	12.1
		CT/DB	--	--	--	--
VOC	Product Gas	CT	--	--	--	4.9
		CT/DB	--	--	--	6.5
	Natural Gas [e]	CT	--	--	--	0.4
		CT/DB	--	--	--	--
PM	Product Gas	CT	--	--	--	6.7
		CT/DB	--	--	--	7.2
	Natural Gas [e]	CT	--	--	--	1.0
		CT/DB	--	--	--	--
SO_2 (lb/MMBtu)	Product Gas	CT	0.06	--	--	8.8
		CT/DB	0.06	--	--	11.3
	Natural Gas [e]	CT	0.06	--	--	8.8
		CT/DB	0.06	--	--	11.3

a. CT means operation of CT in combined cycle mode without use of the DB. CT & DB means operation in combined cycle mode and using the DB.

b. The initial and annual U.S. EPA Reference Method tests associated with the certification of the NOx and CO CEMS instruments may also be used to demonstrate compliance with the individual standards for product gas and natural gas. Compliance with the NOx standards will be demonstrated by conducting tests in accordance with EPA Method 7E. Compliance with the CO standards will be demonstrated by conducting tests in accordance with EPA Method 10.

c. CEMS for NO_X and CO will be installed on the HRSG stacks. Correction to 15% O_2 is required for NOx, consistent with the provisions of 40 CFR 60, Subpart KKKK. Compliance with the continuous NO_X and CO standards will be demonstrated based on data collected by the required CEMS. NOx compliance will be based on a 4- hour rolling average for natural gas firing and a 30-day rolling average for product gas firing. CO compliance will be based on a 30-day rolling average. Compliance will be based on all periods, except startup, shutdown, fuel switching or documented malfunction. The CTs will operate above 80% load, or the lowest load at which compliance is demonstrated during initial testing.

d. The mass emission rate estimates are based on a turbine inlet condition of 59° F and may be adjusted to actual test conditions in accordance with the performance curves and/or equations on file with the Department.

e. Limits for natural gas firing are imposed for NOx and SO_2 only, as required by the New Source Performance Standards pursuant to 40 CFR 60, Subpart KKKK. The natural gas fired values provided for other pollutants are for informational purposes only.

Calculate SO2 for the CT firing on natural gas (which would only be used for SU). Assume:

- 2 gr/100 scf and heat input of 147 MMBtu/hr for the CT —need SO2 rate in lb/hr

Calculate SO2 for the CT/DB based on use of product gas. Calculate based on H2S content of 5 ppm (mass basis) in product gas. Assume:

- Stack exhaust flow rate of 410,210 lb/hr for CT/DB combined and temp of 364 F
- Assume 100% conversion of H2S to SO2
- The heating value of the product gas is 435 Btu/cf (LHV)
- The gas will be flared if not used in the CT/DB—for the flare emissions, assume flaring of all product gas generated (~ 378 MMBtu/hr—LHV)

Calculate SO2 emissions, given the product gas H2S content. The product gas will either be fired in combustion turbines or in a flare. Issues:

- Would the calculation be the same for both the CT and for the flare?

The calculation would be the same, except for conversion efficiency, if there is known difference in conversion efficiency between a CT and a flare.

Natural Gas Firing (CT Only)				
Sulfur Content		2	gr/100 scf	
Heat Input	CT	147	MMBtu/hr	
	DB	--	MMBtu/hr	
	Total	147	MMBtu/hr	
Heating value		1040	btu/cf	
Fuel use		141,346.15	cf/hr	
		1,413.46	100 cf/hr	
S		0.40	lb/hr	
SO2		**0.81**	**lb/hr**	
Emission Factors	CO	8.2E-02	lb/MMBtu	AP-42 Table 3.1-1
	VOC	2.1E-03	lb/MMBtu	AP-42 Table 3.1-2a
	PMtot	6.6E-03	lb/MMBtu	AP-42 Table 3.1-2a
CO		**12.05**	**lb/hr**	
VOC		**0.31**	**lb/hr**	
PMtot		**0.97**	**lb/hr**	
NOx Conc		25	ppm	
Volumetric flowrate		142,444.90	acfm	
Stack Temperature		1,074	F	assumed
MW		46		
NOx		**8.78**	**lb/hr**	

Product Gas Firing (CT Only) SO2			
Based on 5ppm concentration			
Conc	5	ppm	
stack flow rate	403,569	lb/hr	@ 364 deg F
Heating Value of product gas	435	btu/cf	
Temperature	823.67	deg R	
Heat Input	3.78E+08	Btu/hr	
Volumetric flowrate	142,444.88	acfm	@ 364 deg F
			Assumed MW gas 28.4
SO2	**4.55**	**lb/hr**	
	0.03	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular weight =	64	SO2
T =	temperature of gas in (R)	R= F +459.67	

Product Gas Firing (CT/DB, HI= 189 MMBtu/hr) SO2			
Based on 5ppm concentration			
Conc	5	ppm	
stack flow rate	410,210	lb/hr	@ 364 deg F
Heating Value of product gas	435	btu/cf	
Temperature	823.67	deg R	
Heat Input	3.78E+08	Btu/hr	
Volumetric flowrate	144,788.90	acfm	@ 364 deg F
			Assumed MW gas 28.4
SO2	**4.62**	**lb/hr**	
	0.02	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular weight =	64	SO2
T =	temperature of gas in (R)	R= F +459.67	

Walker, Elizabeth (AIR)

From: Vielhauer, Trina
Sent: Monday, July 14, 2008 9:47 AM
To: Walker, Elizabeth (AIR)
Subject: FW: BG&E

Another public record/email pursuant to that request.

-----Original Message-----
From: Vielhauer, Trina
Sent: Sunday, July 13, 2008 7:49 PM
To: 'virginia@wetherellconsulting.com'
Cc: 'glenn@biggreenenergy.com'
Subject: Re: BG&E

I think after we receive this response it will be complete based on our call with Scott on Friday. Scott indicated he thought he could get us the response this week so that is good.

Trina Vielhauer

Sent from my BlackBerry Wireless Handheld

----- Original Message -----
From: virginia@wetherellconsulting.com <virginia@wetherellconsulting.com>
To: Vielhauer, Trina
Cc: Glenn Farris <glenn@biggreenenergy.com>
Sent: Sun Jul 13 17:28:36 2008
Subject: BG&E

Hi Trina---I saw Scott's interpretation of Friday's conference call and your request for additional information which our team is putting together this week-end. What is your sense of where we are at this point ?? Time is slipping away and we have been so hopeful that we can avoid additional delays. As you have seen, Ron Saff is putting out false misleading information about our project calling it "incineration" and "spewing dioxins". It is very disappointing to have these kind of uninformed comments given recognition without knowledgeable persons & groups stepping forward. It is going to be very difficult for our country to avoid real crises with our energy situation if we can not find the means within our regulatory system to address new and improved technologies that provide cleaner energy. I would appreciate your input as to how we bring closure after the response to this next round of questions is provided to you. Thanks, Ginger

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Tuesday, July 08, 2008 12:23 PM
To: Read, David; Linero, Alvaro
Subject: BG&E Draft RAI Response Letter
Attachments: RAI Response Letter.doc; Attach 1.pdf; Attach 3.pdf; Attach 4.pdf

Attached are the draft RAI response letter and attachments. I'll send the remaining attachments (2, 5 and 6) tomorrow. Please let me know if Wednesday afternoon will work to discuss the draft package.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | **D**: +1 (813) 769-5304 | **F**: +1 (813) 287-1716 | **C**: +1 (727) 278-3358 | **E**: Scott_Osbourn@golder.com | **www.golder.com**

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Tampa, FL USA 33609
Telephone: (813) 287-1717
Fax: (813) 287-1716

July 3, 2008 07389628

Florida Department of Environmental Protection
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Attention: Mr. A. A. Linero

RE: RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION BIOMASS GAS AND ELECTRIC; FACILITY ID NO. 0730109

Dear Mr. Linero:

This letter is in response to your request for additional information regarding the Air Construction Permit application submitted by Golder Associates Inc. on behalf of Biomass Gas and Electric (BG&E) on April 3, 2008.

1. Material Handling. In the application, it is indicated that the wood fuel feedstock will be processed off-site and shipped by train to the facility location. The exact composition of the wood feedstock is not provided. Will the feedstock contain understory materials such as detritus material from the floor of forest areas and leaves and small branches or will it consist solely of chipped to size wood chunks from tree trunks? Detritus materials and leaves may contain mercury from dry and wet deposition which could affect the mercury emission estimates. [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. BG&E is being somewhat opportunistic in our feedstock approach, meaning that we 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 include the following:

- *Sander dust;*
- *Saw dust;*
- *Georgia Pacific fuel;*
- *Hogged fuel;*
- *Knots and shives; and*
- *Processed butt cuts.*

The Georgia Pacific (GP) fuel is in essence the reject material off of the round wood debarking system at the GP OSB Hosford, Florida Mill. 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. Knots and shives are the unique residues from the specialty pulping operation at Florida Buckeye in Perry, Florida. Finally, the butt cuts are round wood residues that are either of oversized or undersized non-processible materials from post or pole manufacturers.

Attachment 1 to this letter provides constituent analyses for the different types of woody biomass summarized above, including analyses for mercury. The Department has an interest in mercury emissions and has provided references for potential mercury emissions from combustion of biomass due to forest fires. The range that is given is 14 to 71 nanograms per gram of biomass. While the references are instructive, a comparison to potential emissions from the proposed project isn't valid for several reasons. The mercury emissions from forest fires include forest understory and volatilization of mercury in soils. In addition, the BG&E project is not combustion, but gasification of the feedstock. Nevertheless, using these mercury factors from the literature, and the proposed feedstock processing rate, an uncontrolled mercury emission estimate of 103 grams per year (0.23 lb/yr) was obtained. Finally, as these uncontrolled levels are very low in the biomass feedstock to the gasifier, the mercury that might be present is effectively controlled in the project's proposed gas cleanup system. More detail on this system is provided in the response to Comment No. 6 in this letter.

2. Startups/Shutdowns. In the application, it is estimated that there will be a total of 6 startups of the gasifier system per year. There is no request of provisions in the permit for additional startups for shakedowns during the initial operation of the facility. Does BG&E actually anticipate that the facility will not require additional startups and shutdowns of the gasifier system during the first year of the facility's operation? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- During initial operations, there will be a larger number of startups and shutdowns than the 6 anticipated after the startup and shakedown period. The 6 is based on annual operations after the shakedown period.

In addition, there is a major difference between a cold startup, which takes at least 18 hours, and a hot startup, which can take from as little as a few minutes to several hours. For definition purposes, hot startups are defined as ones where the gasifier is over 1,000 ^{0}F when the startup occurs.

At another gasification facility, the Burlington facility, there were approximately 22 cold startups/shutdowns during the first year of operation. By 2001, this number had dropped to 7. Cold startups involve a transition period during the change from air-fired operation to pyrolysis, where smoke can be produced during the change from excess oxygen combustion to sub-stoichiometric oxygen combustion, and finally to pyrolysis. This period of operation at the flare has an expected initial duration of up to 30 minutes for cold startups. One of the operational objectives of the Tallahassee plant is to reduce the length of the cold startup transition to a minimum, with a target of 10 minutes achieved after the first year of operation. Flare design to help minimize sub-stoichiometric conditions during burnoff are a part of the preliminary engineering design effort, with the objective of minimizing smoke production during the sub-stoichiometric transition.

Emissions from hot startups are minimal, since the wood still pyrolyzes at temperature, with low tar formation. During an electrical trip, gas production tapers off over about three minutes to a zero flow. The gas is flared during this period. Since the gas varies in composition rapidly during this three minute

period, there will be events of a few seconds duration where the flared gas may transition through a substoichiometric range and produce smoke.

Therefore, in response to the Department's comment, BG&E would like to clarify that as many as 22 startup/shutdowns (either hot or cold starts) could occur during the initial 12 months of operation. Subsequent to this initial decommissioning period,we expect that no more than 6 startup/shutdowns would be required annually.

3. Volatile Organic Compounds (VOC) and Sulfur Dioxide (SO_2) Emissions during Shutdowns. On pages 12 to 15 of the application, emission estimates are provided for nitrogen oxides (NOx) and particulate matter (PM) during shutdowns, while none are given for VOC and SOx based on the argument that these emissions from the turbines are already low. What are the anticipated emissions of these pollutants during shutdowns? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- As previously stated, emissions during shutdown are anticipated to be low. Emission estimates were provided for NOx (0.05 tons per year or TPY) and PM (0.0005 TPY) based on material balance and AP-42 emission factors. Attachment 2 provides a tabular summary of all anticipated shutdown emissions, including estimates for VOC and SO_2. These estimates are thought to be conservative and also rely on AP-42 emission factors.

4. Startup and Shutdown Procedures. In Section 2.2.1 of the application, the startup and shutdown modes and procedures for the gasifier/power block are briefly described with the caveat that full descriptions of the procedures are not provided due to their proprietary nature. To effectively assess the proposed durations and associated emissions involved during the startup and shutdown of the gasifier/power block of the facility, the Department requires a full description of the procedures. Please indicate which submitted documents are considered proprietary. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The full description of the startup/shutdown procedure, which SilvaGas has currently developed, was included in the air application. SilvaGas has also developed a preliminary gasifier startup schedule (see Attachment 3, Figure 1), consistent with the cold startup duration described in the response to Comment No. 2 above. The figure presents a sequence of 16 discrete steps that comprise a typical cold startup (the worst case emissions impact). A more detailed procedure is undergoing development, to be provided to plant staff as the system Operating Manual. These procedures and associated manual are evolving as part of the detailed design phase of the engineering effort. It is not BG&E's intent to claim these procedures as proprietary. In fact, BG&E would be receptive to a permit condition that required appropriate staff training to minimize emissions during startup and shutdown events, per the procedures developed by BG&E.

5. Refractory Life. If the facility only requires 6 startups per year what is the anticipated life of the gasifier refractory? If additional startups are required, especially during the initial operation of the facility, how is the life of the refractory affected? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The refractory life varies substantially, depending on the location of the refractory in the vessel. SilvaGas obtained a patent on installing tees instead of elbows at 90 degree flow direction changes, in order to reduce the erosion rate at the ells (i.e., the critical point of circulation between the gasifier and the combustor). Improved materials suggest that the life of the refractory in straight sections of the vessels and ductwork will be approximately 5 years, although there are examples in similar services where the refractory has lasted in excess of 30 years. The worst case found at

Burlington was for a vent pipe off a seal pot which had a gas velocity of 400 feet per second. This refractory lasted only two weeks, but was an isolated case compounded by design error.

Our cyclone vendors suggest an upper limit on gas flow velocity to minimize refractory wear in the cyclone impact zones. Hard facing of exotic materials such as silicon or tungsten carbide plates are planned for the worst impact zones. SilvaGas currently is using advanced computational fluid dynamics software which can predict erosion locations and wear rates. One of the ongoing maintenance programs for the Tallahassee plant is to verify and calibrate the computer prediction of refractory erosion locations and wear rates.

Startups and shutdown affect refractory life only if the heatup and cooldown rates result in thermal expansion-based stresses. The maximum heatup and cooldown rates for the Tallahassee plant are based on Burlington rates which successfully prevented thermal stress induced cracks. An additional factor is the refractory anchoring spacing and design. BG&E is working closely with our original refractory vendor, based out of Tampa, to provide the correct anchor spacing and design.

6. Syngas Cleanup. In Section 2.1.3 of the application, the syngas cleanup system proposed for the project is discussed. However, very few details of the proposed system are given. In previous meetings between the Department and BG&E, it was indicated by BG&E that the syngas cleanup system will be provided by Dahlman Filter Technology. Based on research done by the Department, the technology provided by Dahlman principally involves the removal of tar compounds from the syngas stream utilizing an oil wash. Details on the removal of other pollutants of concern (particulates, inorganic impurities such as sulfur compounds and volatile metals) were not available from research or in the application. Please provide to the Department a more detailed description of the syngas cleanup system proposed for the facility, including, if available, process schematics, which will allow the Department to make a comprehensive technical evaluation of the gas cleanup system. If such information is deemed proprietary, please indicate on the submitted documents. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—A Technical Information Paper on Dahlman's gas cleanup technology, modified to reflect the proposed Tallahassee Renewable Energy center project, has been included as Attachment 4 to this letter. The paper provides a simplified process flow diagram of the product gas cleanup system. As described in the attachment, the gas cleanup system has no direct emissions to the atmosphere. Only condensate water leaves the closed system.

Further background on the gasifier is necessary in order to understand the operation of the gas cleanup system. The gasifier operates as a pyrolysis unit, under reducing conditions. For instance, organic sulfur and nitrogen in the feedstock are converted to H_2S and NH_3 in small amounts. In a similar fashion, it is expected that mercuric salts, methyl mercury organics or mercuric oxides would be reduced to elemental mercury, and be evaporated into the product gas. The wash oil scrubbers remove tars above the dew point of water, so the vapor pressure of the elemental mercury remains high, and at its very low concentration, is anticipated to remain in the vapor phase. The same is true of the H_2S and NH_3.

When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water. The removal level in such a system of mercury is quite low, due to the insolubility of mercury in the water, but the elemental mercury will react with the H_2S present to form mercuric sulfide, and be removed as a particulate in the main recirculating water loop. There is an additional

separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H_2S by reaction with the caustic, making sodium sulfide.

This recirculating loop of caustic soda solution with sulfides in it also provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10^{-35}. Thus, the remaining mercury should be removed here, since the S^- ion concentration will be much higher here than in the main recirculating water loop.

This is the approach used at the mercury cell caustic chlorine plants for removing any traces (i.e., ppt) of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S^- ions, and the precipitated mercuric sulfide filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

The recirculating water at the water scrubber is blown down on a regular basis, where it is used in the cooling tower as part of the cooling tower makeup water. The design has not proceeded far enough yet to determine if this water needs filtration. Should detectable mercury concentrations be obtained in either this blowdown or the blowdown from the separate caustic circulating loop, then this could be filtered to remove the mercuric sulfide particulate.

Further, the combustor receives char and olivine from the gasifier at about 1,350 ^{0}F. At this temperature, and under the gasifier reducing conditions, mercury compounds would be separated out in the upstream cyclones as part of the product gas, described above. A negligible amount of mercury would enter the combustor, as there would be virtually no mercury present in the char. However, if any mercury were present, it would likely remain in the ash bound as a non-volatile inorganic salt rather than be released as a vapor. The vast majority of any mercury in the feedstock should end up in the makeup water from the water scrubber going to the cooling tower, and in particular, the blowdown from the separate caustic loop in the water scrubber which contains S^- ions.

Finally, the Department has expressed an interest in the potential for emissions of dioxins and furans from the proposed project. Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), commonly known as dioxins and furans, are toxic, persistent and bioaccumulative, and result predominantly from human activity. "Dioxins and furans" refer to a group of chemical compounds that share certain similar chemical structures and biological characteristics. Dioxin is formed by burning chlorine-based chemical compounds with hydrocarbons. Furan is typically derived by the thermal decomposition of pentose-containing materials, cellulosic solids especially pine-wood.

Dioxins and furans are unwanted by-products of incineration, uncontrolled burning and certain industrial processes. Industrial sources of dioxin to the environment include incinerators, metal smelters, cement kilns, the manufacture of chlorinated organics, and coal burning power plants. Dioxin is also produced by non-industrial sources (now considered by the U.S. EPA to be the greatest source in the U.S.), like residential wood burning, backyard burning of household trash, oil heating, and emissions from diesel vehicles.

Just as combustion provides a means for dioxin formation, so too does it allow for its destruction, through careful controls. A high combustion temperature, adequate combustion time, and turbulence to distribute heat all contribute to maximize dioxin destruction. Dioxin formation following combustion is

prevented by quickly cooling combustion gases, and minimizing the presence of certain metals known to promote dioxin formation.

As discussed with the Department, BG&E does not anticipate any significant emissions of dioxins or furans from the proposed project. As the project will be utilizing woody biomass as the feedstock, there will be no source of chlorine-based chemical compounds. In addition, the proposed gasification project does not rely on incineration or uncontrolled burning, which is associated with the majority of dioxin and furan formation.

7. Volatile Metal Emissions. As indicated in No. 6 above, no details are provided on how volatile metals, such as mercury, are going to be removed from the syngas. In the application, it is stated that the mercury concentration in the wood fuel is minimal and consequently expected mercury emissions are negligible. However, if this is not the case, does the syngas cleanup system utilize an activated carbon bed or something similar to control volatile metal emissions such as mercury? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—This comment is addressed above.

8. Duct Burner Firing. Based on the application, it appears that the duct burners will only fire syngas (product gas). Will natural gas ever be fired in the duct burners? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—Only product gas will be fired in the duct burners.

9. Emissions Averaging. In Table 3-2 of the application, emissions in ppm at 15 percent oxygen (O_2) of NO_X, carbon monoxide (CO), volatile organic compounds (VOC), and ammonia (NH3) appear to be given for annual stack testing requirements. Please provide Continuous Emissions Monitoring System (CEMS) 24 hour block average and 12 month rolling average estimates of CO emissions and 24 hour block average and 30 day rolling average estimates of NO_X, emissions when firing the combustion turbine and the combustion turbine in combination with the duct burners for the temperatures and loads cited in the table. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response— BG&E's requested emission limits, as well as associated averaging times and compliance methods, are provided in Attachment 5.

10. SO_2 Emissions. On page 19 of the application, it is stated that SO_2 emissions will be minimized through the utilization of natural gas during startups and the gas cleanup system on the product gas. Please provide estimates of the SO_2 concentration in the product gas before and after cleanup. In addition, provide estimates of SO_2 stack emissions when firing product gas for the same conditions described in No. 9 above. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—As stated earlier, the gasifier operates as a pyrolysis unit, under reducing conditions, converting organic sulfur in the feedstock to small amounts of H_2S. The H_2S is then reduced in the gas cleanup system. SO_2 emissions would result from the residual level of H_2S in the product gas (after the gas cleanup system), which is fired in the combustion turbines and duct burners, or, in the event of a system malfunction, when the product gas is flared. Attachment 6 provides a summary table of the H_2S in the pre- and post-gas cleanup scenarios, as well as the amount of SO_2 that is estimated to be emitted by firing of the product gas in the CT/DB or by flaring.

11. Combustion Turbine and Duct Burner Emissions Estimates. When comparing the upper and lower portions of Table 3-2 of the application, the emissions of NO_X, CO, and VOC appear to be lower when firing the duct burners than when not, please clarify. In addition, pollutants and units given in the table are not defined nor is the basis for the different emission concentrations for the various pollutants. Please redo this table and resubmit to address these issues and generally provide a clear overview of the expected emissions for the project as a function of turbine load, ambient air temperature, and duct burner firing. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response— A subsequent discussion between Golder and David Read of the Department has cleared up the confusion associated with the emission table. At times, emissions on a concentration basis (i.e., ppmvd) can be lower from combined firing of a combustion turbine and duct burner than from a combustion turbine alone. Further, as stated in the response to Comment No. 9 above, BG&E has provided a tabular summary of the requested emission limits, including averaging times and methods of compliance (see Attachment 5).

Please do not hesitate to call should you require additional information.

Sincerely,

GOLDER ASSOCIATES INC.

