TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Florida Biomass Energy, LLC
9040 Town Center Parkway
Bradenton, Florida 34202

FBenergy Manatee Facility
ARMS Facility ID No. 0810226

PROJECT

Project No. 0810226-001-AC

60.0 Megawatt (net) Woody Biomass Power Plant

COUNTY

Manatee County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Bureau of Air Regulation
Special Projects Section
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

February 26, 2010

1. APPLICATION INFORMATION

1.1. Applicant Name and Address

Florida Biomass Energy, LLC (FBE)
9040 Town Center Parkway
Bradenton, Florida 34202

Authorized Representative: Mr. Rick Jensen, President

1.2. Key Dates

- October 13, 2009 Received air construction permit application from FBE.
- October 31 FBE published Notice of Application in The Bradenton Herald.
- November 10 Department issued request for additional information (RAI).
- November 24 Received response from FBE to Department's RAI.
- December 18 Department issued second RAI.
- January 12, 2010 Received response from FBE to Department's second RAI.
- February 26 Department issued Revised Draft Permit package and posted documents.

1.3. Facility Location

The proposed plant will be located in Manatee County at 11805 US Highway 41 North in Port Manatee, Palmetto, Manatee County. The location of Manatee County (shown in red) and the proposed site are shown in Figures 1 and 2 respectively. The approximate UTM coordinates for this site are Zone 16; 347.8 kilometers (km) East and 3,056.2 km North. The nearest Prevention of Significant Deterioration (PSD) Class I area is the Chassahowitzka National Wilderness Refuge (CNWR). The CNWR is located approximately 110 km north of the site and straddles the coastline in Citrus and Hernando Counties.

Figure 1 – Manatee County, Florida

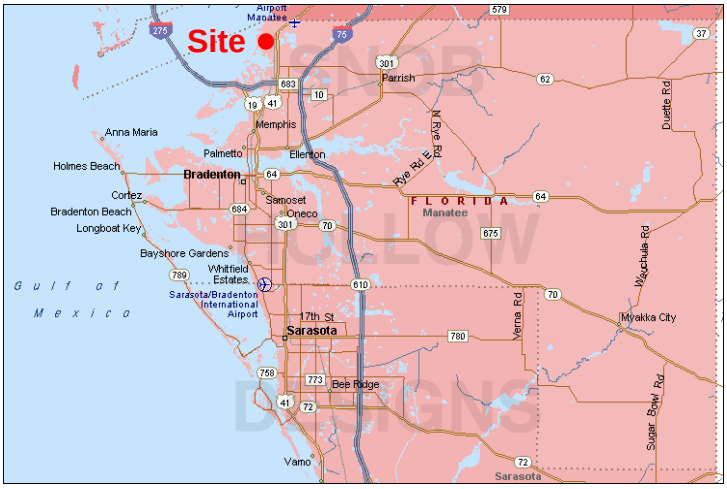

Figure 2 – Map of Manatee County, Location of FBE Site

The immediate environs are visible at the following link: Environs of Proposed FBE Facility

The site is a 44 acre parcel of citrus groves and woods located in northwest Manatee County near Port Manatee. The site is southwest of the defunct Piney Point Phosphates fertilizer complex. It is bordered by the CSX Railroad on the west and US Highway 41 N on the east (see Figure 3). There are woods and an electrical substation to the north. Trielectron Industries is located to the south. Excavation, sand and gravel operations are located to the east across US Highway 41. There are row crops and woods to the west of the CSX Railroad. A conservation area called the Port Manatee Ecological Park lies further west of the mentioned row crops and extends nearly to the Gulf of Mexico shoreline.

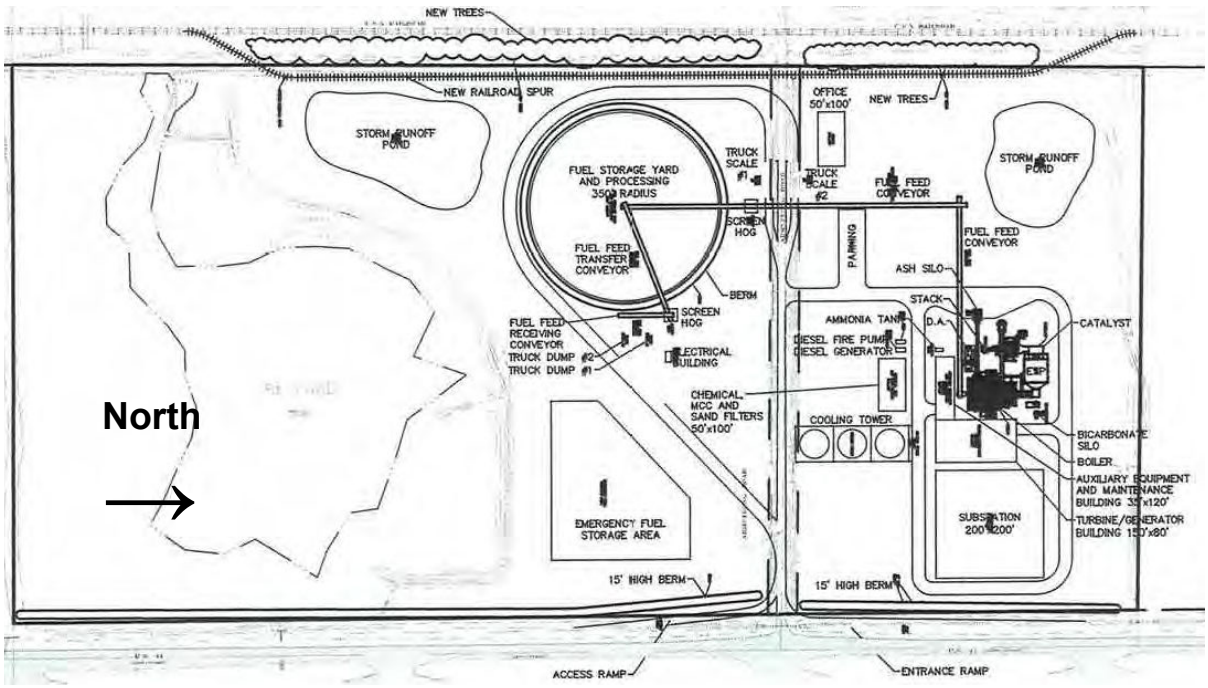

Figure 3 – Proposed Layout between US Highway 41 and the CSX Railroad

1.4. Applicable Federal and State Regulations

Standards of Performance for New Stationary Sources

- 40 CFR 60, Subpart A – General Provisions;
- 40 CFR 60, Subpart Db – Industrial, Commercial, Institutional Steam Generating Units; and
- 40 CFR 60, Subpart IIII – Stationary Compression Ignition Internal Combustion Engines (ICE).

National Emissions Standards for Hazardous Air Pollutants (NESHAP)

The facility is not a major source of hazardous air pollutants (HAP) because it will not have the potential to emit (PTE) 10 tons per year (TPY) of any single HAP or 25 TPY of all HAP. However, the following NESHAP applies to emergency equipment:

- 40 CFR 63, Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines (RICE).

Title IV, Acid Rain Provisions

The facility will be subject to the Title IV, Acid Rain Provisions of the Clean Air Act. The proposed plant will serve an electric generator capable of generating 25 megawatts (MW) or more of electricity and will sell the resultant electricity.

Title V, Permits

The facility is a Title V or "Major Source" of air pollution because the PTE of at least one regulated pollutant will exceed 100 TPY. Key regulated pollutants include carbon monoxide (CO), nitrogen oxides (NO_X), particulate matter ($PM/PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2) and volatile organic compounds (VOC).

Prevention of Significant Deterioration (PSD)

The facility is not classified as a "Major Stationary Source" because it will not have the PTE 250 TPY or more of a PSD regulated air pollutant and is not one of the facility categories with the PSD applicability threshold of 100 TPY as described in Rule 62-210.200, Florida Administrative Code (F.A.C.).

Clean Air Interstate Rule (CAIR)

The FBE facility is subject to CAIR in accordance with the Final Department Rules issued pursuant to CAIR as implemented by the Department in Rule 62-296.470, F.A.C.

Power Plant Siting

The facility is not subject to certification pursuant to the power plant siting provisions of Rule 62-17, F.A.C. because it will produce less than 75 MW of steam power.

2. PROPOSED PROJECT

2.1. Project Description

The applicant proposes to construct a woody biomass electric power plant. The proposed plant will be capable of generating approximately 60.0 MW (net – i.e. after deducting the parasitic load to operate the plant) of electrical power by combusting woody biomass in a grate-type suspension boiler (GSB) and feeding the steam to a steam turbine-electrical generator (STG).

The power plant will be comprised of four process areas. These process areas include:

- Fuel receiving, handling, storage and processing;
- Power island (steam generating unit), including a GSB, cooling tower and STG;
- Ash handling, storage and shipment; and
- Emergency support equipment.

2.2. Additional Project Features

Fuel

FBE proposes to fuel the new GSB with biomass fuel wood chips. The boiler will be equipped with start-up ignition burners using biodiesel fuel and occasionally, ultralow sulfur distillate (ULSD) fuel oil (FO). The emergency generator and fire water pump will be also fueled with bio-diesel or with ULSD FO as back up fuel.