Scott Osbourn, P.E.
Senior Consultant

Enclosures

SO/dcg

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April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Sander Dust	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-002

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		100	
% Total Moisture	[ASTM D4442(METHOD A)]	4.89		
% Ash	[ASTM D1102]	0.75	0.79	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	7985	8395	8462
% Volatile Matter	[ASTM D3175]	74.94	78.79	
% Fixed Carbon	[ASTM D3172(Calc)]	19.42	20.42	
% Sulfur	[ASTM D4239(METHOD C)]	0.08	0.08	
% Carbon	[ASTM D5373]	47.66	50.10	
% Hydrogen	[ASTM D5373]	6.68	7.03	
% Nitrogen	[ASTM D5373]	4.33	4.56	
% Oxygen	[ASTM D5373(Calc)]	35.61	37.44	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.09	0.09	
Mercury, ug/g	[SW846-7471A]		0.09	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	1020 ug/g	ASTM D5600
Potassium, K	662 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	79 ug/g	ASTM D5600
Magnesium, Mg	252 ug/g	ASTM D5600
Barium, Ba	7 ug/g	ASTM D5600
Strontium, Sr	4 ug/g	ASTM D5600
Phosphorus, P	163 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Saw Dust	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-001

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	59.68		
% Ash	[ASTM D1102]	1.26	3.12	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	3410	8458	8730
% Volatile Matter	[ASTM D3175]	31.51	78.15	
% Fixed Carbon	[ASTM D3172(Calc)]	7.55	18.73	
% Sulfur	[ASTM D4239(METHOD C)]	0.01	0.02	
% Carbon	[ASTM D5373]	20.20	50.11	
% Hydrogen	[ASTM D5373]	2.43	6.01	
% Nitrogen	[ASTM D5373]	0.11	0.26	
% Oxygen	[ASTM D5373(Calc)]	16.31	40.48	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	<0.01	0.02	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	77 ug/g	ASTM D5600
Potassium, K	338 ug/g	ASTM D5600
Cerium, Ce	1.30 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	178 ug/g	ASTM D5600
Magnesium, Mg	179 ug/g	ASTM D5600
Barium , Ba	8 ug/g	ASTM D5600
Strontium, Sr	6 ug/g	ASTM D5600
Phosphorus, P	73 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	GP Fuel	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-005

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	36.14		
% Ash	[ASTM D1102]	1.15	1.80	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5786	9061	9228
% Volatile Matter	[ASTM D3175]	47.99	75.15	
% Fixed Carbon	[ASTM D3172(Calc)]	14.72	23.05	
% Sulfur	[ASTM D4239(METHOD C)]	0.04	0.06	
% Carbon	[ASTM D5373]	35.37	55.38	
% Hydrogen	[ASTM D5373]	4.16	6.51	
% Nitrogen	[ASTM D5373]	0.17	0.27	
% Oxygen	[ASTM D5373(Calc)]	22.97	35.98	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.01	0.02	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	5 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	368 ug/g	ASTM D5600
Potassium, K	733 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	193 ug/g	ASTM D5600
Magnesium, Mg	477 ug/g	ASTM D5600
Barium , Ba	7 ug/g	ASTM D5600
Strontium, Sr	6 ug/g	ASTM D5600
Phosphorus, P	251 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Hogged Fuel	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-004

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	34.54		
% Ash	[ASTM D1102]	1.10	1.67	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5403	8254	8394
% Volatile Matter	[ASTM D3175]	51.96	79.37	
% Fixed Carbon	[ASTM D3172(Calc)]	12.40	18.96	
% Sulfur	[ASTM D4239(METHOD C)]	0.02	0.03	
% Carbon	[ASTM D5373]	30.89	47.20	
% Hydrogen	[ASTM D5373]	3.64	5.56	
% Nitrogen	[ASTM D5373]	0.22	0.34	
% Oxygen	[ASTM D5373(Calc)]	29.59	45.20	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.02	0.02	
[illegible], ug/g	[SW846-7471A]		0.03	

Analyte	Result	Method
Arsenic, As	4 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	3 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	0.69 mg/Kg	ASTM D5600
Sodium, Na	89 ug/g	ASTM D5600
Potassium, K	1146 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	212 ug/g	ASTM D5600
Magnesium, Mg	411 ug/g	ASTM D5600
Barium, Ba	8 ug/g	ASTM D5600
Strontium, Sr	5 ug/g	ASTM D5600
Phosphorus, P	466 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	2 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Knots & Shives	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716786-007

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		29	
% Total Moisture	[ASTM D4442(METHOD A)]	61.59		
% Ash	[ASTM D1102]	3.26	8.48	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	2940	7655	8364
% Volatile Matter	[ASTM D3175]	28.31	73.71	
% Fixed Carbon	[ASTM D3172(Calc)]	6.84	17.81	
% Sulfur	[ASTM D4239(METHOD C)]	0.14	0.36	
% Carbon	[ASTM D5373]	17.76	46.25	
% Hydrogen	[ASTM D5373]	2.20	5.74	
% Nitrogen	[ASTM D5373]	0.04	0.11	
% Oxygen	[ASTM D5373(Calc)]	15.01	39.06	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.03	0.09	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	2 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	640 ug/g	ASTM D5600
Potassium, K	52 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	107 ug/g	ASTM D5600
Magnesium, Mg	318 ug/g	ASTM D5600
Barium , Ba	<1 ug/g	ASTM D5600
Strontium, Sr	2 ug/g	ASTM D5600
Phosphorus, P	10 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Processed Butt Cuts	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-006

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	31.52		
% Ash	[ASTM D1102]	0.33	0.48	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5708	8336	8376
% Volatile Matter	[ASTM D3175]	57.01	83.25	
% Fixed Carbon	[ASTM D3172(Calc)]	11.14	16.27	
% Sulfur	[ASTM D4239(METHOD C)]	0.01	0.01	
% Carbon	[ASTM D5373]	35.37	51.65	
% Hydrogen	[ASTM D5373]	4.18	6.10	
% Nitrogen	[ASTM D5373]	0.13	0.19	
% Oxygen	[ASTM D5373(Calc)]	28.46	41.57	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.02	0.03	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	26 ug/g	ASTM D5600
Potassium, K	126 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	41 ug/g	ASTM D5600
Magnesium, Mg	117 ug/g	ASTM D5600
Barium , Ba	2 ug/g	ASTM D5600
Strontium, Sr	2 ug/g	ASTM D5600
Phosphorus, P	22 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

DAHLMAN
FILTER TECHNOLOGY

Technical Information Paper *OLGA Technology*

OLGA Tar Removal

- Biomass gasification to electricity and more.. –

Revision spring 2008

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Ministry of Economic Affairs

The tests in Petten & Moissannes were partly funded by the Dutch ministry of Economic affairs, specifically by ERS (Energy Research Subsidy)

DAHLMAN
FILTER TECHNOLOGY

Note: The information below reflects proposed operation of the Tallahassee Renewable Energy Center project.

1 Gas Purification Overview

Purification of product gas is an important aspect of operation for the Tallahassee Renewable Energy Center project. The gas purification steps that are necessary and how efficient they should be are dependent upon:

1 Feedstock (e.g. biomass) and its chemical components
2 Gasification technology & operational conditions of the gasifier
3 The application and downstream equipment; how clean should the gas be?

In general, we can identify the following gas treatment steps, summarized in their most logical order

- Particulate removal
  -Cyclones, filters, electrostatic filters
- Removal of organic impurities
  -Tar removal is the most important: OLGA
- Removal of inorganic impurities
  - Removal of nitrogen, halogens (mainly NH_3 and HCl) and low quantities of sulfur (H_2S), by scrubber (water) technology
- Sulfur removal (H2S) by a caustic polishing step
- Removal of volatile (alkali / heavy) metals (e.g. mercury)
  - Mercuric sulfide removed as particulate in the water scrubber; vapor phase mercuric compounds removed in a caustic polishing step.

In general, we can say that the particulates and tars are produced by the gasifier. Gasifier type and operation determine the concentration and composition. OLGA combines the particulate and tar removal and is thus always a close match with the gasifier.

2 Tar Removal From Biomass Product Gas

The presence of tars in the biomass product gas is seen as the biggest issue in its smooth commercial application as a source of sustainable energy. Tar is formed in the gasifier and comprises a wide spectrum of organic compounds, generally consisting of several aromatic rings. The tar concentration

and composition is mostly determined by gasifier type and operation. Simplified tars can be distinguished as "heavy tars" and "light tars":

Heavy tars

Heavy tars condense out as the gas temperature drops and cause major fouling, efficiency loss and unscheduled plant stops. The tar dew point is a critical factor.

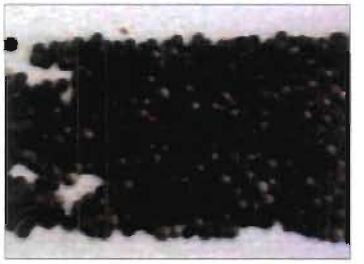


Figure 2.1, 2.2 & 2.3. Heavy tar fouls equipment, left to right:
a water scrubber grid, soot formation on catalyst & a gas engine intercooler

Light tars

Light tars, like phenol or naphthalene, have limited influence on the tar dew point, but are not less of an issue. Light heterocyclic tars, like phenol, are very water soluble. These tars will be easily absorbed into water and chemically affect the bleed water of downstream condensers and aqueous scrubbers. Purification of this water is very cost- intensive and will jeopardize the plant's economic feasibility. Naphthalene is important, as it is known to crystallize at the inlet of gas engines causing a high service demand.

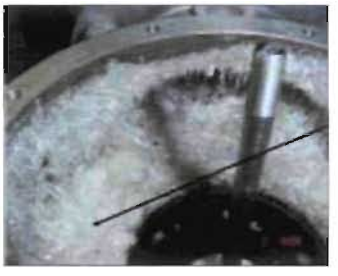


Figure 2.4 & 2.5: light tar fouls equipment & seriously contaminates condense water,
Left- a gas engine control valve fouled with naphthalene crystals
Right- contaminated condense water samples

Tar defined

A well accepted definition states that tars are all organic compounds with a molecular weight bigger than benzene. BTX (benzene, toluene and xylene) are components which are not considered to be as important, as they are not likely to influence the tar dew point nor to affect waste water treatment. A better and more detailed tar description is given by the classification of tars (see Appendix A).

The tar dew point, a critical parameter

The lowest temperature in the process is determined by downstream equipment and the application of the product gas. As typical tar dew points are between 150°C and 350 °C, and the lowest process temperature is typically 30-40 °C, tar condensation and tar issues are inevitable. It is important to realize that the actual tar concentration is not the most important parameter. It is the tar dew point which defines the point at which tars start to be a concern. One of the most important goals for the OLGA technology is to lower the tar dew point to a level at which such concerns can be excluded.

3 OLGA's Gas Cleaning Process

To introduce you to the OLGA technology, it is important to first show its position in a generic line-up of an integrated air blown gasification system with a gas engine for combined heat & power (CHP) production:

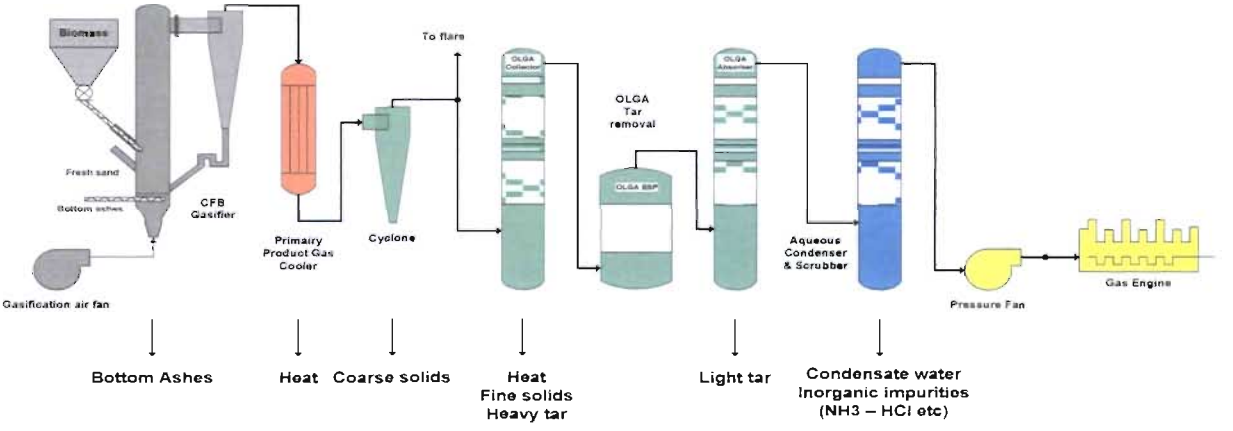


Figure 2.6 Generic line up

Product gas cleaning can be split into the following logical steps:

1. **Solids/dust removal**
2. **Removal of organic impurities (tar)**
3. **Removal of inorganic impurities (e.g., NH_3, HCl, H_2S)**

Product gas produced by the gasifier contains solids (dust), tars and inorganic impurities (depending on biomass feedstock). It is very important to consider the logical order for cleaning the product gas. In principle, mixing dust, tar and water is to be avoided.

Dust removal with OLGA

Solid particles (dust) can be separated from the product gas upstream OLGA by a cyclone or a hot gas filter (HGF). It is best to separate the dust first, as dust can be removed at a temperature in which water and tars are not present (>400 C). For the Tallahassee Renewable Energy Center project, it was decided to remove the coarse particles with a cyclone. The fine particles which pass this cyclone are captured by the Collector column and the ESP. A very high efficiency on particle capture can be ensured.

Removal of Organic Impurities

The philosophy of OLGA is based on dew point control. Tars have to be removed above the water dew point to a level at which the tar situation cannot occur in downstream equipment (minimal process temperature > tar dew point). In the figure below, the tar and water dew points are shown, together with the logical process steps.

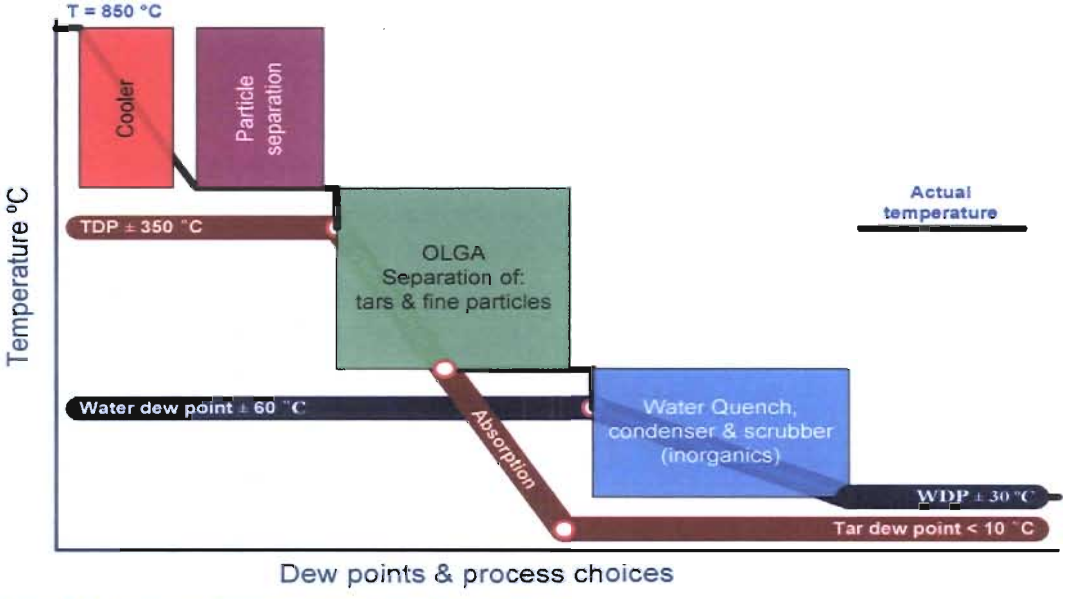


Figure 2.7 Dew points are important for equipment selection

Logical equipment with typical temperatures:

1. Product gas cooler; gasifier exit 700-900 °C– OLGA inlet 380 °C
2. Separation of solids; 380 °C
   - coarse solids by a cyclone (OLGA for fine solid aerosols)
   - all solids by a hot gas filter
3. OLGA tar separation; inlet 380 °C outlet 70-90 °C (safe above water dew point)
4. Water condenser; 70-90 °C to 30 °C
5. Water scrubber; 30 °C

OLGA operates above the water dew point, but decreases the tar dew point to a level under the lowest process temperature. Tar and water are not mixed. The tar removal principle of OLGA is based on a multiple stage scrubber in which the gas is cleaned by special scrubbing oil. In the first section of OLGA (the Collector) the gas is gently cooled down by the scrubbing oil. Heavy tar condenses, is collected, and is separated from the scrubbing oil. The heavy tar condensate, together with the fine solids, is recycled to the gasifier as a liquid. In the second stage (the Absorber / Stripper) lighter gaseous tars are absorbed by the scrubbing oil resulting in a product gas practically free from tars and solids.

In the absorber column, the scrubbing oil is saturated by these lighter tars. This saturated oil is regenerated in a stripper. Hot air is used to strip the tars of the scrubbing oil. This air, loaded with light tars, is recycled to the gasifier for combusting and as a fluidization medium. Hence, the stripper column design is not only based upon tar removal, but also upon the amount of air that can be used by the gasifier.

All heavy and light tars can be recycled to the gasifier where they are destructed and contribute to the overall energy efficiency. Tar waste streams are efficiently recycled this way.

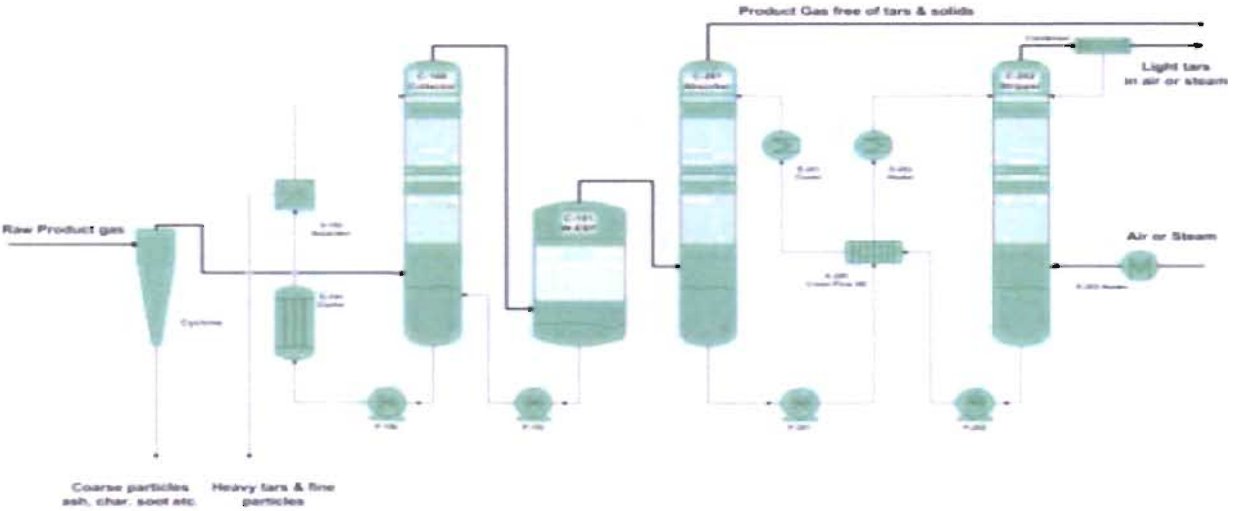


Figure 2.8 Simplified Process Flow Diagram of OLGA

Aqueous Scrubbers, Condensers and Caustic Polishing Downstream of OLGA

When gas is free of tar, an aqueous scrubber column can be operated more efficiently. This aqueous scrubber is normally used for:

1. Cooling the gas by quenching;
2. Further cooling of the gas and removal of the bulk of the water vapor by condensation;
3. Removal of water soluble components like NH_3, HCl, H_2S, if applicable.

The inorganic scrubber system is built as one column which is split into two sections. In section one, the gas will enter the column at the bottom and is scrubbed with cooling water. A large part of the water in the gas will condense and NH3 and HCl will dissolve in the water and be removed from the gas. Also, part of the H2S will dissolve in the water, but not enough to meet the gas turbine specification. Therefore, the inorganic scrubber system is executed with a second section. In this section, the remaining H2S is removed by a caustic polishing step. Diluted sodium hydroxide is the preferred caustic for this use. There is an additional separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H2S by reaction with the caustic, making sodium sulfide.

The following paragraphs provide more detail on the chemistry of mercury within the process and its removal from the system. When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water. The removal level in such a system of mercury is probably low, due to the insolubility of mercury in the water, but the elemental mercury reacts with the H2S present to make mercuric sulfide, and drops out as a particulate in the main recirculating water loop. The recirculating loop of caustic soda solution with sulfides in it provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10-35. Thus, all of the remaining mercury will likely be removed here, since the S- ion concentration should be much higher here rather than in the main recirculating water loop.

This is the approach used at mercury cell caustic chlorine plants for removing any traces (i.e., ppt) of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S- ions, and the precipitated mercuric sulphide is filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

Summarized Advantages of OLGA

The principal advantage of OLGA is that it offers a reliable and sensible solution for the tar problem. The advantages can be summarised as follows:

- Minimal tar related problems
  - Increased system stability and availability
  - Minimization of waste water treatment costs
  - No tar waste streams
- Better gas quality compared to a thermal tar cracker
- More reliable and less vulnerable than a catalytic tar cracker
- No waste water impacts as with tar removal in an aqueous scrubber

Appendix A: Tar Classification system

According to the ECN definition, tar comprises all organic components having a molecular weight higher than benzene. Benzene is not considered to be a tar. ECN uses a tar classification system comprising six classes (see Table B.1). This classification system is in particular developed to provide 'easy' insight in the general composition of tar. Trends are easier recognised on the basis of these classes. However, for more specific problems or issues the detailed data will remain necessary.

Class	Type	Examples
1	GC undetectable tars.	Biomass fragments, heaviest tars (pitch)
2	Heterocyclic compounds. These are components that generally exhibit high water solubility.	Phenol, cresol, quinoline, pyridine
3	Aromatic components. Light hydrocarbons, which are important from the point view of tar reaction pathways, but not in particular towards condensation and solubility.	Toluene, xylenes, ethylbenzene (excluding benzene)
4	Light poly aromatic hydrocarbons (2-3 rings PAHs). These components condense at relatively high concentrations and intermediate temperatures.	Naphthalene, indene, biphenyl, antracene
5	Heavy poly aromatic hydrocarbons (≥4-rings PAHs). These components condense at relatively high temperature at low concentrations.	Fluoranthene, pyrene, crysene
6	GC detectable, not identified compounds.	Unknowns

Table B.1: Tar classification system

From the practical viewpoint, the classification comprises only tar components that can be measured. Classes 2 to 6 are sampled using the solid phase adsorption (SPA) method and measured by gas chromatography (GC). Although class 6 tars are sampled and measured (a peak is found in the chromatogram), it is unknown what the individual components are. In principle components in this class belong to the other classes, but are here lumped to a single concentration representing the 'unknowns'. Class 1 represents the heavy tar fraction (roughly ≥7-ring PAHs). These components cannot be determined by the combination of SPA and GC. The components are measured by weight and thus represent the gravimetric tars.

Appendix B: OLGA vs. other tar removal systems

Tars from biomass product gases can be removed with a thermal tar cracker, a catalytic tar cracker or a physical process. The thermal and catalytic tar cracker are installed directly downstream the gasifier and operate at high temperature. The physical processes like an aqueous scrubber or OLGA are installed downstream a product gas cooler. The inlet temperature of a tar cracker is typically 850°C and of a physical process 400°C.