Air Pollution Controls

The proposed power plant will utilize the following control devices and techniques to control air pollutants, as described below:

Fuel Receiving, Handling, Storage and Processing

- Employment of a first-in/first-out stacking and reclaiming system with minimal drop lengths to minimize dust generation, biological degradation and odors.
- All conveyor systems in the fuel receiving, handling, storage and processing system will be designed to minimize emissions of PM/PM_{10}/$PM_{2.5}$ through the use of Best Management Practices (BMP).
- BMP will include enclosed conveyors, also to the extent possible enclosed chutes for dropping fuel to and from conveyors, and maintenance of paved roads to minimize fugitive dust generating materials on roadways.
- Other reasonable precautions as described in Rule 62-296.320(4)(c), F.A.C.

Power Island

- Emissions of PM/PM_{10}/$PM_{2.5}$ from the GSB will be controlled by a “hot-side” electrostatic precipitator (ESP) located upstream of the air heater.
- SO_2 and sulfuric acid mist (SAM) from the GSB will be controlled by use of inherently low sulfur wood, biodiesel and ULSD FO, and a dry in-duct sorbent injection system (IDSIS).

- NO_X from the GSB will be controlled by good combustion practices (GCP) and an ammonia (NH_3) based selective catalytic reduction (SCR) system located on the "clean-side" downstream of the ESP.
- Emissions of CO and VOC from the boiler will be controlled by GCP and an oxidation catalyst (ox-cat) system also located on the "clean side" downstream of the ESP.
- Emissions of HAP from the GSB will be controlled by GCP, use of untreated woody biomass (inherently low in chloride), the IDSIS, the ESP, the SCR system and the ox-cat system.

Ash Handling, Storage and Shipment

- Emissions of $PM/PM_{10}/PM_{2.5}$ from the fly ash silo will be controlled by a baghouse or similar filter.
- BMP will be utilized during truck loading operations to minimize PM/PM_{10} emissions.

Emergency Support Equipment

- An emergency diesel generator and a fire pump will be designed to meet the emission limits given in NSPS Subpart IIII and NESHAP Subpart ZZZZ.
- Biodiesel and backup ULSD FO will be used in the emergency equipment. Operation will be limited to 500 hours per year (hr/yr) for the emergency diesel generator and 250 hr/yr for the fire pump.

3. PROCESS DESCRIPTION

3.1. Principle

Wood chips will be combusted in a nominal 757 million Btu per hour (mmBtu/hr) GSB. The total maximum heat input capacity will be 833 mmBtu/hr on a 4-hour average basis. The maximum heat input capacity of the backup ULSD FO to the unit is limited to less than 250 mmBtu/hr. The steam produced will then be sent to a STG that will generate approximately 66 MW (gross) of electricity of which approximately 60.0 MW will be delivered to the grid.

3.2. Biomass Feedstock

FBE's contract fuel processor will collect wood waste at several off-site locations, where the fuel will be air-dried, chipped to size, and screened at a remote fuel preparation area. A fuel crop is under consideration to supplement available feedstock supplies. Biomass fuel will generally be delivered via truck to the site on 6-days a week, 12 hour per day schedule.

Delivery trucks will be unloaded via a truck receiving system equipped with two hydraulically operated truck dumpers. The fuel will be conveyed, via an enclosed collecting conveyor, to the fuel storage pile. The fuel storage pile will contain 10 to 14 days of fuel storage. From the fuel storage pile, the fuel will be conveyed to a magnetic separator/sizing screen and will then be transferred to the day-bins within the boiler structure.

3.3. Stackout System

The feedstock material handling process associated with fuel delivery (stackout) is depicted in Figure 4. All wood waste material will be delivered to the project site via truck. The fuel trucks will have an average net load of 25 tons of wood chips. The truck receiving system will be equipped with two hydraulically operated truck dumpers, which will slide each 25 ton load into a 50 ton capacity, fully-enclosed live-bottom receiving hopper. Each hopper will have a very slow moving chain drag to minimize dust. The hoppers will have a discharge rate capability of 150 tons per hour (TPH).

From the bottom of the two collection hoppers, the wood chips will be discharged at a controlled rate, via an enclosed chute, onto a collecting conveyor. The collecting conveyor transfers the incoming fuel to a magnetic separator, sizing screen, and hog mill for reduction of oversize material. These components are mounted in a tower, which is equipped with dust collection hoods at transfer points, which convey emissions to a fabric filter to minimize dust. Separated ferrous metal is discharged by chute to a skip at grade for recycling. The combined streams from the sizing screen and the hog mill are then discharged onto a covered collection conveyor which feeds the stack-out system.

The stack-out system will provide approximately 20,000 tons of biomass storage, using a stacking system that continuously adjusts the height of the discharge just above the pile height, to minimize dust.