Thermal tar cracking

A thermal tar cracker heats up the product gas to a temperature of 1200°C. At this temperature the tars are removed almost completely leading to a very low tar concentration (<100 mg/m_n^3) and tar dew point (<10°C). The disadvantage of this application of a thermal cracker is the reduction in efficiency. To increase the temperature of the product gas a part of the product gas is combusted with oxygen. Consequently, the system efficiency (biomass to electricity) is reduced as well as the calorific value of the product gas. The reduction in calorific value makes the application of the product gas from a direct air blown gasifier in a gas engine difficult.

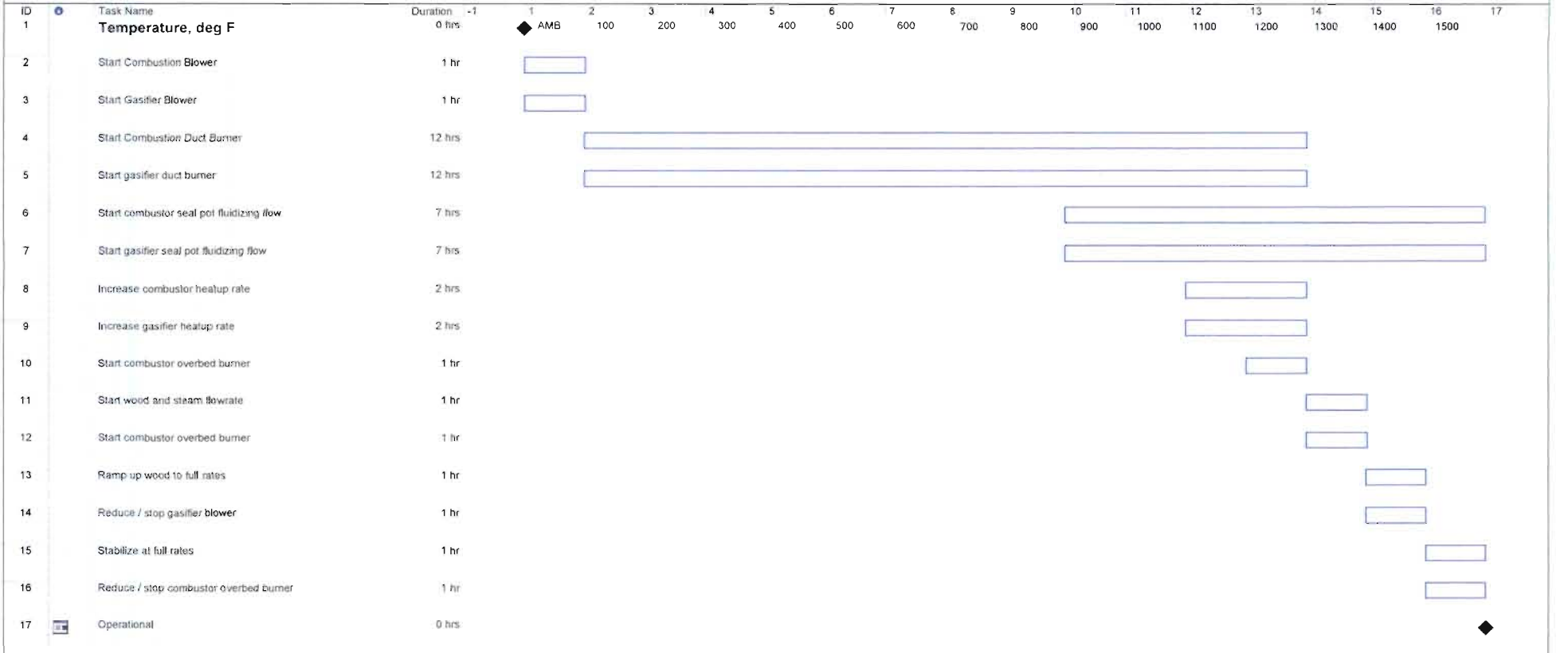
Catalytic tar cracking

A catalytic tar cracker does not heat up the product gas and thus eliminates the disadvantages of a thermal cracker. In theory the tar removal efficiency can be complete. However, soot formation and deactivation of the catalyst is a serious problem to be dealt with, resulting in limitations in the process. At the moment, the tar concentration at the inlet of the cracker should remain below 2 g/m_n^3 and the presence of alkali metals and sulphur should be controlled. Several projects have shown that a catalytic tar cracker can be a vulnerable part of the system. Bad tar removal by e.g. catalyst deactivation directly leads to heavy tar problems downstream. In principle the tar removal efficiency is less compared with a thermal cracker but good enough for the application of the product gas in a gas engine.

Tar removal by aqueous scrubbers

Aqueous tar removal systems cool down the product gas and remove the tars by condensation. In most aqueous systems dust and tars are collected simultaneously. The product gas is cooled down and aerosols of dust and tars are collected with a wet ESP downstream. Some systems use a dry hot gas filter (HGF) upstream for dust removal instead of a wet ESP. The HGF reduces the risk of fouling of the aqueous system with dust. The tar dew point downstream an aqueous system is similar to or higher than the operating temperature of the system. Therefore, the total tar content downstream an aqueous system can exceed 1 g/m_n^3. To avoid tar condensation and fouling of piping the gas should not cool down. In the aqueous scrubber system a tar/water problem is created. Mixing (heavy) tars with water will lead to operational difficulties in the scrubber and huge maintenance costs. The most important disadvantage is formed by waste water handling. Waste water handling is often so expensive that the plants economical feasibility is at stake.

Preliminary
Gasifier Start-Up Schedule



Project: Master BG&E Shell_r
Date: January 8, 2008

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Walker, Elizabeth (AIR)

From: gfarris [glenn@biggreenenergy.com]
Sent: Thursday, June 19, 2008 10:07 AM
To: 'Angela Morrison Uhland'
Cc: Vielhauer, Trina
Subject: RE: BG&E Air Permit - Proof of Publication of Public Notice
Attachments: Tallahassee Air Permit Publication.pdf

Angela,

Thanks for the heads up.

Trina,

please find the proof of publication notice attached.

Glenn

S. Glenn Farris
President & CEO
Biomass Gas & Electric, LLC
770-662-0256
www.biggreenenergy.com

From: Angela Morrison Uhland [mailto:AngelaM@hgslaw.com]
Sent: Thursday, June 19, 2008 9:34 AM
To: Glenn Farris; Sue Lafleur
Subject: BG&E Air Permit - Proof of Publication of Public Notice

Glenn and Sue:

I saw the legal notice regarding the filing of the air permit application for the Tallahassee Renewable Energy Center in the Tallahassee Democrat. We must file a "proof of publication" with the Department. This is supposed to be filed with the Department within 7 days of publication, so if you have not already submitted this to the Department, we should do so now. It can be sent to Trina Vielhauer. If you have any questions or would like my assistance, please let me know.

Thanks,

Angela

Angela Morrison Uhland
Hopping Green & Sams, P.A. | *Attorneys and Counselors* | P.O. Box 6526 | Tallahassee, FL 32314 |
www.hgslaw.com
850.425.2258 | 850.224.8551 (fax) | auhland@hgslaw.com | Legal Assistant: Melanie Gilbert
| mgilbert@hgslaw.com

RECEIVED JUN 16 2008

TALLAHASSEE DEMOCRAT
PUBLISHED DAILY
TALLAHASSEE-LEON-FLORIDA

~~RECEIVED JUN 6 1 2008~~

STATE OF FLORIDA COUNTY OF LEON:
Before the undersigned authority personally appeared Daniel Serrano, who on oath says that he is a Legal Advertising Representative of the Tallahassee Democrat, a daily newspaper published at Tallahassee in Leon County, Florida; that the attached copy of advertising being a Legal Ad in the matter of

NOTICE OF APPLICATION

in the Second Judicial Circuit Court was published in said newspaper in the issues of:

JUNE 8, 2008

Affiant further says that the said Tallahassee Democrat is a newspaper published at Tallahassee, in the said Leon County, Florida, and that the said newspaper has heretofore been continuously published in said Leon County, Florida each day and has been entered as second class mail matter at the post office in Tallahassee, in said Leon County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she has never paid nor promised any person, firm or coporation any discount, rebate, commission or refund for the purpose of securing this publication in the said newspaper.

DANIEL SERRANO
LEGAL ADVERTISING REPRESENTATIVE
Sworn To or Affirmed and Subscribed Before Me.
This 10 Day of July 2008, by
Daniel Serrano,
Personally Known ✓
OR Produced Identification
Type of Identification Produced

(SEAL) Notary Public
State of Florida
County of Leon

RACHEL VICKERS
Commission DD 685817
Expires August 28, 2011
Bonded Thru Troy Fain-Insurance 800-385-7019

1 Legal Notices 1 Legal Notices 1 Legal Notices

NOTICE OF APPLICATION
STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEP File No.0730109-001-AC
Biomass Gas & Electric (BG&E) of Tallahassee, L.L.C
Tallahassee Renewable Energy Center
Leon County

The Department of Environmental Protection announces receipt of an application for an air construction permit from Biomass Gas & Electric (BG&E) of Tallahassee, L.L.C. The project is to construct the Tallahassee Renewable Energy Center to be located on the Florida State University (FSU) campus adjacent to Roberts Avenue and Lipona Road in Tallahassee, Leon County. The application was received on April 3, 2008. The requested permit is for one nominal 42 megawatt woody biomass (including some yard clippings) gasification electrical generation facility. The Energy Center will consist of the gasification unit, two combustion turbines (CT), two heat recovery steam generators (HRSG), one steam electric generator (SEG), and associated facilities.
This application is under review for completeness by the Bureau of Air Regulation in Tallahassee. Key portions of the application and additional information can be accessed at the Department's website at:
http://www.dep.state.fl us/Air/permitting/construction/tallahassee.htm
The application is also available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following

Department office:
Department of Environmental Protection
Bureau of Air Regulation
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32399-2400
Telephone: 850/488-0114
Fax: 850/921-9533.

JUNE 8, 2008

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Tuesday, June 10, 2008 1:07 PM
To: Read, David
Subject: FW: Hg in Forest Understory

It struck me that your estimate of potential mercury emissions from combustion of wood waste (even though the BG&E project is not combustion, but gasification of the feedstock) seemed high. I had one of Golder's engineers review your calculation, with the same assumptions. He came up with a value of 103 grams per year (0.23 lb/yr), not 123 lb/yr.

We're working on our final responses to the Department's RAI and will be in contact shortly.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | **D:** +1 (813) 769-5304 | **F:** +1 (813) 287-1716 | **C:** +1 (727) 278-3358 | **E:** Scott_Osbourn@golder.com | **www.golder.com**

From: Cobb, Phil
Sent: Tuesday, June 10, 2008 12:09 PM
To: Osbourn, Scott
Subject: RE: Hg in Forest Understory

Scott,

If you do the unit analysis of that equation from David Read at the state, the result is grams/yr, not lb/yr. So his calculation overestimates the lb/yr emissions by a factor of 454 (the conversion of g to lb). The result of his calculation should be 103 g/yr, not 123 lb/yr. Let me know if there is anything else that I can help you with.

Phil

Philip Cobb (Ph.D., E.I.) | Staff Engineer | **Golder Associates Inc.**
6241 NW 23rd Street, Suite 500, Gainesville, Florida, USA 32653
T: +1 (352) 336-5600 | **D:** +1 352 336-5600 | **F:** +1 (352) 336-6603 | **E:** pcobb@golder.com | **www.golder.com**

From: Osbourn, Scott
Sent: Monday, June 09, 2008 6:57 PM

To: Cobb, Phil
Subject: FW: Hg in Forest Understory

Can you please do me a favor and double check this calculation by the DEP. This seems like an awful lot of mercury from gasification of wood waste. Charge to 073-89628-0100.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | D: +1 (813) 769-5304 | F: +1 (813) 287-1716 | C: +1 (727) 278-3358 | E: Scott_Osbourn@golder.com | **www.golder.com**

From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Wednesday, June 04, 2008 9:02 AM
To: Osbourn, Scott
Subject: Hg in Forest Understory

Scott attached is an article on the concentration of Hg in forest understory. The range that is given is 14 to 71 nanograms per gram of fuel. An approximation of possible Hg emissions from BG&E (assuming 1% of the fuel is understory*) is:

(730 tpd fuel) x (0.01 tons understory/tons fuel) x (2000 lbs/ton) x (454 grams/lb) x (((14 + 71)/2) x 10^{-9} grams Hg/grams fuel) x (365 days/yr) = **123 lbs Hg per year.**

This rough calculation shows why it is important to know exactly what the definition of woody biomass is. If it is solely chipped tree trunks then Hg emissions will probably be minimal, but if only a little bit of understory is included Hg emissions **may** be significant.

* Foliage and ground litter, not tree trunks

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

Walker, Elizabeth (AIR)

From: Read, David
Sent: Monday, July 21, 2008 1:05 PM
To: Walker, Elizabeth (AIR)
Subject: FW: public notice
Attachments: BG&E_App_Notice.pdf

FYI

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

From: Read, David
Sent: Monday, June 02, 2008 4:12 PM
To: 'Osbourn, Scott'
Subject: RE: public notice

My bad! Here is a revised, revised copy.

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

From: Osbourn, Scott [mailto:Scott_Osbourn@golder.com]
Sent: Monday, June 02, 2008 4:07 PM
To: Read, David
Subject: RE: public notice

I hate to be picky—I noted that you made the change in the title but not in the 2nd line of the text.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | **D:** +1 (813) 769-5304 | **F:** +1 (813) 287-1716 | **C:** +1 (727) 278-3358 | **E:** Scott_Osbourn@golder.com | **www.golder.com**

From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Monday, June 02, 2008 3:12 PM
To: Osbourn, Scott
Subject: public notice

Scott attached is the revised public notice for BG&E with the correct company name.

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

NOTICE OF APPLICATION

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No.0730109-001-AC

Biomass Gas & Electric (BG&E) of Tallahassee, L.L.C
Tallahassee Renewable Energy Center
Leon County

The Department of Environmental Protection announces receipt of an application for an air construction permit from Biomass Gas & Electric (BG&E) of Tallahassee, L.L.C. The project is to construct the Tallahassee Renewable Energy Center to be located on the Florida State University (FSU) campus adjacent to Roberts Avenue and Lipona Road in Tallahassee, Leon County. The application was received on April 3, 2008. The requested permit is for one nominal 42 megawatt woody biomass (including some yard clippings) gasification electrical generation facility. The Energy Center will consist of the gasification unit, two combustion turbines (CT), two heat recovery steam generators (HRSG), one steam electric generator (SEG), and associated facilities.

This application is under review for completeness by the Bureau of Air Regulation in Tallahassee. Key portions of the application and additional information can be accessed at the Department's website at:

http://www.dep.state.fl.us/Air/permitting/construction/tallahassee.htm

The application is also available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following Department office:

Department of Environmental Protection
Bureau of Air Regulation
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32399-2400
Telephone: 850/488-0114
Fax: 850/921-9533.

Walker, Elizabeth (AIR)

From: Vielhauer, Trina
Sent: Monday, June 02, 2008 12:05 PM
To: 'virginia@wetherellconsulting.com'
Cc: Kahn, Joseph
Subject: RE: meeting

Ginger,

Just a quick update. I left a voicemail for Scott late Friday and my lead engineer has emailed and telephoned him today to set up a 3:00 meeting. We haven't heard anything back yet nor received a fax (Scott had indicated that would be forthcoming). Anyway- I just wanted you to know we're trying to fit this in before folks are out this week but so far we haven't received a response.

Take care,

Trina

-----Original Message-----
From: virginia@wetherellconsulting.com [mailto:virginia@wetherellconsulting.com]
Sent: Friday, May 30, 2008 5:11 PM
To: Vielhauer, Trina
Subject: meeting

Hi Trina---Thanks so much for your time today and the excellent progress---I really appreciate it. Scott Osbourn will try to get on your calendar for Monday as we discussed to go over the responses to your questions. I think you and Joe outlined a time line that can work and we will do our part in getting information to you as committed. Regards, Ginger

Walker, Elizabeth (AIR)

From: Read, David
Sent: Monday, July 21, 2008 1:05 PM
To: Walker, Elizabeth (AIR)
Subject: FW: public notice
Attachments: BG&E_App_Notice.pdf

FYI

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

From: Read, David
Sent: Monday, June 02, 2008 4:12 PM
To: 'Osbourn, Scott'
Subject: RE: public notice

My bad! Here is a revised, revised copy.

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

From: Osbourn, Scott [mailto:Scott_Osbourn@golder.com]
Sent: Monday, June 02, 2008 4:07 PM
To: Read, David
Subject: RE: public notice

I hate to be picky—I noted that you made the change in the title but not in the 2nd line of the text.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | D: +1 (813) 769-5304 | F: +1 (813) 287-1716 | C: +1 (727) 278-3358 | E: Scott_Osbourn@golder.com | **www.golder.com**

From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Monday, June 02, 2008 3:12 PM
To: Osbourn, Scott
Subject: public notice

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David Lyle Read
Engineering Specialist II
Special Projects Section
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Ph: 850-414-7268 or David.Read@dep.state.fl.us

NOTICE OF APPLICATION

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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111 South Magnolia Drive, Suite 4
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Telephone: 850/488-0114
Fax: 850/921-9533.

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Monday, June 02, 2008 12:40 PM
To: Read, David
Cc: Vielhauer, Trina; Angela Morrison Uhland; virginia@wetherellconsulting.com; Glenn Farris
Subject: RE: RAI meeting
Attachments: RAI Response rev1.doc; Startup Schedule.pdf; Gas Cleaning PFD for air permit.pdf

As we discussed, please find attached a DRAFT of our response to the Department's request for additional information. I look forward to our discussions at 2:30 PM today.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Monday, June 02, 2008 10:26 AM
To: Osbourn, Scott
Cc: Vielhauer, Trina
Subject: RAI meeting

Scott Trina asked me to contact you to see if you still plan on faxing us the response to the RAI for BG&E today so we can discuss it by phone at 3:00 pm. We will need the response a couple of hours before the meeting so when can give it a quick review. I will also try to contact you by phone on this issue.

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

Golder Associates Inc.
5100 West Lemon Street
Suite 114
Tampa, FL USA 33609
Telephone: (813) 287-1717
Fax: (813) 287-1716

June 2, 2007 07389628

Florida Department of Environmental Protection
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Attention: Mr. A. A. Linero

RE: RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
BIOMASS GAS AND ELECTRIC; FACILITY ID NO. 0730109

Dear Mr. Linero:

This letter is in response to your request for additional information regarding the Air Construction Permit application submitted by Golder Associates Inc. on behalf of Biomass Gas and Electric (BG&E) on April 3, 2008.

1. Material Handling. In the application, it is indicated that the wood fuel feedstock will be processed off-site and shipped by train to the facility location. The exact composition of the wood feedstock is not provided. Will the feedstock contain understory materials such as detritus material from the floor of forest areas and leaves and small branches or will it consist solely of chipped to size wood chunks from tree trunks? Detritus materials and leaves may contain mercury from dry and wet deposition which could affect the mercury emission estimates. [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. Deleterious material such as nails, glass and metal will be removed for landfill disposal. 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. While mercury should be at very low levels in the biomass feedstock to the gasifier, the disposition and control of any mercury that might be present is discussed in the response to Comment No. 6 in this letter.

2. Startups/Shutdowns. In the application, it is estimated that there will be a total of 6 startups of the gasifier system per year. There is no request of provisions in the permit for additional startups for shakedowns during the initial operation of the facility. Does BG&E actually anticipate that the facility will not require additional startups and shutdowns of the gasifier system during the first year of the facility's operation? [Rule 62-4.070, F.A.C. Reasonable Assurance]

   Response-- During initial operations, there will be a larger number of startups and shutdowns than the 6 anticipated after the startup and shakedown period. The 6 is based on annual operations after the shakedown period.

In addition, there is a major difference between a cold startup, which takes at least 18 hours, and a hot startup, which can take from as little as a few minutes to several hours. For definition purposes, hot startups are defined as ones where the gasifier is over 1,000 ^{0}F when the startup occurs.

At another gasification facility, the Burlington facility, there were approximately 22 cold startups/shutdowns during the first year of operation. By 2001, this number had dropped to 7. Cold startups involve a transition period during the change from air-fired operation to pyrolysis, where smoke can be produced during the change from excess oxygen combustion to sub-stoichiometric oxygen combustion, and finally to pyrolysis. This period of operation at the flare has an expected initial duration of up to 30 minutes for cold startups. One of the operational objectives of the Tallahassee plant is to reduce the length of the cold startup transition to a minimum, with a target of 10 minutes achieved after the first year of operation. Flare design to help minimize sub-stoichiometric conditions during burnoff are a part of the preliminary engineering design effort, with the objective of minimizing smoke production during the sub-stoichiometric transition.

Emissions from hot startups are minimal, since the wood still pyrolyzes at temperature, with low tar formation. During an electrical trip, gas production tapers off over about three minutes to a zero flow. The gas is flared during this period. Since the gas varies in composition rapidly during this three minute period, there will be events of a few seconds duration where the flared gas may transition through a substoichiometric range and produce smoke.

Therefore, in response to the Department's comment, BG&E would like to request the flexibility for as many as 22 startup/shutdowns during initial operation, until an average of no more than 6 startup/shutdowns would be required annually.

3. Volatile Organic Compounds (VOC) and Sulfur Dioxide (SO_2) Emissions during Shutdowns. On pages 12 to 15 of the application, emission estimates are provided for nitrogen oxides (NOx) and particulate matter (PM) during shutdowns, while none are given for VOC and SOx based on the argument that these emissions from the turbines are already low. What are the anticipated emissions of these pollutants during shutdowns? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- As previously stated, emissions during shutdown are anticipated to be low. Emission estimates were provided for NOx (0.05 tons per year or TPY) and PM (0.0005 TPY) based on material balance and AP-42 emission factors. Attached are estimates for VOC and SO2, which also rely on AP-42 emission factors.[These will be provided by BG&E]

4. Startup and Shutdown Procedures. In Section 2.2.1 of the application, the startup and shutdown modes and procedures for the gasifier/power block are briefly described with the caveat that full descriptions of the procedures are not provided due to their proprietary nature. To effectively assess the proposed durations and associated emissions involved during the startup and shutdown of the gasifier/power block of the facility, the Department requires a full description of the procedures. Please indicate which submitted documents are considered proprietary. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The full description of the startup/shutdown procedure, which SilvaGas has currently developed, was included in the air application. SilvaGas has also developed a preliminary gasifier startup schedule (see attached Figure 1), consistent with the cold startup duration described in the response to Comment No. 2 above. A more detailed procedure is anticipated, but only as part of the Operating Manual for the plant. This will not be developed until the detailed design phase of the engineering effort. It is not BG&E's intent to claim these procedures as proprietary, the issue is that these formalized procedures do not yet exist. The proposed project is not a conventional power plant, where an operating manual of this type may be available off the shelf.

5. Refractory Life. If the facility only requires 6 startups per year what is the anticipated life of the gasifier refractory? If additional startups are required, especially during the initial operation of the facility, how is the life of the refractory affected? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The refractory life varies substantially, depending on the location of the refractory in the vessel. SilvaGas obtained a patent on installing tees instead of elbows at 90 degree flow direction changes, in order to reduce the erosion rate at the ells (i.e., the critical point of circulation between the gasifier and the combustor). Improved materials suggest that the life of the refractory in straight sections of the vessels and ductwork will be approximately 5 years, although there are examples in similar services where the refractory has lasted in excess of 30 years. The worst case found at Burlington was for a vent pipe off a seal pot which had a gas velocity of 400 feet per second. This refractory lasted only two weeks, but was an isolated case compounded by design error.

Our cyclone vendors suggest an upper limit on gas flow velocity to minimize refractory wear in the cyclone impact zones. Hard facing of exotic materials such as silicon or tungsten carbide plates are planned for the worst impact zones. SilvaGas currently is using advanced computational fluid dynamics software which can predict erosion locations and wear rates. One of the ongoing maintenance programs for the Tallahassee plant is to verify and calibrate the computer prediction of refractory erosion locations and wear rates.

Startups and shutdown affect refractory life only if the heatup and cooldown rates result in thermal expansion-based stresses. The maximum heatup and cooldown rates for the Tallahassee plant are based on Burlington rates which successfully prevented thermal stress induced cracks. An additional factor is the refractory anchoring spacing and design. BG&E is working closely with our original refractory vendor, based out of Tampa, to provide the correct anchor spacing and design.

6. Syngas Cleanup. In Section 2.1.3 of the application, the syngas cleanup system proposed for the project is discussed. However, very few details of the proposed system are given. In previous meetings between the Department and BG&E, it was indicated by BG&E that the syngas cleanup system will be provided by Dahlman Filter Technology. Based on research done by the Department, the technology provided by Dahlman principally involves the removal of tar compounds from the syngas stream utilizing an oil wash. Details on the removal of other pollutants of concern (particulates, inorganic impurities such as sulfur compounds and volatile metals) were not available from research or in the application. Please provide to the Department a more detailed description of the syngas cleanup system proposed for the facility, including, if

available, process schematics, which will allow the Department to make a comprehensive technical evaluation of the gas cleanup system. If such information is deemed proprietary, please indicate on the submitted documents. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—A simplified process flow diagram of the product gas cleanup system has been obtained from Dahlman and is attached as Figure 2. As described in the following paragraphs, the gas cleanup system has no direct emissions to the atmosphere. Only condensate water leaves the closed system.

Further background on the gasifier is necessary in order to understand the operation of the gas cleanup system. The gasifier operates as a pyrolysis unit, under reducing conditions. For instance, organic sulfur and nitrogen in the feedstock are converted to H_2S and NH_3 in small amounts. In a similar fashion, it is expected that mercuric salts, methyl mercury organics or mercuric oxides would be reduced to elemental mercury, and be evaporated into the product gas. The wash oil scrubbers remove tars above the dew point of water, so the vapor pressure of the elemental mercury remains high, and at its very low concentration, it should all remain in the vapor phase. The same is true of the H_2S and NH_3.

When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water, according to calculations by Dahlman. The removal level in such a system of mercury is probably quite low, due to the insolubility of mercury in the water, but the elemental mercury probably reacts with the H_2S present to make mercuric sulfide, and drops out as a particulate in the main recirculating water loop. There is an additional separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H_2S by reaction with the caustic, making sodium sulfide.

This recirculating loop of caustic soda solution with sulfides in it provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10^{-35}. Thus, all of the remaining mercury should come out here, since the S^{-} ion concentration should be much higher here rather than in the main recirculating water loop.

This is the approach used as the mercury cell caustic chlorine plants for removing any ppt traces of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S^{-} ions, and the precipitated mercuric sulfide filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

The recirculating water at the water scrubber is blown down on a regular basis, where it is used in the cooling tower as part of the cooling tower makeup water. The design has not proceeded far enough yet to determine if this water needs filtration. Should detectable mercury concentrations be obtained in either this blowdown or the blowdown from the separate caustic cuirculating loop, then this could be filtered to remove the mercuric sulfide particulate.

Further, the combustor receives char and olivine from the gasifier at about 1,350 ^{0}F. At this temperature, and under the gasifier reducing conditions, mercury compounds would be separated out in the upstream cyclones as part of the product gas, described above. A negligible amount of mercury would enter the combustor, as there would be virtually no

mercury present in the char. However, if any mercury were present, it would likely remain in the ash bound as a non-volatile inorganic salt rather than be released as a vapor.

The vast majority of any mercury in the feedstock should end up in the makeup water from the water scrubber going to the cooling tower, and in particular, the blowdown from the separate caustic loop in the water scrubber which contains S ions. Routine sampling of this stream by filtration, and typically, an AA or similar analysis of the filter cake for mercury should determine if there is any need for further monitoring of mercury emissions.

7. Volatile Metal Emissions. As indicated in No. 6 above, no details are provided on how volatile metals, such as mercury, are going to be removed from the syngas. In the application, it is stated that the mercury concentration in the wood fuel is minimal and consequently expected mercury emissions are negligible. However, if this is not the case, does the syngas cleanup system utilize an activated carbon bed or something similar to control volatile metal emissions such as mercury? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—This comment is addressed above.

8. Duct Burner Firing. Based on the application, it appears that the duct burners will only fire syngas (product gas). Will natural gas ever be fired in the duct burners? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—Only product gas will be fired in the duct burners.

9. Emissions Averaging. In Table 3-2 of the application, emissions in ppm at 15 percent oxygen (O_2) of NO_X, carbon monoxide (CO), volatile organic compounds (VOC), and ammonia (NH3) appear to be given for annual stack testing requirements. Please provide Continuous Emissions Monitoring System (CEMS) 24 hour block average and 12 month rolling average estimates of CO emissions and 24 hour block average and 30 day rolling average estimates of NO_X, emissions when firing the combustion turbine and the combustion turbine in combination with the duct burners for the temperatures and loads cited in the table. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- BG&E's requested emission limits are provided in the attached table (this is to be provided in a later transmittal).

10. SO_2 Emissions. On page 19 of the application, it is stated that SO_2 emissions will be minimized through the utilization of natural gas during startups and the gas cleanup system on the product gas. Please provide estimates of the SO2 concentration in the product gas before and after cleanup. In addition, provide estimates of SO2 stack emissions when firing product gas for the same conditions described in No. 9 above. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—As stated earlier, the gasifier operates as a pyrolysis unit, under reducing conditions, converting organic sulfur in the feedstock to small amounts of H_2S. The H_2S is then reduced to acceptable levels in the gas cleanup system. SO_2 emissions would result from the residual level of H_2S in the product gas (after the gas cleanup system), which is fired in the combustion turbines and duct burners, or, in the event of a system malfunction, when the product gas is flared. (BG&E will provide a summary table of the H2S in the pre- and post-

gas cleanup scenarios, as well as the amount of SO2 that can be generated by firing in the CT/DB or by flaring).

11. Combustion Turbine and Duct Burner Emissions Estimates. When comparing the upper and lower portions of Table 3-2 of the application, the emissions of NO_X, CO, and VOC appear to be lower when firing the duct burners than when not, please clarify. In addition, pollutants and units given in the table are not defined nor is the basis for the different emission concentrations for the various pollutants. Please redo this table and resubmit to address these issues and generally provide a clear overview of the expected emissions for the project as a function of turbine load, ambient air temperature, and duct burner firing. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response— A subsequent discussion between Golder and David Read of the Department has cleared up some of the confusion associated with the emission table. Further, as stated in the response to Comment No. 9 above, BG&E has provided a tabular summary of the requested emission limits, including averaging times and methods of compliance (BG&E will provide in a separate transmittal).

Please do not hesitate to call should you require additional information.

Sincerely,

GOLDER ASSOCIATES INC.

Scott Osbourn, P.E.
Senior Consultant

Enclosures

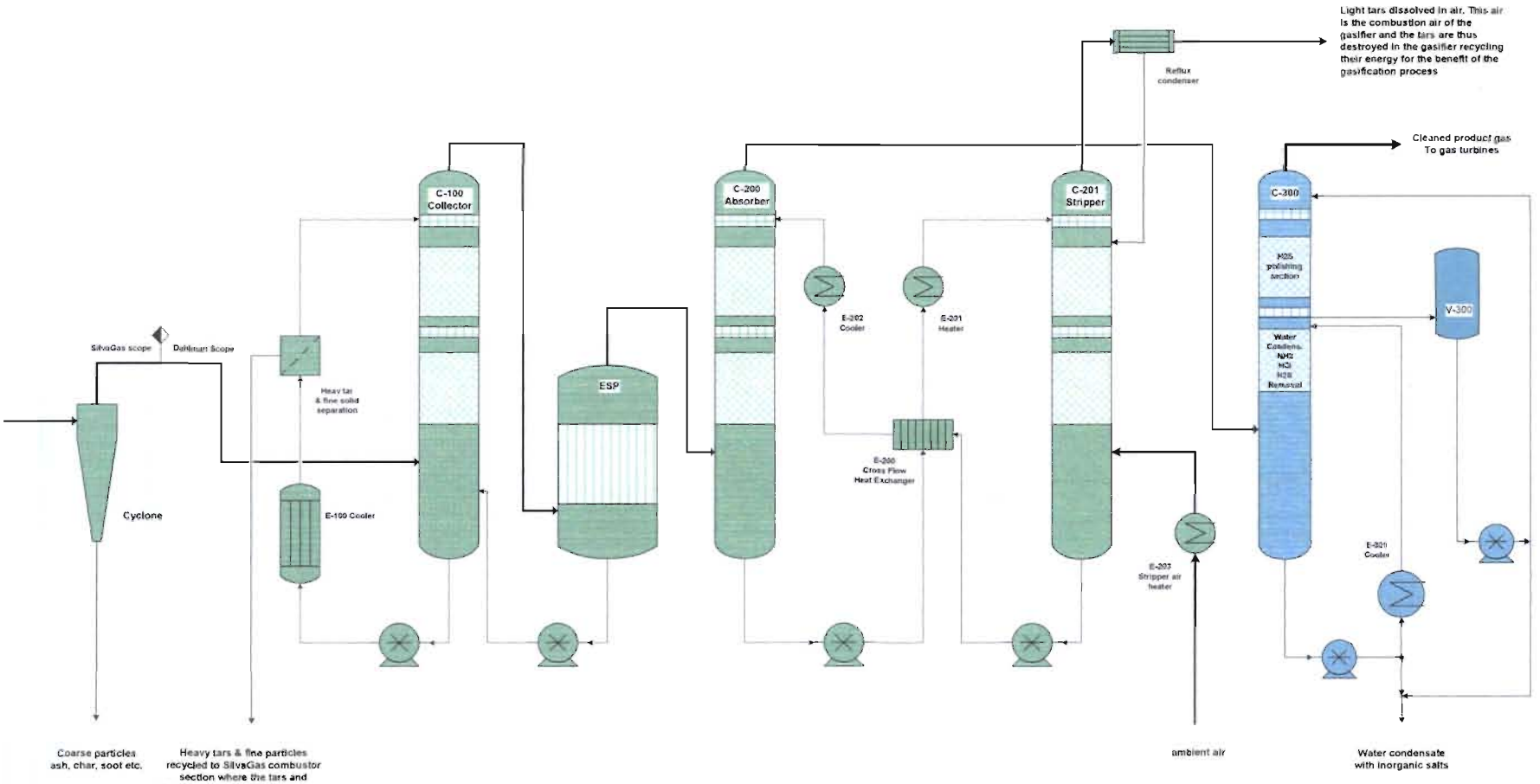
SO/dcg

H:\PROJECTS\2007proj\073-89628 BG&E Air and Noise Support\RAI Response\RAI Response.docx

Preliminary
Gasifier Start-Up Schedule

Project: Master BG&E Shell_r
Date: January 8, 2008

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline



drawn by JWK	date 09-05-2008	customer	Biomass Gas & Electric LLC Tallahassee project
checked by -	approved by -		
drawing no. -	revision 000 JWK 09-05-08	title	Simplyfied Process Flow Diagram,
drn.proj.	scale N.A.		DAHLMAN INDUSTRIAL PROJECTS
order no.	74.7.6060		

Dahlman Industrial Projects B.V.
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Phone: +31-10-5991114
Fax: +31-10-5991100
E-mail: dahlman@dahlman.nl
Internet: www.algaetechnology.com

Walker, Elizabeth (AIR)

From: Read, David
Sent: Friday, May 30, 2008 11:17 AM
To: Osbourn, Scott
Cc: Vielhauer, Trina; Walker, Elizabeth (AIR); Arif, Syed
Subject: Public Notice of BG&E Application
Attachments: BG&E_App_Notice.pdf

Scott attached is the Public Notice of an Application for the BG&E facility. The Public Notice shall be published one time only as soon as possible in the legal advertisement section of a newspaper (Tallahassee Democrat) of general circulation in the area affected by this project. Once published please send Elizabeth Walker (Elizabeth.Walker@dep.state.fl.us) proof of publication. Scott, if you have any questions please give me a call.

Have a great weekend.

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

NOTICE OF APPLICATION

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No.0730109-001-AC

Biomass Gas & Electric (BG&E)
Tallahassee Renewable Energy Center
Leon County

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111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32399-2400
Telephone: 850/488-0114
Fax: 850/921-9533.

Walker, Elizabeth (AIR)

From: Walker, Elizabeth (AIR)
Sent: Friday, May 30, 2008 11:45 AM
To: 'Forney.Kathleen@epamail.epa.gov'
Cc: Read, David
Subject: BG & E Bioenergy Project in Florida (EPA may be asked to comment - PLEASE READ!)

Katy,

David Read asked me to forward this application to you, in case you had not received it. EPA may be asked to comment on this project in the near future. I can forward a hard copy to you if you feel you need it, but links to the application and other documents are below included in this email.

ARMS PA Project ID:	0730109-001-AC
PSD	YES NO
Facility Name:	BG &E of Tallahassee
Project Description:	Construct Biomass Energy Plant
Permit Application Processor:	Al Linero/David Read
Processor Phone:	850/488-0114
Processor Email Address:	alvaro.linero@dep.state.fl.us / david.read@dep.state.fl.us
Received in-house:	April 3, 2008

Link to the scanned application: http://arm-permit2k.dep.state.fl.us/psd/0730109/00002D22.pdf
-or-
Link to documents posted to the NSR/Special Projects website for this project:
http://www.dep.state.fl.us/Air/permitting/construction/tallahassee.htm

If you have any questions, please don't hesitate to contact us.

Thanks!

Elizabeth Walker
Bureau of Air Regulation
Division of Air Resource Management (DARM)
(850)921-9505

Walker, Elizabeth (AIR)

From: virginia@wetherellconsulting.com
Sent: Friday, May 30, 2008 10:45 PM
To: Vielhauer@up1.dep.state.fl.us; Vielhauer, Trina
Subject: Re: meeting

Great----Thanks

-----Original message-----
From: "Vielhauer, Trina" Trina.Vielhauer@dep.state.fl.us
Date: Fri, 30 May 2008 18:22:35 -0400
To: virginia@wetherellconsulting.com
Subject: Re: meeting

> Absolutely. My pleasure. Scott and I traded voicemail today. I'm
> hoping > late Monday will fit his schedule. Have a good weekend.
>
>
> Trina Vielhauer
>
> --------------------------
> Sent from my BlackBerry Wireless Handheld
>
>
> ----- Original Message -----
> From: virginia@wetherellconsulting.com >
> <virginia@wetherellconsulting.com>
> To: Vielhauer, Trina
> Sent: Fri May 30 17:11:10 2008
> Subject: meeting
>
> Hi Trina---Thanks so much for your time today and the excellent >
> progress---I really appreciate it. Scott Osbourn will try to get on
> your calendar > for Monday as we discussed to go over the responses to
> your questions. I > think you and Joe outlined a time line that can
> work and we will do our part > in getting information to you as
> committed. Regards, Ginger
>
>
>
> The Department of Environmental
>
> Protection values your feedback as a customer. DEP Secretary Michael
> W. > Sole is committed to continuously assessing and
>
> improving the level and quality of services provided to you. Please
> take > a few minutes to comment on the quality of
>
> service you received. Copy the url below to a web browser to complete
> > the DEP
>
> survey: > http://survey.dep.state.fl.us/?refemail=Trina.Vielhauer@dep.state.fl.us> Thank
you in advance for completing the survey.

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Wednesday, May 21, 2008 1:19 PM
To: Read, David
Cc: glenn@biggreenenergy.com; Morrison Uhland, Angela
Subject: Meeting Agenda - BG&E

The proposed agenda for tomorrow's meeting is as follows:

- Confirm FDEP concurrence on regulatory applicability determinations
- Discussion of RAI questions and responses
- Discussion of the project and technology being used
- Treatment of confidential data

It will just be Angela and myself attending in person. Glenn Farris (BG&E) will be phoning in. Looking forward to our meeting tomorrow.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
T: +1 (813) 287-1717 | **D:** +1 (813) 769-5304 | **F:** +1 (813) 287-1716 | **C:** +1 (727) 278-3358 | **E:** Scott_Osbourn@golder.com | **www.golder.com**

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Wednesday, May 14, 2008 8:46 AM
To: Read, David
Subject: RE: BG&E Meeting

Thanks David. I sent out an email to the group to see which date is best. I appreciate your efforts at coordination. As we discussed, I'll give you a call at 10 AM to go over your comments to see how we can best respond.

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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Wednesday, May 14, 2008 8:42 AM
To: Osbourn, Scott
Cc: Arif, Syed
Subject: BG&E Meeting

Scott I left you a voice mail with this information. The best date and time for us up here to have the BG&E meeting is Thursday May 22nd at 10:00 am. I have tentatively reserved a conference room for the meeting. The backup date is Friday May 23rd at 1:00 pm. Let me know which of these dates and times you preferred and I will send out an Outlook meeting notice. As of now on our end, the people attending will be Trina, Debbie, Syed, Ronni, and I. Also let me now if you need a teleconference hookup on your end. As of right now I have not requested one.

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Thursday, May 15, 2008 10:34 AM
To: Read, David
Subject: RE: Teleconference

I'm trying to confirm. I would suspect no more than 2.

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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Thursday, May 15, 2008 10:22 AM
To: Osbourn, Scott
Subject: RE: Teleconference

Scott, do you know how many people will be calling in?

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

From: Osbourn, Scott [mailto:Scott_Osbourn@golder.com]
Sent: Thursday, May 15, 2008 10:16 AM
To: Read, David
Subject: RE: Teleconference

Thanks—and thanks for your time yesterday.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Thursday, May 15, 2008 10:05 AM
To: Osbourn, Scott
Subject: Teleconference

Scott the info for the teleconference call next Thursday is:

Reservationless VCS Dial-in Number: (888) 808-6959
Conference Code: 9219504 (followed by the # sign)

See you on the 22nd.

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Thursday, May 15, 2008 10:16 AM
To: Read, David
Subject: RE: Teleconference

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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Thursday, May 15, 2008 10:05 AM
To: Osbourn, Scott
Subject: Teleconference

Scott the info for the teleconference call next Thursday is:

Reservationless VCS Dial-in Number: (888) 808-6959
Conference Code: 9219504 (followed by the # sign)

See you on the 22nd.

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Wednesday, May 14, 2008 4:02 PM
To: Read, David
Cc: Arif, Syed
Subject: RE: BG&E Meeting

Thursday (5/22) at 10 AM will work for us. We may need the conferencing capability.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Wednesday, May 14, 2008 8:42 AM
To: Osbourn, Scott
Cc: Arif, Syed
Subject: BG&E Meeting

Scott I left you a voice mail with this information. The best date and time for us up here to have the BG&E meeting is Thursday May 22nd at 10:00 am. I have tentatively reserved a conference room for the meeting. The backup date is Friday May 23rd at 1:00 pm. Let me know which of these dates and times you preferred and I will send out an Outlook meeting notice. As of now on our end, the people attending will be Trina, Debbie, Syed, Ronni, and I. Also let me now if you need a teleconference hookup on your end. As of right now I have not requested one.

Thanks

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Monday, May 12, 2008 4:05 PM
To: Read, David
Subject: RE: BG&E Meeting

Whatever works from your end.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
5100 West Lemon Street, Suite 114, Tampa, Florida, USA 33609
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From: Read, David [mailto:David.Read@dep.state.fl.us]
Sent: Monday, May 12, 2008 3:59 PM
To: Osbourn, Scott
Subject: RE: BG&E Meeting

What times Scott?

David Lyle Read
Engineering Specialist II
Special Projects Section
Bureau of Air Regulation (BAR)
Division of Air Resource Management (DARM)
Florida DEP
Ph: 850-414-7268 or David.Read@dep.state.fl.us

From: Osbourn, Scott [mailto:Scott_Osbourn@golder.com]
Sent: Monday, May 12, 2008 3:55 PM
To: Read, David
Subject: BG&E Meeting

Please also check May 22nd and 23rd.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
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Scott_Osbourn@golder.com | **www.golder.com**

Walker, Elizabeth (AIR)

From: Osbourn, Scott [Scott_Osbourn@golder.com]
Sent: Monday, May 12, 2008 3:55 PM
To: Read, David
Subject: BG&E Meeting

Please also check May 22nd and 23rd.

Scott Osbourn (P.E.) | Senior Consultant | **Golder Associates Inc.**
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Walker, Elizabeth (AIR)

From: Linero, Alvaro
Sent: Saturday, July 12, 2008 10:28 AM
To: Walker, Elizabeth (AIR)
Subject: Request for Additional Information - Biomass Gas and Energy of Tallahassee L.L.C.
Attachments: BGE additional information request_1_R.pdf

-----Original Message-----
From: Linero, Alvaro
Sent: Fri 5/2/2008 5:25 PM
To: 'glenn@biggreenenergy.com'
Cc: Read, David; 'sosbourn@golder.com'; Sarasua, Armando; Arif, Syed
Subject: Request for Additional Information - Biomass Gas and Energy of Tallahassee L.L.C.

Dear Mr. Farris:

Please refer to the attached letter regarding the status of our review of the application to construct the Biomass Gas and Electric facility in Tallahassee.

Generally, the gasification system seems to be well-described. However, the product gas cleanup system needs better description to provide reasonable assurance of meeting the proposed emission limits.

Please call Mr. David Read at 850-414-7268 or Syed Arif at 850-921-9528 if you have any questions. We discussed the status with your consultant, Golder Associates, earlier this week.

Thank you.

A. A. Linero

Florida Department of Environmental Protection
Bob Martinez Center
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Charlie Crist
Governor
Jeff Kottkamp
Lt. Governor
Michael W. Sole
Secretary

May 2, 2008

Electronically Sent – Received Receipt Requested.

Mr. Glenn Farris glenn@biggreenenergy.com
President and Chief Executive Officer
Biomass Gas and Electric (BG&E) of Tallahassee, L.L.C.
3500 Parkway Lane
Suite 4000
Atlanta, Georgia 30092

Re: Request for Additional Information
Project Number: 0730109-001-AC

Dear Mr. Farris:

The Department has received your application for an Air Construction Permit by hardcopy submission on April 3, 2008. After review, it has been determined that the application is incomplete. In order to continue processing your application, the Department will need the additional information requested below. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. Material Handling. In the application, it is indicated that the wood fuel feedstock will be processed off-site and shipped by train to the facility location. The exact composition of the wood feedstock is not provided. Will the feedstock contain understory materials such as detritus material from the floor of forest areas and leaves and small branches or will it consist solely of chipped to size wood chunks from tree trunks? Detritus materials and leaves may contain mercury from dry and wet deposition which could affect the mercury emission estimates. [Rule 62-4.070, F.A.C. Reasonable Assurance]
2. Startups/Shutdowns. In the application, it is estimated that there will be a total of 6 startups of the gasifier system per year. There is no request of provisions in the permit for additional startups for shakedowns during the initial operation of the facility. Does BG&E actually anticipate that the facility will not required additional startups and shutdowns of the gasifier system during the first year of the facility's operation?
[Rule 62-4.070, F.A.C. Reasonable Assurance]
3. Volatile Organic Compounds (VOC) and Sulfur Dioxide (SO_2) Emissions during Shutdowns. On pages 12 to 15 of the application, emission estimates are provided for nitrogen oxides (NO_X) and particulate matter (PM) during shutdowns, while none are given for VOC and SO_X based on the argument that these emissions from the turbines are already low. What are the anticipated emissions of these pollutants during shutdowns?
[Rule 62-4.070, F.A.C. Reasonable Assurance]

4. Startup and Shutdown Procedures. In Section 2.2.1 of the application, the startup and shutdown modes and procedures for the gasifier/power block are briefly described with the caveat that full descriptions of the procedures are not provided due to their proprietary nature. To effectively assess the proposed durations and associated emissions involved during the startup and shutdown of the gasifier/power block of the facility, the Department requires a full description of the procedures. Please indicate which submitted documents are considered proprietary. [Rule 62-4.070, F.A.C. Reasonable Assurance]
5. Refractory Life. If the facility only requires 6 startups per year what is the anticipated life of the gasifier refractory? If additional startups are required, especially during the initial operation of the facility, how is the life of the refractory affected?
[Rule 62-4.070, F.A.C. Reasonable Assurance]
6. Syngas Cleanup. In Section 2.1.3 of the application, the syngas cleanup system proposed for the project is discussed. However, very few details of the proposed system are given. In previous meetings between the Department and BG&E, it was indicated by BG&E that the syngas cleanup system will be provided by,Dahlman Filter Technology. Based on research done by the Department, the technology provided by Dahlman principally involves the removal of tar compounds from the syngas stream utilize an oil wash. Details on the removal of other pollutants of concern (particulates, inorganic impurities such as sulfur compounds and volatile metals) were not available from research or in the application. Please provide to the Department a more detailed description of the syngas cleanup system proposed for the facility, including, if available, process schematics, which will allow the Department to make a comprehensive technical evaluation of the gas cleanup system. If such information is deemed proprietary please indicate on the submitted documents.
[Rule 62-4.070, F.A.C. Reasonable Assurance]
7. Volatile Metal Emissions. As indicated in No. 6 above, no details are provided on how volatile metals, such as mercury, are going to be removed from the syngas. In the application, it is stated that the mercury concentration in the wood fuel is minimal and consequently expected mercury emissions are negligible. However, if this is not the case, does the syngas cleanup system utilize an activated carbon bed or something similar to control volatile metal emissions such as mercury?
[Rule 62-4.070, F.A.C. Reasonable Assurance]
8. Duct Burner Firing. Based on the application, it appears that the duct burners will only fire syngas (product gas). Will natural gas ever be fired in the duct burners?
[Rule 62-4.070, F.A.C. Reasonable Assurance]
9. Emissions Averaging. In Table 3-2 of the application, emissions in ppm at 15 percent oxygen (O_2) of NO_X, carbon monoxide (CO), volatile organic compounds (VOC), and ammonia (NH_3) appear to be given for annual stack testing requirements. Please provide Continuous Emissions Monitoring System (CEMS) 24 hour block average and 12 month rolling average estimates of CO emissions and 24 hour block average and 30 day rolling average estimates of NO_X, emissions when firing the combustion turbine and the combustion turbine in combination with the duct burners for the temperatures and loads cited in the table.
[Rule 62-4.070, F.A.C. Reasonable Assurance]

10. SO_2 Emissions. On page 19 of the application, it is stated that SO_2 emissions will be minimized through the utilization of natural gas during startups and the gas cleanup system on the product gas. Please provide estimates of the SO_2 concentration in the product gas before and after cleanup. In addition, provide estimates of SO_2 stack emissions when firing product gas for the same conditions described in No. 9 above.
[Rule 62-4.070, F.A.C. Reasonable Assurance]
11. Combustion Turbine and Duct Burner Emissions Estimates. When comparing the upper and lower portions of Table 3-2 of the application, the emissions of NO_X, CO, and VOC appear to be lower when firing the duct burners than when not, please clarify. In addition, pollutants and units given in the table are not defined nor is the basis for the different emission concentrations for the various pollutants. Please redo this table and resubmit to address these issues and generally provide a clear overview of the expected emissions for the project as a function of turbine load, ambient air temperature, and duct burner firing.
[Rule 62-4.070, F.A.C. Reasonable Assurance]

The Department will resume processing your application after receipt of the requested information. 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. For any material changes to the application, please include a new certification statement by the authorized representative or responsible official. You are reminded that Rule 62-4.055(1), F.A.C., now requires applicants to respond to requests for information within 90 days or provide a written request for an additional period of time to submit the information.

If you should have any questions, please contact Mr. David Read at 850/414-7268 or Syed Arif 850/921-9528.

Sincerely,

A.A. Linero, Program Administrator
Special Projects Section

Cc: Armando Sarasua, NWD, armando.sarasua@dep.state.fl.us
Scott Osbourn, Golder Associates., sosbourn@golder.com

Gibson, Victoria

From: Gibson, Victoria
Sent: Friday, October 24, 2008 10:41 AM
To: 'salters@magnet.fsu.edu'; 'sth@magnet.fsu.edu'; 'ronsaff@aol.com'; 'hluebkemann@comcast.net'; 'shereitte@gmail.com'; 'shereitte1.stokes@famu.edu'; 'richard.gragg@famu.edu'; 'richardgraggiii@mac.com'; 'bobfulford@nettally.com'; 'anitald@embarqmail.com'; 'susiecaplowe@comcast.net'; 'hopeforcleanwater@yahoo.com'
Cc: Read, David
Subject: BG & E Meeting of 10/23/08 -- Attendees List

Attachments: BG&E Meeting of October 23, 2008 - Attendees List.pdf

Good morning.

Please find attached the attendees list from the BG & E meeting of yesterday.

BG&E Meeting of October 23, 20...

Have a great weekend.

Vickie

Victoria Gibson, Administrative Secretary for
Trina Vielhauer, Chief
Bureau of Air Regulation
Division of Air Resource Management
victoria.gibson@dep.state.fl.us
850-921-9504 fax 850-921-9533

Gibson, Victoria

From: System Administrator
To: richardgraggiii@mac.com
Sent: Friday, October 24, 2008 10:41 AM
Subject: Undeliverable:BG & E Meeting of 10/23/08 -- Attendees List

Your message did not reach some or all of the intended recipients.

Subject: BG & E Meeting of 10/23/08 -- Attendees List
Sent: 10/24/2008 10:41 AM

The following recipient(s) could not be reached:

richardgraggiii@mac.com on 10/24/2008 10:42 AM
The e-mail account does not exist at the organization this message was sent to. Check the e-mail address, or contact the recipient directly to find out the correct address.
<tlhexsprot2.floridadep.net #5.1.1 smtp;550 5.1.1 unknown or illegal alias: richardgraggiii@mac.com>

BEST AVAILABLE COPY

Name	Affiliation	Contact info
[illegible]	DEP - Air	[illegible]
Amy Graham	DEP	~~[illegible]~~
Vincent Salters	FSU	salters@magnet.fsu.edu
Scott Hannahs	Magnet Lab - FSU	sth@magnet.fsu.edu
Ron Saff	Self-employed	RONSAFF@AOL.COM
Heinz Luebkemann	F.S.U. Retired	hluebkemann@comcast.net
Sherette C. Stokes IV	FAMU - Environmental Sciences Institute	sherette@gmail.com sherette.stokes@famu.edu
Richard Gragg	FAMU - ESI - Center for Env. Equity & Justice	richard.gragg@famu.edu richardgraggiii@mac.com
Julie Ferris	DEP - Air	921 5549
Bob Fulford	Citizen	bobfulford@nettally.com
Anita L. Davis	FCAN & JGNA	ANITALD@EMBARQMAIL.Com
Susie Caplowe 385-6160	Florida League of Conservation Voters	Susiecaplowe@comcast.net
Joy Towles Ezell	President	Hopeforcleanwater@yahoo.com
David Read	DEP - Air	850-414-7268

Allergy & Asthma
DIAGNOSTIC TREATMENT CENTER

Ronald H. Saff, M.D.
Board Certified Allergy & Immunology
Board Certified Internal Medicine
Certified Clinical Research Investigator ACRP
Certified Physician Investigator AAPP

Christine Stabley, PA-C
Certified Physician Assistant

August 26, 2008

Ms. Trina L. Vielhauer, Bureau Chief
Bureau of Air Regulation, Division of Air Resources Mgmt.
Florida Dept. of Environmental Protection
2600 Blairstone Road MS 5500
Tallahassee, FL 32399-2400

Dear Ms. Vielhauer,

We oppose a permit for the BG & E plant on the following grounds:

1. The Florida Medical Association passed a resolution earlier this month noting "Even the most technologically advanced incinerators release hazardous byproducts including dioxins, mercury & heavy metals" ... and "urges state government to adopt policies to minimize the approval and construction of new incinerators including mass-burn, gasification, plasma, prolysis, *biomass*, refuse – derived fuel and other incinerator technologies..."

2. No large biomass plant has been built that reliably produces greater than 35 MW of electricity & doesn't pollute. Dr. Hannahs, a physicist at the Mag Lab, has looked at the plans and states this technology is "experimental state". He has called for an outside panel to review the merits of this plant.

3. This experimental stage technology can malfunction and, like Mr. Farris' previous operation at the McNeil Station in Burlington, VT, cause contamination of the air and groundwater, emit fugitive dust emissions, pungent odors, noise and vibration. The superintendent of McNeil Station was quoted, "Generally speaking, it is best to site a biomass plant ... far from residential neighborhoods." This plant will be two blocks from Sail High School, across the street from Innovation Park and is in the middle of a residential area. Have the parents of Sail students been informed?

4. BG & E has never built a successful plant previously. For this plant, where did they get their analysis? How do they know about their emissions? Where is their test data? Who made the gas analysis? What lab?

5. At the Tallahassee Scientific Society forum, Mr. Farris stated that he could have done a better job of informing nearby residents of the proposed plant. Has this been done? What is the nature of the information he has provided? Has he explained that the technology is experimental and can possibly fail – emitting carcinogens into the groundwater and air?

6. It is visually impossible to distinguish CCA treated wood from non-CCA treated wood. What regulations are in place to ensure the plant does not combust CCA treated wood?

7. Will the plant allow 24 hour continuous monitoring of harmful pollutants - the only proven way to ensure compliance with emission standards?

8. Leon County already has the 2nd worst air quality of any county in Florida. Air pollution causes strokes, cancer, heart attacks, asthma attacks and shortens life. This biomass plant will likely worsen our air quality.

9. Combustion of wood releases dioxin, as well as other pollutants. Residents in communities with incinerators have higher levels of dioxin – thought to be the most carcinogenic compound known to science.

10. Liberty County residents didn't want the stench, air pollution and rail traffic, and refused to allow BG & E to build a biomass incinerator there.

11. The American Lung Association & American College of Cardiology have stated that people are getting heart attacks and asthma attacks at levels of pollution that are considered "safe". They state also that our air quality standards are too lax and need to be strengthened.

12. The American Lung Association's State of the Air report urges individuals to get involved and to send a message to decision makers.

Respectfully, you are the decision makers.

Ronald Saff, M.D.
Floridians Against Incinerators
In Disguise
Tallahassee, FL

Lynn Ringenberg, M.D., FAAP
Professor of Pediatrics
Chief, General Academic Pediatrics
Co-Director Med-Peds Training Program
USF Department of Pediatrics
President, Physicians for Social Responsibility
Tampa, FL

Bob Fulford
Concerned Citizen
Tallahassee, FL

Joy Towles Ezell
Florida League of Conservation Voters
Perry, FL

Donald L. Mellman, M.D., MPH, MBA
Cofounder & Vice President
Physicians for Social Responsibility
Tampa, FL

Neil Seldman
President
Institute for Local Self-Reliance
Washington, DC

David Ciplet
Global Alliance for Incinerator Alternatives
Berkeley, CA

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

BILL PROCTOR, LEON COUNTY COMMISSIONER, FIRST DISTRICT, LEON COUNTY,

Petitioner,

vs.

DOAH CASE NO. 08-_____
OGC CASE NO. 08-2674

BIOMASS GAS & ELECTRIC OF TALLAHASSEE, LLC, And STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Respondent.
_____/

NOTICE OF PENDING RELATED CASES

Respondent, State of Florida Department of Environmental Protection (Department), provides notice to the Division of Administrative Hearings (DOAH), under Rule 28-106.108, Florida Administrative Code, that the Department has dismissed ten (10) petitions with leave to amend relating directly to notice of intent to issue a permit to Biomass Gas & Electric of Tallahassee, LLC. Any amended petitions must be received by the Department on or before December 4, 2008. These cases currently pending before the Department involve the same permit, issues of law and of fact, and identical parties as Respondents. The Department anticipates the timely filing of amended petitions, which, if sufficient, will be forwarded to DOAH for the assignment of an administrative law judge.

The Department requests the administrative law judge to allow twenty-one (21) days extend to respond to the initial order to permit coordination of a date for final hearing with all anticipated parties.

Respectfully submitted this 25th day of November, 2008.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

JACK CHISOLM, Deputy General Counsel
RONDA L. MOORE, Assistant General Counsel
3900 Commonwealth Boulevard – MS 35
Tallahassee, Florida 32399-3000
Telephone 850-245-2242 Facsimile 850-245-2302

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished via electronic mail only this 25th day of November, 2008, to:

Bill Proctor, County Commissioner
301 S. Monroe Street, Room 202
Tallahassee, FL 32301
proctorb@leoncountyfl.gov

Angela Morrison Uhland
123 South Calhoun Street
Tallahassee, FL 32314
AUhland@hgslaw.com

Attorney for Biomass Gas and Electric of Tallahassee, LLC

JACK CHISOLM, Deputy General Counsel
RONDA L. MOORE, Assistant General Counsel

Florida Department of
Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

March 19, 2008

FILE COPY

The Honorable Bill Proctor
Leon County Commission
301 South Monroe Street
Tallahassee, Florida 32301

Dear Commissioner Proctor:

I received a copy of your letter to Governor Charlie Crist regarding the proposed waste-to-energy facility, Biomass Gas and Electric (BG&E). At the request of Secretary Michael Sole, I would like to update you on our interactions with the facility.

To date, the Florida Department of Environmental Protection (DEP) has not received any permit applications associated with this facility. However, on January 17, 2008 and February 19, 2008, representatives from DEP met with BG&E representatives to discuss the proposed project and DEP's permitting process. The 45 megawatt facility is proposed to be located near Innovation Park in Tallahassee. The facility is proposing to use wood waste, yard clippings and fuel crops as fuel sources, and anticipates using 800,000 to 900,000 gallons of water per day in their process. To satisfy the water demand, BG&E is currently evaluating the possibility of using reclaimed water from the City of Tallahassee as their water source.

BG&E's facility will produce less than 75 megawatts of electricity, so it is not subject to the State's Power Plant Siting Act process. However, the proposed project does require air, stormwater management and domestic wastewater permits from DEP. DEP's permitting process includes public notification of DEP actions, as well as a process for citizens to challenge agency actions. In addition, DEP's Division of Air Resource Management also requires the applicant to publish a notice upon filing of the application in a newspaper of local circulation and will post such applications on its webpage at: http://www.dep.state.fl.us/Air/permitting/construction.htm.

Whether a facility goes through the power plant siting process or DEP's permitting process, the ability to regulate where a facility is located rests with the local government. DEP's environmental permitting standards do not contain provisions to evaluate compliance with local land use regulations.

I am very sensitive to your concerns, and would be happy to meet with you if you have additional questions. I can be reached at (850) 245-2037.

Sincerely,

Mimi A. Drew
Deputy Secretary, Regulatory Programs and Energy

cc: Dick Fancher, Director, Northwest District, DEP
Joseph Kahn, Director, Division of Air Resource Management, DEP

Leon County

Board of County Commissioners

301 South Monroe Street, Tallahassee, Florida 32301
(850) 606-5302 www.leoncountyfl.gov

TELEFAX COVER SHEET

LEON COUNTY ATTORNEY'S OFFICE
LEON COUNTY COURTHOUSE
SUITE 202, 301 S. MONROE STREET
TALLAHASSEE, FLORIDA 32301

TO:	Al Linero **Florida Department of Environmental Protection**
FROM:	Emily Long Leon County Attorney's Office
FAX OPERATOR:	
DATE:	November 7, 2008
FAX NUMBER:	921-9533
REGARDING:	Biomass Plant
# OF PAGES:	
COMMENTS:	

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Leon County

Board of County Commissioners

301 South Monroe Street, Tallahassee, Florida 32301
(850) 606-5302 www.leoncountyfl.gov

November 6, 2008

Michael W. Sole, Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, M.S. 49
Tallahassee, FL 32399

Re: Proposed Project and Air Pollution Construction Permit for BG&E Bio Mass Plant Located at Roberts Avenue, Tallahassee, Florida

Dear Secretary Sole:

It has come to the attention of the Leon County Board of County Commissioners that the Florida Department of Environmental Protection is preparing to issue what is called an air pollution construction permit that will permit the further development of a biomass-fed integrated gasification combined cycle power plant called the "Tallahassee Renewable Energy Center" to be located in Leon County along Lipona Road at Roberts Avenue, in Tallahassee, Florida. It appears that this location is also within the Florida State University's Southwest Campus.

Since the Board of County Commissioners has not been involved in being briefed on this matter, nor in having any input on this permit nor on the development of the Biomass plant itself, the Board of County Commissioners instructed the County Attorney's Office to develop a series of questions which we would like to have answered by the Florida Department of Environmental Protection as soon as possible. We understand that the permit may be issued within the next fourteen (14) days and request that the information be provided to us before the fourteen (14) day waiting period expires. The air permit number we believe is 0730109-001-AC to be issued to the Tallahassee Renewable Energy Center to be located along Lipona Road at Roberts Avenue.

The series of questions are set forth in the attachment to this correspondence and we would appreciate your prompt consideration and response thereto. Additionally, Commission Bill Proctor, who represents District 1 in Leon County also posed a series of questions by memorandum dated October 28, 2008, which is also attached. We would request that you provide answers to those questions which are applicable to FDEP. Thank you for your assistance.

Sincerely yours,

BOARD OF COUNTY COMMISSIONERS
LEON COUNTY, FLORIDA

Jane G. Sauls

Jane G. Sauls, Chairman
JGS:eal
cc: Members of the Board of County Commissioners of Leon County, Florida
Parwez Alam, County Administrator
Herbert W. A. Thiele, Esq., Leon County Attorney

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INQUIRIES CONCERNING BIOMASS-FED INTEGRATED GASIFICATION COMBINED CYCLE PLANT AIR PERMIT NO. 0730109-001-AC

With regard to the construction of the plant and the air permit, we have the following questions:

- How is this process different than incineration?
- What is the chemical or elemental makeup of the resulting material?
- What are the potential dangers of the supposed "inert" slag that results from the process?
- Is there testing require once the plant is up and running to ensure that the slag is actually inert?
- What steps are being taken to dilute or disperse the residual material to ensure no environmental impact?
- In regards to the unit that house the actual gasification, what steps are being taken to ensure reliability of the housing?
- What is the degradation of the housing unit? At what point does the housing unit need to be replaced?
- How long will the housing unit last and what steps are taken to ensure that the unit is properly maintained?
- There are a lot of issues with this being a new technology. But over 100 plants in the world are utilizing this technology. Did the company provide information or reports of issues common to the other plants?
- What process ensured that no gas escapes in excess of the amount permitted?
- What process ensured that no gas escapes through the feed process?
- In regards to the fuel source, what process will be in place to ensure the fuel used in the gasification process?
- What process is in place to ensure that there are no accompanying toxic materials in the saw dust, especially materials from out of state?
- What further development activities are necessary by the developer of this project to commence construction?

- What further permits are required from the Florida Department of Environmental Protection of other state agencies so as to allow the construction of this biomass plant?

- On January 12, 2007, the CEO of Biomass Gas & Electric, LLC, Mr. S. Glenn Ferris, wrote a letter to the City of Tallahassee City Commission indicating that BG&E was no longer considering the Roberts Avenue site, but instead was to move the plant to an existing site in Liberty County, in Telogia, Florida. When were these plans changed and what caused this change in plans and relocation back to the site on Roberts Avenue?

BOARD OF COUNTY COMMISSIONERS
MEMORANDUM

DATE: October 28, 2008

TO: Chairman Jane Sauls and Members of BCC

FROM: Commissioner Bill Proctor

SUBJECT: DEP to Permit Biomass Plant

I request that the Board file a permit challenge within 14 days deadline to the permit the State (Department of Environmental Protection) will give to the State (Florida State University) today.

The multiple issues I have in mind exceed the space and time to place in this memo. Suffice me quickly saying several concerns include:

1. Process for Permitting that includes local governments, area citizens within x mile radius,
2. Technology Uses/Vetting that includes the science and technology that will be employed by Biomass Gas & Electric. Is it current and safe?
3. Who owns Innovation Park and has say in controlling the industrial activities around it?
4. When did the City of Tallahassee cut this deal to buy electricity from Biomass Gas & Electric? I want to review this agreement.
5. Who is footing the bill for building this plant? What are the incentives and giveaways?
6. Does a local government have more than 14 days to hold public hearings and to receive citizen input before weighing in on this matter or must we object in the same 14 day period whether blindly or not?
7. Who regulates Biomass Fuel?
8. What does the Public Service Commission do in relation to this utility company Biomass Gas & Electric?
9. Has the PSC already approved this electric plant deal?
10. Why has this been so secretive and unknown to the County government?
11. Why has the City been so secretive?
12. Why has FSU been so secretive?
13. Why are we only finding out about this matter from a newspaper today?
14. Does the County government have any say?
15. Why has the Capital Medical Society exceeded our presence with DEP in this matter?
16. Why didn't we know about this?
17. Why is Biomass Gas & Electric "very pleased" and "appreciative of all the hard work the DEP has done" and DEP has not involved us in "all the hard work?"
18. As the Capital County, does anyone get the sense that this title vastly overstates our relation with the state or the respect we received from its Governor, agencies or legislators?
19. Why is this stink smelling pulp mill placed down the street from the stink smelling transfer station off Gum Road?

20. Why does the Governor champion these plants for the southside but never has asked us locals whether we want these entities in our neighborhood.
21. Why does FSU close off streets, take over the Tallahassee Leon County Civic Center and import gas and electric companies to locate off Roberts Avenue and essentially ignore informing us until they are deep in the red zone?
22. Who owns Biomass Gas & Electric?
23. Are the owners connected to our community, connected to any of the principals or are they complete outsiders invited in by a three person local team?
24. Is the proposed Roberts Avenue site zoned for industrial uses such as pulp mill generated electricity? If it is not, does the county or city have the authority to compromise the zoning?
25. Whose waste and what sort of waste will be imported into our community?
26. The City has several waste plants on the southside, how many more environmental toxic activities will the city, state and FSU dump on poor people in the southside?
27. Why can't FSU and the Governor through DEP leave the southside alone and give this project to the coast in Pancea where other land is owned by FSU and the state?
28. How will FSU be compensated for the 22 acres off Roberts Avenue? Will it be sold outright to Biomass Gas, leased or operate on a profit sharing arrangement?
29. Does FSU receive a lower utility rate, abatement or rebate on its electric bill in sponsoring Biomass as an electricity conduit for the City of Tallahassee?
30. When can we review all of the paperwork related to our doing due diligence on these several concerns I present? This includes all financials on the Biomass Gas Company, the ownership questions and the right of our government to be included in the permitting of a gas and electric company run off of waste and pulp?

Colleagues, I request a discussion of this matter as a relevant agenda item outside the context of my 3 minutes Commission time. Given the brevity of our General Business items will you allow this to be heard following the public hearing at 6:00 p.m.?

Golder Associates Inc.
5100 West Lemon Street
Suite 114
Tampa, FL USA 33609
Telephone: (813) 287-1717
Fax: (813) 287-1716

Golder Associates

July 25, 2008

07389628

Florida Department of Environmental Protection
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Attention: Mr. A. A. Linero

RE: RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION BIOMASS GAS AND ELECTRIC; FACILITY ID NO. 0730109

Dear Mr. Linero:

This letter is in response to your request for additional information regarding the Air Construction Permit application submitted by Golder Associates Inc. on behalf of Biomass Gas and Electric (BG&E) on April 3, 2008.

1. Material Handling. In the application, it is indicated that the wood fuel feedstock will be processed off-site and shipped by train to the facility location. The exact composition of the wood feedstock is not provided. Will the feedstock contain understory materials such as detritus material from the floor of forest areas and leaves and small branches or will it consist solely of chipped to size wood chunks from tree trunks? Detritus materials and leaves may contain mercury from dry and wet deposition which could affect the mercury emission estimates. [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. While BG&E initially proposed a small amount of yard trimmings (no more than 30 tons per day, quarterly average) as a possible feedstock source, BG&E has decided to eliminate yard trimmings as a proposed feedstock source for the Tallahassee Renewable Energy Center. Therefore, none of the feedstocks proposed for the Tallahassee Renewable Energy Center constitute "municipal solid waste". Fuel availability appears to be both predictable and plentiful going forward, with the only real concern involving transportation costs. BG&E is being somewhat opportunistic in their feedstock 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 Tallahassee Renewable Energy Center, include the following:

- *Sander Dust;*
- *Saw Dust;*

- *Georgia Pacific Fuel;*
- *Hogged Fuel;*
- *Knots and Shives;*
- *Processed Butt Cuts and;*
- *A Fuel Crop.*

The Georgia Pacific (GP) fuel is in essence the reject material off of the round wood debarking system at the GP OSB Hosford, Florida Mill. 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. Knots and shives are the unique residues from the specialty pulping operation at Florida Buckeye in Perry, Florida. 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.

Attachment 1 to this letter provides constituent analyses for the different types of woody biomass summarized above, including analyses for mercury. The Department has an interest in mercury emissions and has provided references for potential mercury emissions from combustion of biomass due to forest fires. The range that is given is 14 to 71 nanograms per gram of biomass. While the references are instructive, a comparison to potential emissions from the proposed project isn't valid for several reasons. The mercury emissions from forest fires include forest understory and volatilization of mercury in soils. In addition, the BG&E project is not combustion, but gasification of the feedstock. Nevertheless, using these mercury factors from the literature, and the proposed feedstock processing rate, an uncontrolled mercury emission estimate of 103 grams per year (0.23 lb/yr) was obtained. Finally, even as these uncontrolled levels are very low in the biomass feedstock to the gasifier, the mercury that might be present is effectively further controlled in the project's proposed gas cleanup system. More detail on this system is provided in the response to Comment No. 6 in this letter.

2. Startups/Shutdowns. In the application, it is estimated that there will be a total of 6 startups of the gasifier system per year. There is no request of provisions in the permit for additional startups for shakedowns during the initial operation of the facility. Does BG&E actually anticipate that the facility will not require additional startups and shutdowns of the gasifier system during the first year of the facility's operation? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- During initial operations, there will be a larger number of startups and shutdowns than the 6 anticipated after the startup and shakedown period. The 6 is based on annual operations after the shakedown period.

In addition, there is a major difference between a cold startup, which takes at least 18 hours, and a hot startup, which can take from as little as a few minutes to several hours. For definition purposes, hot startups are defined as ones where the gasifier is over 1,000 ^{0}F when the startup occurs.

At another gasification facility, the Burlington facility, there were approximately 22 cold startups/shutdowns during the first year of operation. By 2001, this number had dropped to 7. Cold startups involve a transition period during the change from air-fired operation to pyrolysis, where smoke can be produced during the change from excess oxygen combustion to sub-stoichiometric oxygen combustion, and finally to pyrolysis. This period of operation at the flare has an expected initial duration of up to 30 minutes for cold startups. One of the operational objectives of the Tallahassee plant is to reduce the length of the cold startup transition to a minimum, with a target of 10 minutes achieved after the first year of operation. Flare design to help minimize sub-stoichiometric conditions

during burnoff are a part of the preliminary engineering design effort, with the objective of minimizing smoke production during the sub-stoichiometric transition.

Emissions from hot startups are minimal, since the wood still pyrolyzes at temperature, with low tar formation. During an electrical trip, gas production tapers off over about three minutes to a zero flow. The gas is flared during this period. Since the gas varies in composition rapidly during this three minute period, there will be events of a few seconds duration where the flared gas may transition through a substoichiometric range and produce smoke.

Therefore, in response to the Department's comment, BG&E would like to clarify that as many as 22 startup/shutdowns (either hot or cold starts) could occur during the initial 12 months of operation. Subsequent to this initial decommissioning period, BG&E expects that no more than an average of 6 startup/shutdowns would be required annually.

3. Volatile Organic Compounds (VOC) and Sulfur Dioxide (SO_2) Emissions during Shutdowns. On pages 12 to 15 of the application, emission estimates are provided for nitrogen oxides (NOx) and particulate matter (PM) during shutdowns, while none are given for VOC and SOx based on the argument that these emissions from the turbines are already low. What are the anticipated emissions of these pollutants during shutdowns? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- As previously stated, emissions during shutdown are anticipated to be low. Emission estimates were provided for NOx (0.075 tons per year or TPY) and PM (0.003 TPY) based on a material balance approach, engineering judgment and AP-42 emission factors. These estimates represented the total of annual planned shutdowns (about 6 per year) and emergency shutdowns (about 4 per year). Attachment 2 provides a tabular summary of all anticipated shutdown emissions, including estimates for VOC, CO and SO_2. These estimates are thought to be conservative and also rely on a material balance approach and AP-42 emission factors.

It should be noted that potential annual emissions for the project were estimated based on continuous operation (i.e., 8,760 hours per year). Therefore, in order for startup and shutdown emissions to occur, the unit would essentially be non-operational for periods of time. Any downtime of the unit would result in lower than estimated annual emissions, in spite of the fact that some emissions will occur during startup and shutdown conditions.

4. Startup and Shutdown Procedures. In Section 2.2.1 of the application, the startup and shutdown modes and procedures for the gasifier/power block are briefly described with the caveat that full descriptions of the procedures are not provided due to their proprietary nature. To effectively assess the proposed durations and associated emissions involved during the startup and shutdown of the gasifier/power block of the facility, the Department requires a full description of the procedures. Please indicate which submitted documents are considered proprietary. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The full description of the startup/shutdown procedure, which SilvaGas has currently developed, was included in the air application. SilvaGas has also developed a preliminary gasifier startup schedule (see Attachment 3, Figure 1), consistent with the cold startup duration described in the response to Comment No. 2 above. The figure presents a sequence of 16 discrete steps that comprise a typical cold startup (the worst case emissions impact). As part of Attachment 3, BG&E has provided additional detail on anticipated emissions due to startup operations (see Tables Attachment 3-1 through 3-6). The emission estimates do not rely on actual emission test data, but are based on worst-case

assumptions. Actual emissions test data during unit startups does not typically exist for many types of process operations. This is primarily because this mode of operation is typically of short duration, as well as the fact that certain required conditions (e.g., minimum threshold exhaust temperatures and flows) are necessary to conduct U.S. EPA reference method tests.

A more detailed procedure is undergoing development, to be provided to plant staff as the system Operating Manual. These procedures and associated manual are evolving as part of the detailed design phase of the engineering effort. It is not BG&E's intent to claim these procedures as proprietary. In fact, BG&E would be receptive to a permit condition that required appropriate staff training to minimize emissions during startup and shutdown events, per the procedures developed by BG&E.

5. Refractory Life. If the facility only requires 6 startups per year what is the anticipated life of the gasifier refractory? If additional startups are required, especially during the initial operation of the facility, how is the life of the refractory affected? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- The refractory life varies substantially, depending on the location of the refractory in the vessel. SilvaGas obtained a patent on installing tees instead of elbows at 90 degree flow direction changes, in order to reduce the erosion rate at the ells (i.e., the critical point of circulation between the gasifier and the combustor). Improved materials suggest that the life of the refractory in straight sections of the vessels and ductwork will be approximately 5 years, although there are examples in similar services where the refractory has lasted in excess of 30 years. The worst case found at Burlington was for a vent pipe off of a seal pot, which had a gas velocity of 400 feet per second. This refractory lasted only two weeks, but was an isolated case compounded by design error.

Our cyclone vendors suggest an upper limit on gas flow velocity to minimize refractory wear in the cyclone impact zones. Hard facing of exotic materials such as silicon or tungsten carbide plates are planned for the worst impact zones. SilvaGas has used advanced computational fluid dynamics software, which can predict erosion locations and wear rates, and has incorporated the results into the project design. One of the ongoing maintenance programs for the Tallahassee plant is to verify and calibrate the computer prediction of refractory erosion locations and wear rates.

Startups and shutdown affect refractory life only if the heatup and cooldown rates result in thermal expansion-based stresses. The maximum heatup and cooldown rates for the Tallahassee plant are based on Burlington rates which successfully prevented thermal stress induced cracks. An additional factor is the refractory anchoring spacing and design. BG&E is working closely with our original refractory vendor, based out of Tampa, to provide the correct anchor spacing and design.

6. Syngas Cleanup. In Section 2.1.3 of the application, the syngas cleanup system proposed for the project is discussed. However, very few details of the proposed system are given. In previous meetings between the Department and BG&E, it was indicated by BG&E that the syngas cleanup system will be provided by Dahlman Filter Technology. Based on research done by the Department, the technology provided by Dahlman principally involves the removal of tar compounds from the syngas stream utilizing an oil wash. Details on the removal of other pollutants of concern (particulates, inorganic impurities such as sulfur compounds and volatile metals) were not available from research or in the application. Please provide to the Department a more detailed description of the syngas cleanup system proposed for the facility, including, if available, process schematics, which will allow the Department to make a comprehensive technical evaluation of the gas cleanup

system. If such information is deemed proprietary, please indicate on the submitted documents. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—A Technical Information Paper on Dahlman's gas cleanup technology, modified to reflect the proposed Tallahassee Renewable Energy center project, has been included as Attachment 4 to this letter. The paper provides a simplified process flow diagram of the product gas cleanup system. As described in the attachment, the gas cleanup system has no direct emissions to the atmosphere. Only condensate water leaves the closed system.

Further background on the gasifier is necessary in order to understand the operation of the gas cleanup system. The gasifier operates as a pyrolysis unit, under reducing conditions. For instance, organic sulfur and nitrogen in the feedstock are converted to H_2S and NH_3 in small amounts. In a similar fashion, it is expected that mercuric salts, methyl mercury organics or mercuric oxides would be reduced to elemental mercury, and be evaporated into the product gas. The wash oil scrubbers remove tars above the dew point of water, so the vapor pressure of the elemental mercury remains high, and at its very low concentration, is anticipated to remain in the vapor phase. The same is true of the H_2S and NH_3.

When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water. The removal level in such a system of mercury is quite low, due to the insolubility of mercury in the water, but the elemental mercury will react with the H_2S present to form mercuric sulfide, and be removed as a particulate in the main recirculating water loop. There is an additional separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H_2S by reaction with the caustic, making sodium sulfide.

This recirculating loop of caustic soda solution with sulfides in it also provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10^{-35}. Thus, the remaining mercury should be removed here, since the S^- ion concentration will be much higher here than in the main recirculating water loop.

This is the approach used at the mercury cell caustic chlorine plants for removing any traces (i.e., ppt) of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S^- ions, and the precipitated mercuric sulfide filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

The recirculating water at the water scrubber is blown down on a regular basis, where it is used in the cooling tower as part of the cooling tower makeup water. The design has not proceeded far enough yet to determine if this water needs filtration. Should detectable mercury concentrations be obtained in either this blowdown or the blowdown from the separate caustic circulating loop, then this could be filtered to remove the mercuric sulfide particulate.

Further, the combustor receives char and olivine from the gasifier at about 1,350 ^{0}F. At this temperature, and under the gasifier reducing conditions, mercury compounds would be separated out in the upstream cyclones as part of the product gas, described above. A negligible amount of mercury would enter the combustor, as there would be virtually no mercury present in the char. However, if any mercury was present, it would likely remain in the ash bound as a non-volatile inorganic salt rather

than be released as a vapor. The vast majority of any mercury in the feedstock should end up in the makeup water from the water scrubber going to the cooling tower, and in particular, the blowdown from the separate caustic loop in the water scrubber which contains S^- ions.

7. Volatile Metal Emissions. As indicated in No. 6 above, no details are provided on how volatile metals, such as mercury, are going to be removed from the syngas. In the application, it is stated that the mercury concentration in the wood fuel is minimal and consequently expected mercury emissions are negligible. However, if this is not the case, does the syngas cleanup system utilize an activated carbon bed or something similar to control volatile metal emissions such as mercury? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—This comment is addressed above.

8. Duct Burner Firing. Based on the application, it appears that the duct burners will only fire syngas (product gas). Will natural gas ever be fired in the duct burners? [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—Only product gas will be fired in the duct burners.

9. Emissions Averaging. In Table 3-2 of the application, emissions in ppm at 15 percent oxygen (O_2) of NO_X, carbon monoxide (CO), volatile organic compounds (VOC), and ammonia (NH3) appear to be given for annual stack testing requirements. Please provide Continuous Emissions Monitoring System (CEMS) 24 hour block average and 12 month rolling average estimates of CO emissions and 24 hour block average and 30 day rolling average estimates of NO_X, emissions when firing the combustion turbine and the combustion turbine in combination with the duct burners for the temperatures and loads cited in the table. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response-- BG&E's requested emission limits, as well as associated averaging times and compliance methods, are provided in Attachment 5.

10. SO_2 Emissions. On page 19 of the application, it is stated that SO_2 emissions will be minimized through the utilization of natural gas during startups and the gas cleanup system on the product gas. Please provide estimates of the SO_2 concentration in the product gas before and after cleanup. In addition, provide estimates of SO_2 stack emissions when firing product gas for the same conditions described in No. 9 above. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response—As stated earlier, the gasifier operates as a pyrolysis unit, under reducing conditions, converting organic sulfur in the feedstock to small amounts of H_2S. The H_2S is then reduced in the gas cleanup system. SO_2 emissions would result from the residual level of H_2S in the product gas (after the gas cleanup system), which is fired in the combustion turbines and duct burners, or, in the event of a system malfunction, when the product gas is flared. Attachment 6 provides an H_2S estimate in the post-gas cleanup scenario, as well as the resultant amount of SO_2 that is estimated to be emitted by firing of the product gas in the CT/DB. SO_2 emissions from the pre-gas cleanup scenario were addressed in Attachment 3 (i.e., flare emissions during startups).

11. Combustion Turbine and Duct Burner Emissions Estimates. When comparing the upper and lower portions of Table 3-2 of the application, the emissions of NO_X, CO, and VOC appear to be lower when firing the duct burners than when not, please clarify. In addition, pollutants and units given in

the table are not defined nor is the basis for the different emission concentrations for the various pollutants. Please redo this table and resubmit to address these issues and generally provide a clear overview of the expected emissions for the project as a function of turbine load, ambient air temperature, and duct burner firing. [Rule 62-4.070, F.A.C. Reasonable Assurance]

Response— A subsequent discussion between Golder and David Read of the Department has cleared up the confusion associated with the emission table. At times, emissions on a concentration basis (i.e., ppmvd) can be lower from combined firing of a combustion turbine and duct burner than from a combustion turbine alone. Further, as stated in the response to Comment No. 9 above, BG&E has provided a tabular summary of the requested emission limits, including averaging times and methods of compliance (see Attachment 5).

Please do not hesitate to call should you require additional information.

Sincerely,

GOLDER ASSOCIATES INC.

Scott Osbourn, P.E.
Senior Consultant

Enclosures

Cc: Glenn Farris, President & CEO, BG&E

SO/dcg

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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 Date 7/25/08

(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**

APPLICATION INFORMATION

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name :
   Glenn Farris, President & CEO
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **BG&E**
   Street Address: **3500 Parkway Lane, Suite 400**
   City: **Atlanta** State: **GA** Zip Code: **30092**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(770) 662-0256** ext. Fax: **(770) 662-0287**
4. Owner/Authorized Representative Email Address: **glenn@biggreenenergy.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

   7.24.08
   Date

ATTACHMENT 1

FEEDSTOCK ANALYSES

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Sander Dust	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-002

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		100	
% Total Moisture	[ASTM D4442(METHOD A)]	4.89		
% Ash	[ASTM D1102]	0.75	0.79	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	7985	8395	8462
% Volatile Matter	[ASTM D3175]	74.94	78.79	
% Fixed Carbon	[ASTM D3172(Calc)]	19.42	20.42	
% Sulfur	[ASTM D4239(METHOD C)]	0.08	0.08	
% Carbon	[ASTM D5373]	47.66	50.10	
% Hydrogen	[ASTM D5373]	6.68	7.03	
% Nitrogen	[ASTM D5373]	4.33	4.56	
% Oxygen	[ASTM D5373(Calc)]	35.61	37.44	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.09	0.09	
Mercury, ug/g	[SW846-7471A]		0.09	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	1020 ug/g	ASTM D5600
Potassium, K	662 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	79 ug/g	ASTM D5600
Magnesium, Mg	252 ug/g	ASTM D5600
Barium , Ba	7 ug/g	ASTM D5600
Strontium, Sr	4 ug/g	ASTM D5600
Phosphorus, P	163 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Saw Dust	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-001

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	59.68		
% Ash	[ASTM D1102]	1.26	3.12	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	3410	8458	8730
% Volatile Matter	[ASTM D3175]	31.51	78.15	
% Fixed Carbon	[ASTM D3172(Calc)]	7.55	18.73	
% Sulfur	[ASTM D4239(METHOD C)]	0.01	0.02	
% Carbon	[ASTM D5373]	20.20	50.11	
% Hydrogen	[ASTM D5373]	2.43	6.01	
% Nitrogen	[ASTM D5373]	0.11	0.26	
% Oxygen	[ASTM D5373(Calc)]	16.31	40.48	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	<0.01	0.02	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	77 ug/g	ASTM D5600
Potassium, K	338 ug/g	ASTM D5600
Cerium, Ce	1.30 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	178 ug/g	ASTM D5600
Magnesium, Mg	179 ug/g	ASTM D5600
Barium , Ba	8 ug/g	ASTM D5600
Strontium, Sr	6 ug/g	ASTM D5600
Phosphorus, P	73 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	GP Fuel	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-005

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	36.14		
% Ash	[ASTM D1102]	1.15	1.80	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5786	9061	9228
% Volatile Matter	[ASTM D3175]	47.99	75.15	
% Fixed Carbon	[ASTM D3172(Calc)]	14.72	23.05	
% Sulfur	[ASTM D4239(METHOD C)]	0.04	0.06	
% Carbon	[ASTM D5373]	35.37	55.38	
% Hydrogen	[ASTM D5373]	4.16	6.51	
% Nitrogen	[ASTM D5373]	0.17	0.27	
% Oxygen	[ASTM D5373(Calc)]	22.97	35.98	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.01	0.02	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	5 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	368 ug/g	ASTM D5600
Potassium, K	733 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	193 ug/g	ASTM D5600
Magnesium, Mg	477 ug/g	ASTM D5600
Barium , Ba	7 ug/g	ASTM D5600
Strontium, Sr	6 ug/g	ASTM D5600
Phosphorus, P	251 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Hogged Fuel	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-004

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	34.54		
% Ash	[ASTM D1102]	1.10	1.67	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5403	8254	8394
% Volatile Matter	[ASTM D3175]	51.96	79.37	
% Fixed Carbon	[ASTM D3172(Calc)]	12.40	18.96	
% Sulfur	[ASTM D4239(METHOD C)]	0.02	0.03	
% Carbon	[ASTM D5373]	30.89	47.20	
% Hydrogen	[ASTM D5373]	3.64	5.56	
% Nitrogen	[ASTM D5373]	0.22	0.34	
% Oxygen	[ASTM D5373(Calc)]	29.59	45.20	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.02	0.02	
[illegible] ug/g	[SW846-7471A]		0.03	

Analyte	Result	Method
Arsenic, As	4 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	3 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	0.69 mg/Kg	ASTM D5600
Sodium, Na	89 ug/g	ASTM D5600
Potassium, K	1146 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	212 ug/g	ASTM D5600
Magnesium, Mg	411 ug/g	ASTM D5600
Barium , Ba	8 ug/g	ASTM D5600
Strontium, Sr	5 ug/g	ASTM D5600
Phosphorus, P	466 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	3 ug/g	ASTM D5600
Lead, Pb	2 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Knots & Shives	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-007

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		29	
% Total Moisture	[ASTM D4442(METHOD A)]	61.59		
% Ash	[ASTM D1102]	3.26	8.48	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	2940	7655	8364
% Volatile Matter	[ASTM D3175]	28.31	73.71	
% Fixed Carbon	[ASTM D3172(Calc)]	6.84	17.81	
% Sulfur	[ASTM D4239(METHOD C)]	0.14	0.36	
% Carbon	[ASTM D5373]	17.76	46.25	
% Hydrogen	[ASTM D5373]	2.20	5.74	
% Nitrogen	[ASTM D5373]	0.04	0.11	
% Oxygen	[ASTM D5373(Calc)]	15.01	39.06	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.03	0.09	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	2 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	640 ug/g	ASTM D5600
Potassium, K	52 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	107 ug/g	ASTM D5600
Magnesium, Mg	318 ug/g	ASTM D5600
Barium , Ba	<1 ug/g	ASTM D5600
Strontium, Sr	2 ug/g	ASTM D5600
Phosphorus, P	10 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

SGS

April 26, 2007

BIOMASS GAS & ELECTRIC LLC
3500 PARKWAY LANE
SUITE 440
NORCROSS GA 30092

ATTN: SUE LAFLEUR

Client Sample ID:	Processed Butt Cuts	Sample ID By	Biomass Gas & Electric LLC
Date Sampled:	N/A	Sample Taken At	------
Date Received:	Apr 5, 2007	Sample Taken By	------
Product Description:	WOOD		

SGS Minerals Sample ID: 491-0716796-006

		As Received	Dry	MAF
Bromine	[ASTM D4208(MODIFIED)]		<20	
% Total Moisture	[ASTM D4442(METHOD A)]	31.52		
% Ash	[ASTM D1102]	0.33	0.48	
Gross Calorific Value (Btu/lb)	[ASTM D3286]	5708	8336	8376
% Volatile Matter	[ASTM D3175]	57.01	83.25	
% Fixed Carbon	[ASTM D3172(Calc)]	11.14	16.27	
% Sulfur	[ASTM D4239(METHOD C)]	0.01	0.01	
% Carbon	[ASTM D5373]	35.37	51.65	
% Hydrogen	[ASTM D5373]	4.18	6.10	
% Nitrogen	[ASTM D5373]	0.13	0.19	
% Oxygen	[ASTM D5373(Calc)]	28.46	41.57	
Fluorine, ug/g	[ASTM D3761]		<10	
% Chlorine	[ASTM E776]	0.02	0.03	
Mercury, ug/g	[SW846-7471A]		<0.02	

Analyte	Result	Method
Arsenic, As	<1 ug/g	ASTM D3683
Cobalt, Co	<1 ug/g	ASTM D5600
Molybdenum, Mo	<1 ug/g	ASTM D5600
Silver, Ag	<1 ug/g	ASTM D5600
Thallium, Tl	<1 ug/g	ASTM D5600
Tungsten, W	<0.50 mg/Kg	ASTM D5600
Zirconium, Zr	<0.50 mg/Kg	ASTM D5600
Sodium, Na	26 ug/g	ASTM D5600
Potassium, K	126 ug/g	ASTM D5600
Cerium, Ce	<0.50 mg/Kg	ASTM D5600
Lithium, Li	<1 ug/g	ASTM D5600
Calcium, Ca	41 ug/g	ASTM D5600
Magnesium, Mg	117 ug/g	ASTM D5600
Barium , Ba	2 ug/g	ASTM D5600
Strontium, Sr	2 ug/g	ASTM D5600
Phosphorus, P	22 ug/g	ASTM D5600
Antimony, Sb	<1 ug/g	ASTM D5600
Chromium, Cr	<1 ug/g	ASTM D5600
Copper, Cu	<1 ug/g	ASTM D5600
Lead, Pb	<1 ug/g	ASTM D5600
Nickel, Ni	<1 ug/g	ASTM D5600

AS-RECEIVED BIOMASS FUEL CROP ANALYSIS

Dry Analysis		mang lab 1	P'cola (unmang) lab 2	SC (unmang) lab 2	*generic* near ocean lab 3	site expected	Avg	Range	standard deviation
Ash	% wt	2.61	3.80	3.16	3.43	3.80	3.25	1.19	0.43
Carbon	% wt	47.39	47.42	47.60	47.06	47.42	47.37	0.54	0.19
Fixed Carbon	% wt	9.79	20.34	22.97	16.38	20.34	17.37	13.18	4.96
Hydrogen	% wt	5.51	5.73	5.85	5.84	5.73	5.73	0.34	0.14
Nitrogen	% wt	0.88	0.44	0.47	0.60	0.44	0.60	0.44	0.17
Oxygen	% wt	43.45	42.50	42.71	42.95	42.50	42.90	0.95	0.35
Volatiles	% wt	87.60	75.75	73.66	80.19	75.75	79.30	13.94	5.34
Sulfur	% wt	0.16	0.11	0.21	0.12	0.11	0.15	0.10	0.04
Chlorine	% wt		0.00	0.00	0.20	0.00	0.07	0.20	0.09
Heat of Comb, LHV	Btu/lb	8,180	8,070	8,100	8,104	8,070	8,114	110	40.58
lb / MMBtu		122.2	123.9	123.5	123.4	123.9	123.3		
Normal Moisture, As Received Analysis									
Moisture	% wt	**40.00**	**39.42**	**31.47**	**42.01**	**23.35**	38.23	10.54	4.02
Ash	% wt	1.57	2.30	2.17	1.99	2.91	2.01	0.74	0.28
Carbon	% wt	28.43	28.73	32.62	27.29	36.35	29.27	5.33	2.01
Fixed Carbon	% wt	5.87	12.32	15.74	9.50	15.59	10.86	9.87	3.63
Hydrogen	% wt	3.31	3.47	4.01	3.39	4.39	3.54	0.70	0.28
Nitrogen	% wt	0.53	0.27	0.32	0.35	0.34	0.37	0.26	0.10
Oxygen	% wt	26.07	25.75	29.27	24.91	32.58	26.50	4.36	1.66
Volatiles	% wt	52.56	45.89	50.48	46.50	58.06	48.86	6.67	2.77
Sulfur	% wt	0.10	0.07	0.14	0.07	0.08	0.09	0.08	0.03
Heat of Comb, LHV	Btu/lb	4,908	4,889	5,551	4,700	6,186	5,012	851	321.75
lb / MMBtu		203.7	204.5	180.1	212.8	161.7	199.5		
Major/Minor Oxides in Ash									
Aluminum Oxide	% wt	0.70	0.11	0.11	0.80	0.10	0.43	0.69	0.32
Calcium Oxide	% wt	5.27	9.42	6.20	2.78	8.23	5.92	6.64	2.38
Iron Oxide	% wt	0.29	0.63	0.52	0.86	0.55	0.58	0.57	0.21
Magnesium Oxide	% wt	3.75	7.69	6.32	3.07	6.72	5.21	4.62	1.88
Phos. Pentoxide	% wt	5.43	7.30	5.11	6.16	6.38	6.00	2.19	0.84
Potassium Oxide	% wt	30.43	21.47	29.85	30.00	18.76	27.94	8.96	3.74
Silicon Dioxide	% wt	22.81	32.39	29.80	44.21	**45.00**	32.30	21.40	7.72
Sodium Oxide	% wt	1.50	4.14	2.12	0.49	3.62	2.06	3.65	1.33
Sulfur Trioxide	% wt	4.47	4.90	8.63	4.82	4.28	5.71	4.16	1.70
Titanium Oxide	% wt	0.03	0.01	0.01	0.10	0.01	0.04	0.09	0.04
Undetermined		25.32	11.94	11.33	6.71	10.43	13.83	18.61	6.94
Alkali, Lb/MMBtu		1.31	1.91	1.69	1.68	1.67	1.65	0.60	0.22
Percent S in Ash		39%	90%	69%	73%	79%	68%	0.51	0.19
Ash Fusion									
CaO (lb/MMBtu, dry)		0.17	0.44	0.24	0.12	0.39	0.24		
K2O (lb/MMBtu, dry)		0.97	1.01	1.16	1.27	0.88	1.12		
SiO2 (lb/MMBtu, dry)		0.73	1.53	1.16	1.87	2.12	1.29		
Ternary CaO		9%	15%	9%	4%	11%	9%		
Ternary K2O		52%	34%	45%	39%	26%	42%		
Ternary SiO2		39%	51%	45%	57%	63%	49%		
ASPEN Inputs									
C (moles / 10-lb dry)		39.46	39.48	39.63	39.18	39.48	39.44		
H2 (moles / 10-lb dry)		27.33	28.43	29.02	28.97	28.43	28.44		
N2 (moles / 10-lb dry)		0.31	0.16	0.17	0.21	0.16	0.21		
O2 (moles / 10-lb dry)		13.58	13.28	13.35	13.42	13.28	13.41		
C6H10O5 (moles / 10 lb)		6.58	6.58	6.61	6.53	6.58	6.57		
H2 excess of C6H10O5		21.85	22.94	23.52	23.53	22.94	22.96		
O2 excess of C6H10O5		10.84	10.54	10.60	10.70	10.54	10.67		

ATTACHMENT 2

SHUTDOWN EMISSIONS SUMMARY

Table Attachment 2-1. Shutdown Emissions Summary

Emission Component	Pollutant *	Planned ** Shutdowns, TPY	Emergency ** Shutdowns, TPY	**Total Annual Emissions (TPY)**
Gasifier Island/Flare	NOX	0.0500	0.0250	**0.075**
	PM/PM10	0.0025	0.0005	**0.003**
	CO	0.0011	0.0008	**0.002**
	VOC	0.0003	0.0002	**0.001**
	SO2	0.0090	0.0060	**0.015**

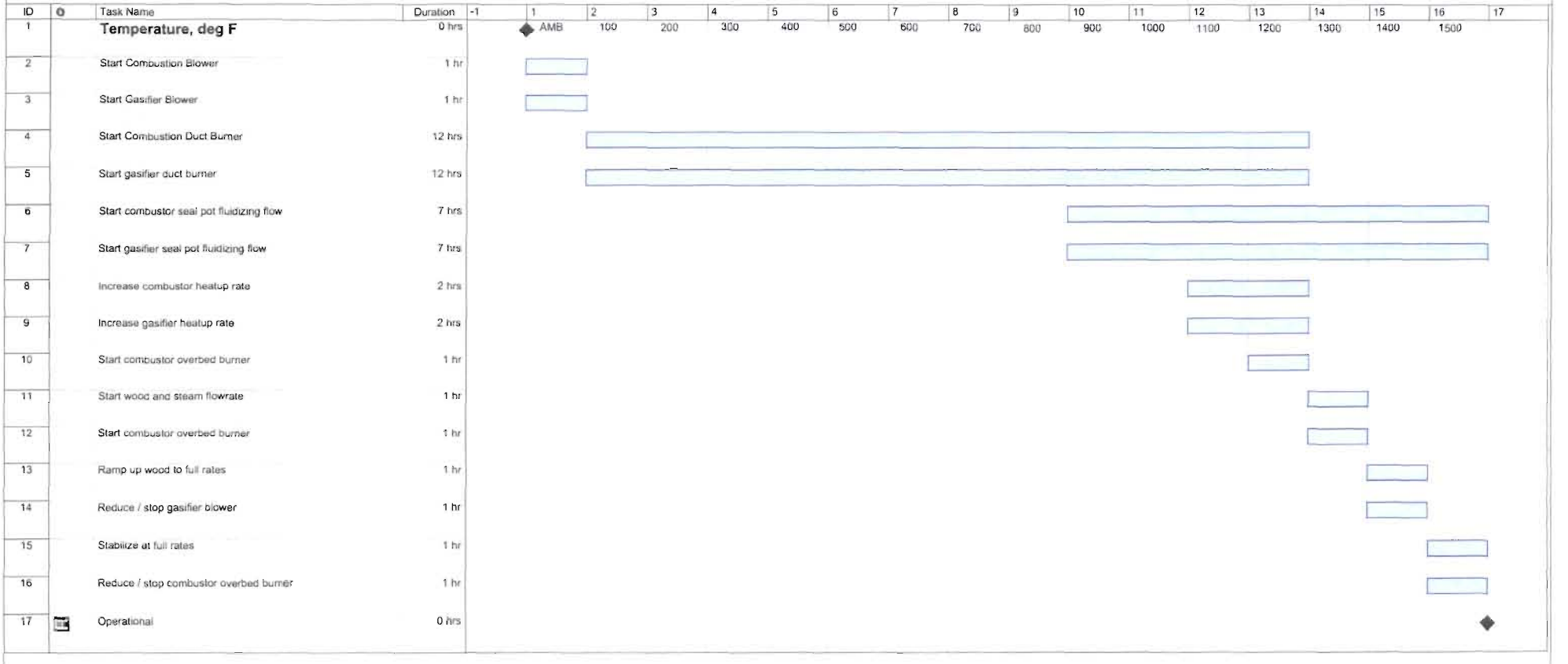
* Based upon information from SilvaGas and AP-42 Section 1.1 for Cyclone Furnace, Bituminous

** Based on an estimated 6 planned shutdowns/yr and an estimated 4 emergency shutdowns/yr

ATTACHMENT 3

STARTUP SCHEDULE AND EMISSIONS

Preliminary
Gasifier Start-Up Schedule



Project: Master BG&E Shell_r
Date: January 8, 2008

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Table Attachment 3-1

Natural Gas Firing (CT Only)			
Sulfur Content		**2 gr/100 scf**	
Heat Input	CT	147 MMBtu/hr	
	DB	-- MMBtu/hr	
	Total	147 MMBtu/hr	
Heating value		1040 btu/cf	
Fuel use		141,346.15 cf/hr	
		1,413.46 100 cf/hr	
S		0.40 lb/hr	
SO2		**0.81 lb/hr**	
Emission Factors	CO	8.2E-02 lb/MMBtu	AP-42 Table 3.1-1
	VOC	2.1E-03 lb/MMBtu	AP-42 Table 3.1-2a
	PMtot	6.6E-03 lb/MMBtu	AP-42 Table 3.1-2a
CO		**0.00 lb/hr**	
VOC		**0.00 lb/hr**	
PMtot		**0.00 lb/hr**	
NOx Conc.		25 ppm	
Volumetric flowrate		142,444.90 acfm	
Stack Temperature		1,074 F	assumed
MW		46	
NOx		**8.78 lb/hr**	

Table Attachment 3-2. Auxiliary Boiler Emissions

Performance	
Fuel Usage (scf/hr-gas)	60,713
Heat Input (mmBtu/hr-HHV)	62.00
Hours per Year	500
Maximum Fuel Usage (mmscf/yr)	30.36
Stack Parameters	
Diameter (ft)	2.75
Height (ft)	50
Temperature (^{o}F)	296
Velocity (ft/sec)	81
Flow (acfm)	29,000
Emissions	
SO_2 -Basis (grains S/100 scf-gas; %S diesel)	2.00
(lb/hr)	0.35
(tpy)	0.01
NO_x - (lb/mmBtu)	0.095
(lb/hr)	5.89
(tpy)	0.09
CO - (lb/mmBtu)	0.08
(lb/hr)	4.96
(tpy)	0.08
VOC - (lb/mmBtu)	0.005
(lb/hr)	0.31
(tpy)	0.00
PM/PM10 - (lb/10^6 ft^3)	1.90
(lb/hr)	0.12
(tpy)	0.00

* Based on AP-42 Section 1.4

Table Attachment 3-3. Combustor & Gasifier Burner Emissions

Performance	
Fuel Usage (scf/hr-gas)	41,176
Heat Input (mmBtu/hr-HHV)	42.00
Hours per Year	72
Maximum Fuel Usage (mmscf/yr)	2.96
Stack Parameters	
Diameter (ft)	TBD
Height (ft)	TBD
Temperature (^{o}F)	TBD
Velocity (ft/sec)	TBD
Flow (acfm)	TBD
Emissions	
SO_2 -Basis (grains S/100 scf-gas; %S diesel)	2.00
(lb/hr)	0.24
(tpy)	0.00
NO_x - (lb/mmBtu)	0.098
(lb/hr)	4.12
(tpy)	0.00
CO - (lb/mmBtu)	0.08
(lb/hr)	3.36
(tpy)	0.00
VOC - (lb/mmBtu)	0.005
(lb/hr)	0.21
(tpy)	0.00
PM/PM10 - (lb/10^6 ft^3)	1.90
(lb/hr)	0.08
(tpy)	0.00

* Based on AP-42 Section 1.4

Table Attachment 3-4. Gasifier Combustor Startup Emissions

Performance	
Product Gas Produced (MMBtu/hr)	376
Quantity of Residual Char (%)	33.0
Heat Input from Residual Char (MMBtu/hr)	124
Char Heating Value (Btu/lb)	14,500
Hours of Operation	72
Stack Parameters	
Diameter (ft)	TBD
Height (ft)	TBD
Temperature (°F)	TBD
Velocity (ft/sec)	TBD
Flow (acfm)	TBD
Emissions	
SO_2 -Basis is feedstock organic sulfur (%)	0.004
Feedstock Rate (dry TPD)	730
(lb/hr)	0.0
(tpy)	0.01
NO_x - with tar recycle (10 hr/SU * 6 SU/yr)	60.00
(lb/hr)	9.9
(tpy)	0.0
NO_x - w/out tar recycle (12 hr/SU * 6 SU/yr)	72.00
(lb/hr)	99.9
(tpy)	0.0
CO - (lb/ton) AP-42, Table 1.2-2	0.6
Char produced (ton/hr)	4.3
(lb/hr)	2.6
(tpy)	0.1
VOC - (lb/ton) AP-42, Table 1.2-6	0.3
Char produced (ton/hr)	4.3
(lb/hr)	1.3
(tpy)	0.0
PM/PM10-(lb/ton) AP-42, Table 1.2-3	71.2
Char produced (ton/hr)	4.3
(lb/hr)	304.6
Cyclone/Baghouse Efficiency (%)	98.0
(tpy)	0.2

Table Attachment 3-5. Flare System Emissions

Parameter		Value	Units	Source/Description
Fuel Flow		19,627	lbm/hr	Gas Analysis 18-Oct -07, Solar
Energy Density		7,337	Btu/lbm	Gas Analysis 18-Oct -07, Solar, Low Heating Value of fuel
Energy Input to Flare		144	MMBtu/hr	Energy Input = Fuel Flow * Energy Density / 1,000,000
Emissions				
TOC -	Emission Factor	0.14	lb/MMBtu	AP-42 Table 13.5-1
	Emission Rate	-	lb/hr	Emission Rate = Emission Factor * Energy Input
	Emission Rate	-	tpy	Emission Rate (tpy) = Emission Rate (lb/hr) * 144 /2000 (144 hr/yr is assumed to be 6 SU/yr @ 24 hr/SU)
CO -	Emission Factor	0.37	lb/MMBtu	AP-42 Table 13.5-1
	Emission Rate	-	lb/hr	Emission Rate = Emission Factor * Energy Input
	Emission Rate	-	tpy	Emission Rate (tpy) = Emission Rate (lb/hr) * 144/2000
NO_x -	Emission Factor	0.068	lb/MMBtu	AP-42 Table 13.5-1
	Emission Rate	-	lb/hr	Emission Rate = Emission Factor * Energy Input
	Emission Rate	-	tpy	Emission Rate (tpy) = Emission Rate (lb/hr) * 144/2000
	Heating Value	435.0	Btu/scf	Heating Value of Syngas @ 14.7 psia & 60°F
SO_2 (Based on Mass Balance) -	Syngas Flow	331,042.1	scf/hr	144 MMBtu * 1,000,000 / 435 btu/scf
	H2S in syngas	0.10	% by vol	Based on untreated gas H2S value of ~ 50 ppm
	H2S Flow	331.0	scf/hr	86687 scfm * 0.0002 vol %
	gas constant	0.0029	cf-atm/mol-K	Constant
	H2S Molar Flow	395.7	g-mol/hr	n= (1 atm) * (17.34 scfm) / (0.0029 cf-atm/mol-K) / (288.7K)
	MW SO2	64.1	g/g-mol	1 mol of H2S forms 1 mol of SO2
	SO2 Mass Flow	25,364.1	g/hr	20.7 gmol/hr * 64.1 g/gmol
	SO2 Mass Flow	**55.9**	lb/hr	5072 g/hr / 453.59 g/lb
	SO2 Mass Flow	**4.0**	tpy	11.2 lb/hr * 144/ 2000
Soot (PM) -	AP-42, Table 13.5-1--- fuels with a C:H ratio of less than 0.33 tend not to soot. The average C:H ratio in the syngas is less than 0.33.			

Table Attachment 3-6. Total Startup Emissions

	Emission Units					Total Emissions
Pollutant	Gasifier/Combustor Burners	Boiler	Combustor	Flare	Combustion Turbines	
NOX	0.15	1.47	3.89	0.7	0.0088	6.2
CO	0.12	1.24	0.09	3.8	0.0121	5.3
PM	0.00	0.03	0.22	Neg	0.0010	0.3
SO2	0.01	0.09	0.01	4.0	0.0008	4.1
VOC	0.01	0.08	0.05	1.5	0.0003	1.6

ATTACHMENT 4

DAHLMAN GAS CLEANUP SYSTEM

DAHLMAN
FILTER TECHNOLOGY

Technical Information Paper — *OLGA Technology*

OLGA Tar Removal

- Biomass gasification to electricity and more.. –

Revision spring 2008

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DAHLMAN
FILTER TECHNOLOGY

Note: The information below reflects proposed operation of the Tallahassee Renewable Energy Center project.

1 Gas Purification Overview

Purification of product gas is an important aspect of operation for the Tallahassee Renewable Energy Center project. The gas purification steps that are necessary and how efficient they should be are dependent upon:

1 Feedstock (e.g. biomass) and its chemical components
2 Gasification technology & operational conditions of the gasifier
3 The application and downstream equipment; how clean should the gas be?

In general, we can identify the following gas treatment steps, summarized in their most logical order

- Particulate removal
  -Cyclones, filters, electrostatic filters
- Removal of organic impurities
  -Tar removal is the most important: OLGA
- Removal of inorganic impurities
  - Removal of nitrogen, halogens (mainly NH_3 and HCl) and low quantities of sulfur (H_2S), by scrubber (water) technology
- Sulfur removal (H2S) by a caustic polishing step
- Removal of volatile (alkali / heavy) metals (e.g. mercury)
  - Mercuric sulfide removed as particulate in the water scrubber; vapor phase mercuric compounds removed in a caustic polishing step.

In general, we can say that the particulates and tars are produced by the gasifier. Gasifier type and operation determine the concentration and composition. OLGA combines the particulate and tar removal and is thus always a close match with the gasifier.

2 Tar Removal From Biomass Product Gas

The presence of tars in the biomass product gas is seen as the biggest issue in its smooth commercial application as a source of sustainable energy. Tar is formed in the gasifier and comprises a wide spectrum of organic compounds, generally consisting of several aromatic rings. The tar concentration

and composition is mostly determined by gasifier type and operation. Simplified tars can be distinguished as "heavy tars" and "light tars":

Heavy tars

Heavy tars condense out as the gas temperature drops and cause major fouling, efficiency loss and unscheduled plant stops. The tar dew point is a critical factor.


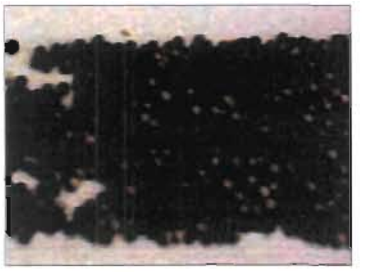


Figure 2.1, 2.2 & 2.3. Heavy tar fouls equipment, left to right: a water scrubber grid, soot formation on catalyst & a gas engine intercooler

Light tars

Light tars, like phenol or naphthalene, have limited influence on the tar dew point, but are not less of an issue. Light heterocyclic tars, like phenol, are very water soluble. These tars will be easily absorbed into water and chemically affect the bleed water of downstream condensers and aqueous scrubbers. Purification of this water is very cost- intensive and will jeopardize the plant's economic feasibility. Naphthalene is important, as it is known to crystallize at the inlet of gas engines causing a high service demand.

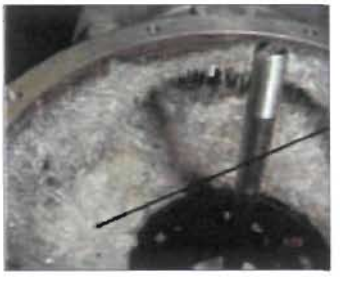


Figure 2.4 & 2.5: light tar fouls equipment & seriously contaminates condense water, Left- a gas engine control valve fouled with naphthalene crystals Right- contaminated condense water samples

Tar defined

A well accepted definition states that tars are all organic compounds with a molecular weight bigger than benzene. BTX (benzene, toluene and xylene) are components which are not considered to be as important, as they are not likely to influence the tar dew point nor to affect waste water treatment. A better and more detailed tar description is given by the classification of tars (see Appendix A).

The tar dew point, a critical parameter

The lowest temperature in the process is determined by downstream equipment and the application of the product gas. As typical tar dew points are between 150°C and 350 °C, and the lowest process temperature is typically 30-40 °C, tar condensation and tar issues are inevitable. It is important to realize that the actual tar concentration is not the most important parameter. It is the tar dew point which defines the point at which tars start to be a concern. One of the most important goals for the OLGA technology is to lower the tar dew point to a level at which such concerns can be excluded.

3 OLGA's Gas Cleaning Process

To introduce you to the OLGA technology, it is important to first show its position in a generic line-up of an integrated air blown gasification system with a gas engine for combined heat & power (CHP) production:

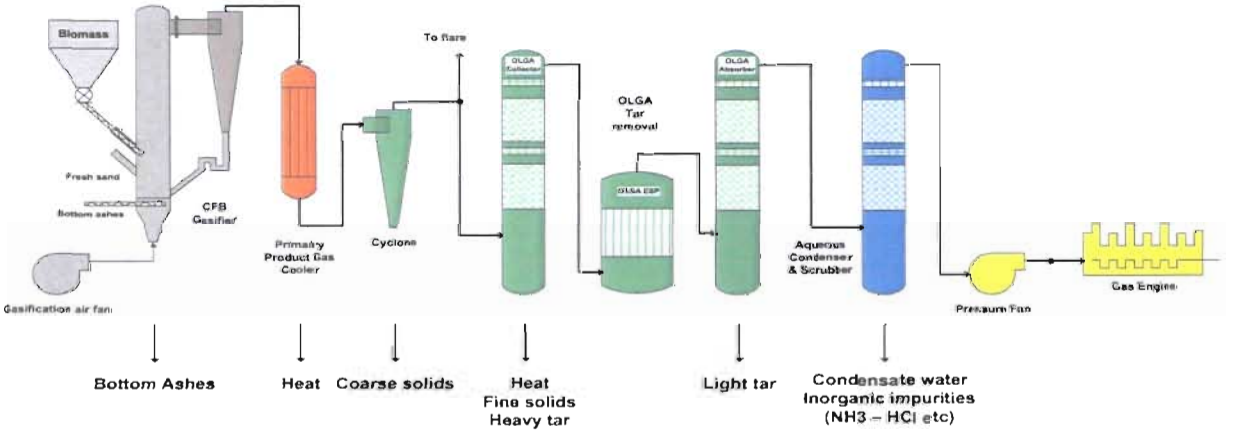

Figure 2.6 Generic line up

Product gas cleaning can be split into the following logical steps:

1. **Solids/dust removal**
2. **Removal of organic impurities (tar)**
3. **Removal of inorganic impurities (e.g., NH3, HCl, H2S)**

Product gas produced by the gasifier contains solids (dust), tars and inorganic impurities (depending on biomass feedstock). It is very important to consider the logical order for cleaning the product gas. In principle, mixing dust, tar and water is to be avoided.

Dust removal with OLGA

Solid particles (dust) can be separated from the product gas upstream OLGA by a cyclone or a hot gas filter (HGF). It is best to separate the dust first, as dust can be removed at a temperature in which water and tars are not present (>400 C). For the Tallahassee Renewable Energy Center project, it was decided to remove the coarse particles with a cyclone. The fine particles which pass this cyclone are captured by the Collector column and the ESP. A very high efficiency on particle capture can be ensured.

Removal of Organic Impurities

The philosophy of OLGA is based on dew point control. Tars have to be removed above the water dew point to a level at which the tar situation cannot occur in downstream equipment (minimal process temperature > tar dew point). In the figure below, the tar and water dew points are shown, together with the logical process steps.

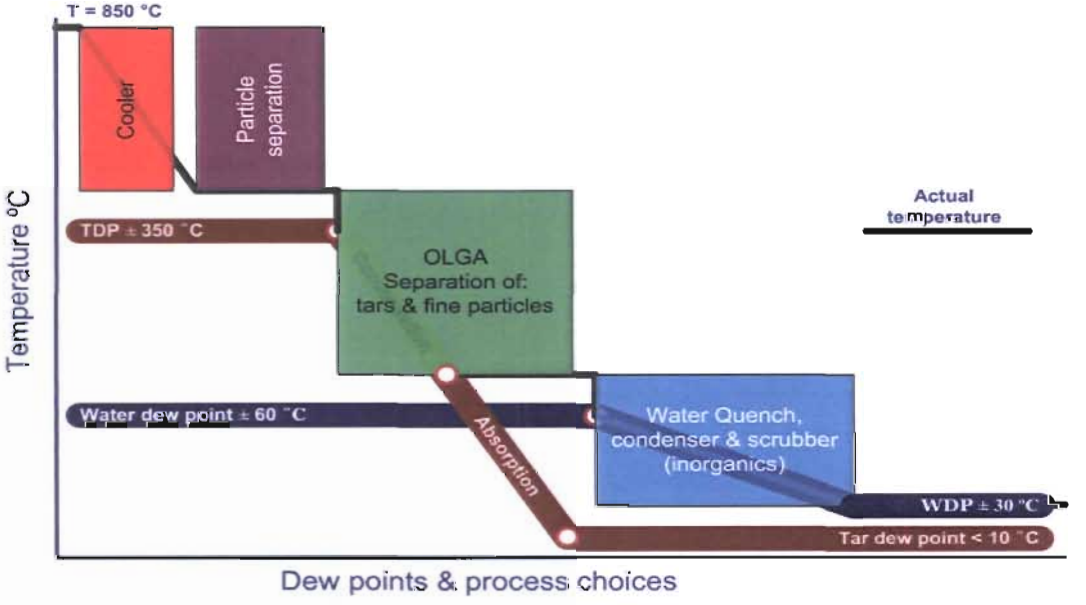

Figure 2.7 Dew points are important for equipment selection

Logical equipment with typical temperatures:

1. Product gas cooler; gasifier exit 700-900 °C– OLGA inlet 380 °C
2. Separation of solids; 380 °C
   - coarse solids by a cyclone (OLGA for fine solid aerosols)
   - all solids by a hot gas filter
3. OLGA tar separation; inlet 380 °C outlet 70-90 °C (safe above water dew point)
4. Water condenser; 70-90 °C to 30 °C
5. Water scrubber; 30 °C

OLGA operates above the water dew point, but decreases the tar dew point to a level under the lowest process temperature. Tar and water are not mixed. The tar removal principle of OLGA is based on a multiple stage scrubber in which the gas is cleaned by special scrubbing oil. In the first section of OLGA (the Collector) the gas is gently cooled down by the scrubbing oil. Heavy tar condenses, is collected, and is separated from the scrubbing oil. The heavy tar condensate, together with the fine solids, is recycled to the gasifier as a liquid. In the second stage (the Absorber / Stripper) lighter gaseous tars are absorbed by the scrubbing oil resulting in a product gas practically free from tars and solids.

In the absorber column, the scrubbing oil is saturated by these lighter tars. This saturated oil is regenerated in a stripper. Hot air is used to strip the tars of the scrubbing oil. This air, loaded with light tars, is recycled to the gasifier for combusting and as a fluidization medium. Hence, the stripper column design is not only based upon tar removal, but also upon the amount of air that can be used by the gasifier.

All heavy and light tars can be recycled to the gasifier where they are destructed and contribute to the overall energy efficiency. Tar waste streams are efficiently recycled this way.

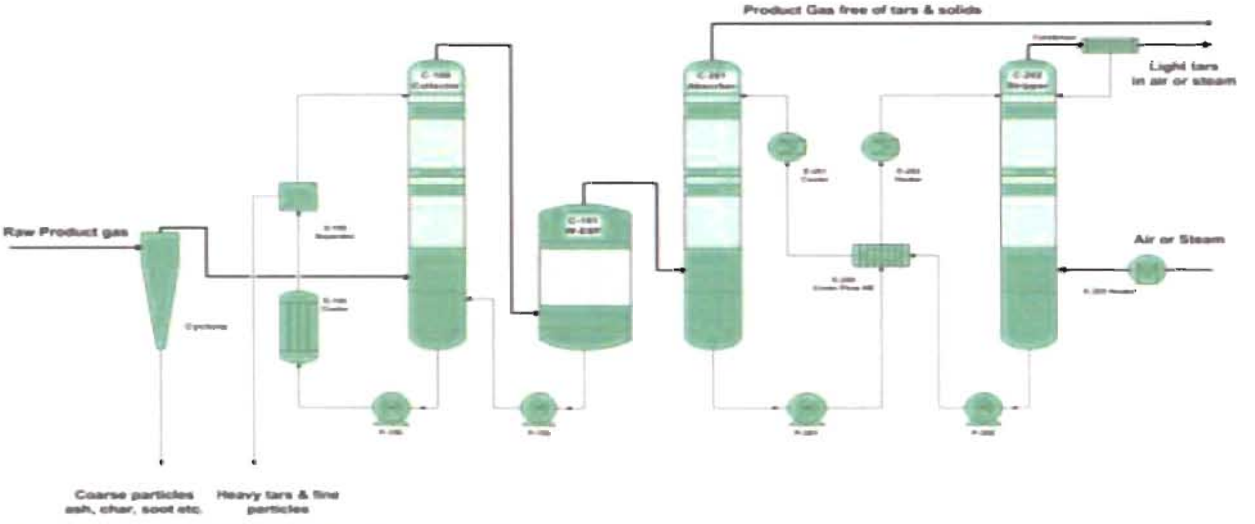

Figure 2.8 Simplified Process Flow Diagram of OLGA

Aqueous Scrubbers, Condensers and Caustic Polishing Downstream of OLGA

When gas is free of tar, an aqueous scrubber column can be operated more efficiently. This aqueous scrubber is normally used for:

1. Cooling the gas by quenching;
2. Further cooling of the gas and removal of the bulk of the water vapor by condensation;
3. Removal of water soluble components like NH_3, HCl, H_2S, if applicable.

The inorganic scrubber system is built as one column which is split into two sections. In section one, the gas will enter the column at the bottom and is scrubbed with cooling water. A large part of the water in the gas will condense and NH3 and HCl will dissolve in the water and be removed from the gas. Also, part of the H2S will dissolve in the water, but not enough to meet the gas turbine specification. Therefore, the inorganic scrubber system is executed with a second section. In this section, the remaining H2S is removed by a caustic polishing step. Diluted sodium hydroxide is the preferred caustic for this use. There is an additional separate section in the water scrubber that has an isolated recirculating loop of caustic soda solution. The primary objective of this section is to remove the remaining H2S by reaction with the caustic, making sodium sulfide.

The following paragraphs provide more detail on the chemistry of mercury within the process and its removal from the system. When the de-tarred product gas goes through the water scrubber at the tail end of gas cleanup, the acid gases and inorganic salts (metallic ions) are cooled down and absorbed to about a 90 percent removal level by the water. The removal level in such a system of mercury is probably low, due to the insolubility of mercury in the water, but the elemental mercury reacts with the H2S present to make mercuric sulfide, and drops out as a particulate in the main recirculating water loop. The recirculating loop of caustic soda solution with sulfides in it provides an ideal solution for scrubbing mercuric compounds out of the vapor phase, with the dissociation constant for mercuric sulfide at 10-35. Thus, all of the remaining mercury will likely be removed here, since the S- ion concentration should be much higher here rather than in the main recirculating water loop.

This is the approach used at mercury cell caustic chlorine plants for removing any traces (i.e., ppt) of mercury from plant waste water and the food-grade product caustic soda. The water is treated with a ppm concentration or lower of S- ions, and the precipitated mercuric sulphide is filtered out. Residual concentrations of mercury in the food grade caustic soda are removed in the same manner, down to non-detectable limits.

Summarized Advantages of OLGA

The principal advantage of OLGA is that it offers a reliable and sensible solution for the tar problem. The advantages can be summarised as follows:

- Minimal tar related problems
  - Increased system stability and availability
  - Minimization of waste water treatment costs
  - No tar waste streams
- Better gas quality compared to a thermal tar cracker
- More reliable and less vulnerable than a catalytic tar cracker
- No waste water impacts as with tar removal in an aqueous scrubber

Appendix A: Tar Classification system

According to the ECN definition, tar comprises all organic components having a molecular weight higher than benzene. Benzene is not considered to be a tar. ECN uses a tar classification system comprising six classes (see Table B.1). This classification system is in particular developed to provide 'easy' insight in the general composition of tar. Trends are easier recognised on the basis of these classes. However, for more specific problems or issues the detailed data will remain necessary.

Class	Type	Examples
1	GC undetectable tars.	Biomass fragments, heaviest tars (pitch)
2	Heterocyclic compounds. These are components that generally exhibit high water solubility.	Phenol, cresol, quinoline, pyridine
3	Aromatic components. Light hydrocarbons, which are important from the point view of tar reaction pathways, but not in particular towards condensation and solubility.	Toluene, xylenes, ethylbenzene (excluding benzene)
4	Light poly aromatic hydrocarbons (2-3 rings PAHs). These components condense at relatively high concentrations and intermediate temperatures.	Naphthalene, indene, biphenyl, antracene
5	Heavy poly aromatic hydrocarbons (≥4-rings PAHs). These components condense at relatively high temperature at low concentrations.	Fluoranthene, pyrene, crysene
6	GC detectable, not identified compounds.	Unknowns

Table B.1: Tar classification system

From the practical viewpoint, the classification comprises only tar components that can be measured. Classes 2 to 6 are sampled using the solid phase adsorption (SPA) method and measured by gas chromatography (GC). Although class 6 tars are sampled and measured (a peak is found in the chromatogram), it is unknown what the individual components are. In principle components in this class belong to the other classes, but are here lumped to a single concentration representing the 'unknowns'. Class 1 represents the heavy tar fraction (roughly ≥7-ring PAHs). These components cannot be determined by the combination of SPA and GC. The components are measured by weight and thus represent the gravimetric tars.

Appendix B: OLGA vs. other tar removal systems

Tars from biomass product gases can be removed with a thermal tar cracker, a catalytic tar cracker or a physical process. The thermal and catalytic tar cracker are installed directly downstream the gasifier and operate at high temperature. The physical processes like an aqueous scrubber or OLGA are installed downstream a product gas cooler. The inlet temperature of a tar cracker is typically 850°C and of a physical process 400°C.

Thermal tar cracking

A thermal tar cracker heats up the product gas to a temperature of 1200°C. At this temperature the tars are removed almost completely leading to a very low tar concentration (<100 mg/m_n^3) and tar dew point (<10°C). The disadvantage of this application of a thermal cracker is the reduction in efficiency. To increase the temperature of the product gas a part of the product gas is combusted with oxygen. Consequently, the system efficiency (biomass to electricity) is reduced as well as the calorific value of the product gas. The reduction in calorific value makes the application of the product gas from a direct air blown gasifier in a gas engine difficult.

Catalytic tar cracking

A catalytic tar cracker does not heat up the product gas and thus eliminates the disadvantages of a thermal cracker. In theory the tar removal efficiency can be complete. However, soot formation and deactivation of the catalyst is a serious problem to be dealt with, resulting in limitations in the process. At the moment, the tar concentration at the inlet of the cracker should remain below 2 g/m_n^3 and the presence of alkali metals and sulphur should be controlled. Several projects have shown that a catalytic tar cracker can be a vulnerable part of the system. Bad tar removal by e.g. catalyst deactivation directly leads to heavy tar problems downstream. In principle the tar removal efficiency is less compared with a thermal cracker but good enough for the application of the product gas in a gas engine.

Tar removal by aqueous scrubbers

Aqueous tar removal systems cool down the product gas and remove the tars by condensation. In most aqueous systems dust and tars are collected simultaneously. The product gas is cooled down and aerosols of dust and tars are collected with a wet ESP downstream. Some systems use a dry hot gas filter (HGF) upstream for dust removal instead of a wet ESP. The HGF reduces the risk of fouling of the aqueous system with dust. The tar dew point downstream an aqueous system is similar to or higher than the operating temperature of the system. Therefore, the total tar content downstream an aqueous system can exceed 1 g/m_n^3. To avoid tar condensation and fouling of piping the gas should not cool down. In the aqueous scrubber system a tar/water problem is created. Mixing (heavy) tars with water will lead to operational difficulties in the scrubber and huge maintenance costs. The most important disadvantage is formed by waste water handling. Waste water handling is often so expensive that the plants economical feasibility is at stake.

ATTACHMENT 5

REQUESTED EMISSION STANDARDS

TABLE ATTACHMENT 5-1

REQUESTED EMISSIONS

Pollutant	*Fuel*	*Method of Operation* [a]	*Stack Test* [b] *(3-Run Average)*		*CEMS* [c] *Compliance*	*Estimated Emissions (Informational purposes only)*
			ppmvd @ 15% O_2	*lb/hr* [d]	*ppmvd @ 15% O_2*	*lb/hr* [d]
NO_X	Product Gas	CT	32.5	--	32.5	18.4
		CT/DB	32.5	--	32.5	19.2
	Natural Gas [e]	CT	25.0	--	25.0	8.8
		CT/DB	--	--	--	--
CO	Product Gas	CT	50.0	--	50.0	17.2
		CT/DB	50.0	--	50.0	21.4
	Natural Gas [e]	CT	--	--	--	12.1
		CT/DB	--	--	--	--
VOC	Product Gas	CT	--	--	--	4.9
		CT/DB	--	--	--	6.5
	Natural Gas [e]	CT	--	--	--	0.4
		CT/DB	--	--	--	--
PM	Product Gas	CT	--	--	--	6.7
		CT/DB	--	--	--	7.2
	Natural Gas [e]	CT	--	--	--	1.0
		CT/DB	--	--	--	--
SO_2 (lb/MMBtu)	Product Gas	CT	0.06	--	--	8.8
		CT/DB	0.06	--	--	11.3
	Natural Gas [e]	CT	0.06	--	--	8.8
		CT/DB	0.06	--	--	11.3

a. CT means operation of CT in combined cycle mode without use of the DB. CT & DB means operation in combined cycle mode and using the DB.

b. The initial and annual U.S. EPA Reference Method tests associated with the certification of the NOx and CO CEMS instruments may also be used to demonstrate compliance with the individual standards for product gas and natural gas. Compliance with the NOx standards will be demonstrated by conducting tests in accordance with EPA Method 7E. Compliance with the CO standards will be demonstrated by conducting tests in accordance with EPA Method 10.

c. CEMS for NO_X and CO will be installed on the HRSG stacks. Correction to 15% O_2 is required for NOx, consistent with the provisions of 40 CFR 60, Subpart KKKK. Compliance with the continuous NO_X and CO standards will be demonstrated based on data collected by the required CEMS. NOx compliance will be based on a 4- hour rolling average for natural gas firing and a 30-day rolling average for product gas firing. CO compliance will be based on a 30-day rolling average. Compliance will be based on all periods, except startup, shutdown, fuel switching or documented malfunction. The CTs will operate above 80% load, or the lowest load at which compliance is demonstrated during initial testing.

d. The mass emission rate estimates are based on a turbine inlet condition of 59° F and may be adjusted to actual test conditions in accordance with the performance curves and/or equations on file with the Department.

e. Limits for natural gas firing are imposed for NOx and SO_2 only, as required by the New Source Performance Standards pursuant to 40 CFR 60, Subpart KKKK. The natural gas fired values provided for other pollutants are for informational purposes only.

ATTACHMENT 6

SO_2 EMISSION ESTIMATES FROM PRODUCT GAS FIRING

Table Attachment 6-1

Product Gas Firing (CT Only, HI = 147 MMBtu/hr) SO2
Based on 5ppm H2S concentration

Conc.	5	ppm	
stack flow rate	403,569	lb/hr	@ 364 deg. F
Heating Value of prod	435	btu/cf	
Temperature	823.67	deg. R	
Heat Input	1.47E+08	Btu/hr	
Volumetric flowrate	########	acfm	@ 364 deg. F
			Assumed MW gas 28.4
SO2	**4.55**	**lb/hr**	
	0.03	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular	= 64	SO2
T =	temperature of gas in	R= F +459.67	

Product Gas Firing (CT/DB, HI= 189 MMBtu/hr) SO2
Based on 5ppm H2S concentration

Conc.	5	ppm	
stack flow rate	410,210	lb/hr	@ 364 deg. F
Heating Value of prod	435	btu/cf	
Temperature	823.67	deg. R	
Heat Input	1.89E+08	Btu/hr	
Volumetric flowrate	########	acfm	@ 364 deg. F
			Assumed MW gas 28.4
SO2	**4.62**	**lb/hr**	
	0.02	**lb/MMBtu**	

lb/hr =(ppm/10^6) x 2,116.8 x (60xV) x (MW/1545.6) x (1/T)

ppm =	parts per million by volume		
V =	volumetric flowrate in acfm or dscfm		
MW =	molecular	= 64	SO2
T =	temperature of gas in	R= F +459.67	

Walker, Elizabeth (AIR)

From: Walker, Elizabeth (AIR)
Sent: Monday, July 28, 2008 11:40 AM
To: 'Forney.Kathleen@epamail.epa.gov'; Sarasua, Armando; Bradburn, Rick
Cc: Linero, Alvaro; Read, David
Subject: BG & E of Tallahassee, Biomass Energy Plant Response to RAI
Attachments: BGE RAI Response.pdf

FYI - Attached is the a Request for Additional Information (RAI) Response from the applicant for the following project:

ARMS PA Project ID:	0730109-001-AC
PSD	Does not trigger PSD
Facility Name:	BG &E of Tallahassee
Project Description:	Construct Biomass Energy Plant
Permit Application Processor:	Al Linero/David Read
Processor Phone:	850/488-0114
Processor Email Address:	alvaro.linero@dep.state.fl.us / david.read@dep.state.fl.us
Received in-house:	April 3, 2008
Document details	Request for Additional Information (RAI) response, received 7/28/2008

Please direct any questions about this project to the Permit Application Processors.

Thanks!

Elizabeth Walker
Bureau of Air Regulation
Division of Air Resource Management (DARM)
(850)921-9505

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Cottondale plant cranks out biofuel

John Crawford

By John Crawford

STATE NEWS COORDINATOR

COTTONDALE - In an unlikely meeting between the new South and the old, a collection of suits and sundresses, hardhats and foreign investors gathered Monday in Jackson County to witness the grand opening of Green Circle Bio Energy's new plant, the largest and most modern wood-pellet producing facility in the world.

The pellets, which look more like rabbit food than biofuel, are made from compressed pine tree pulp and can be used to generate cleaner energy for use in everything from home heating units to coal-burning power plants.

Stephen Adams, the director for the Office of Strategic Projects and Planning at Florida's Department of Environmental Protection, called the facility a harbinger of things to come. "It's an example of green technology and development that we see moving forward in Florida and the world," he added.

While the technology may seem futuristic, the real-time economic benefits were readily apparent throughout the facility. Workers like senior electrician Michael Adkins of Marianna, who started at Green Circle following an 18-month stint in Afghanistan, and systems operator Bill Gause, also of Marianna, both readily signed on at a facility that only one year ago was little more than an idea.

In all, Adkins says Green Circle will employ some 50 people at its Cottondale location.

The process for making the pellets is simple. Green Circle officials say the trees are harvested from within a 50-mile radius of Cottondale at an eventual rate of 4,000 tons per day.

They are then be stripped of their bark, pulverized, dried and finally compressed into low-moisture, 9-millimeter pellets. At maximum production the plant should produce 600,000 tons of wood pellets annually, which will be transported by rail to the Port of Panama City and shipped to Europe for use in Scandinavian power plants.

Wood pellets can offset coal use by between 10 and 20 percent. "There is a good and ready market for wood pellets for power plants in Europe, and the fact that Florida has an abundant supply of biomass puts us at a competitive advantage," Adams says. "Carbon gas is a global pollutant, and any reduction is good. This is a win-win for the region, for Florida and for the environment."