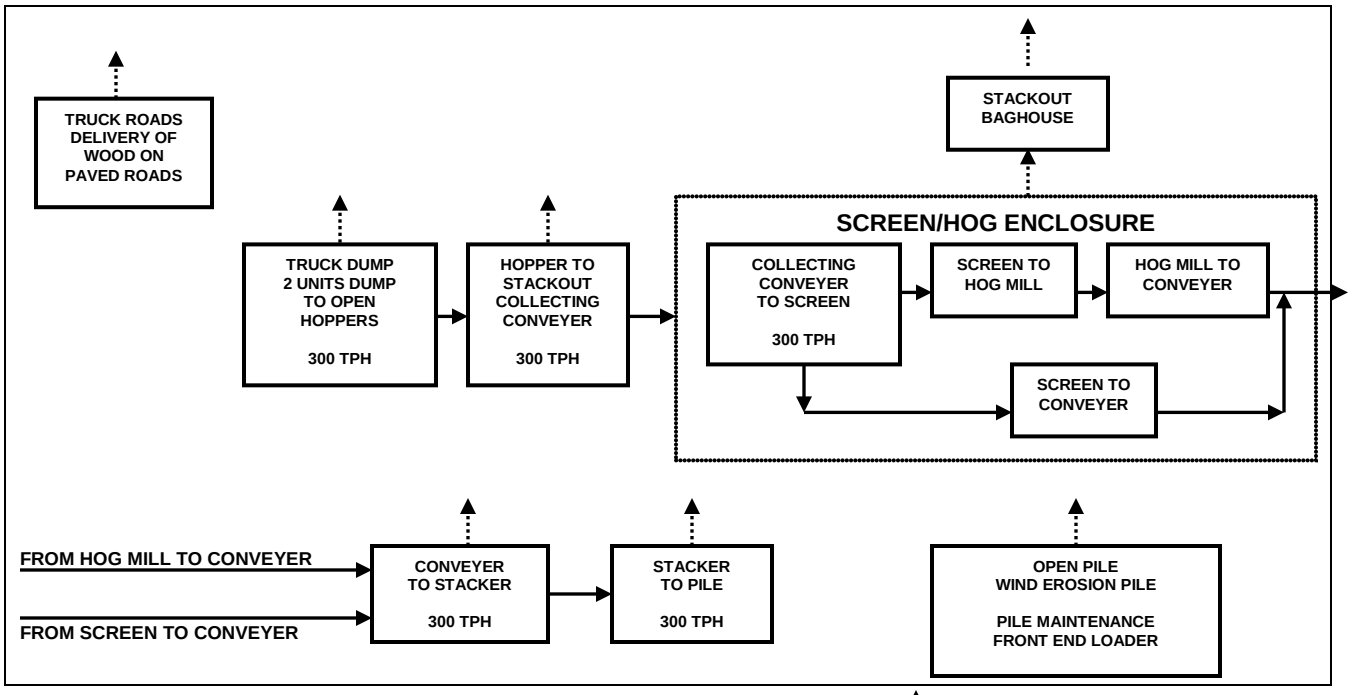

Figure 4 – Material Handling Emission Points – Stackout (Emission Point ⋮ Material Flow ⟶)

3.4. Reclaim System

The feedstock material handling process associated with fuel reclaim is depicted in Figure 5. Wood chips will be reclaimed from the storage pile via a drag chain or auger type reclaimer to a covered conveyor identified as Reclaim Conveyor No. 1. Reclaim Conveyor No. 1 will transfer the material to a second enclosed magnetic separator and sizing screen system and then transfer the screened fuel to the covered Supply Conveyor No. 2. The magnetic separator and sizing screen system will be controlled by a fabric filter. The covered reclaim conveyors are rated at 150 TPH.

The anticipated average reclaim rate is estimated equal to 68 TPH hour based on a boiler heat input rate of 757 mmBtu/hr. Covered belt conveyors will then transport the feedstock to a storage silo (day bin) within the boiler structure. Particulate emissions from these transfer points are kept to a minimum through special designs. All conveyors will be covered to reduce particulate emissions. In addition, and as depicted in Figure 5, a fabric filter will control emissions from the day bin and from transfer of material from the day bin to the boiler.

3.5. Emergency Short-Term Fuel Feed System

The feedstock material handling process will also include an emergency short-term fuel feed system, as depicted in Figure 6. An at-grade back-up emergency fuel storage area, located adjacent to the fuel truck access road, sufficient for an additional 30,000 tons of fuel, will be used in the event of major repairs to the stack out or reclaim systems. The emergency pile will be transferred to the truck dump hoppers via front-end loaders and will utilize the enclosed by-pass conveyor to by-pass the stacker to transport the material directly to the boiler.

The enclosed by-pass conveyor between the primary screening tower and the reclaim conveyor screening tower will enable the stack-out and reclaim systems to undergo routine maintenance without shutting down the boiler. The transfer points to and from this conveyor are covered by the same hoods and extraction systems that control dust from the screening towers.

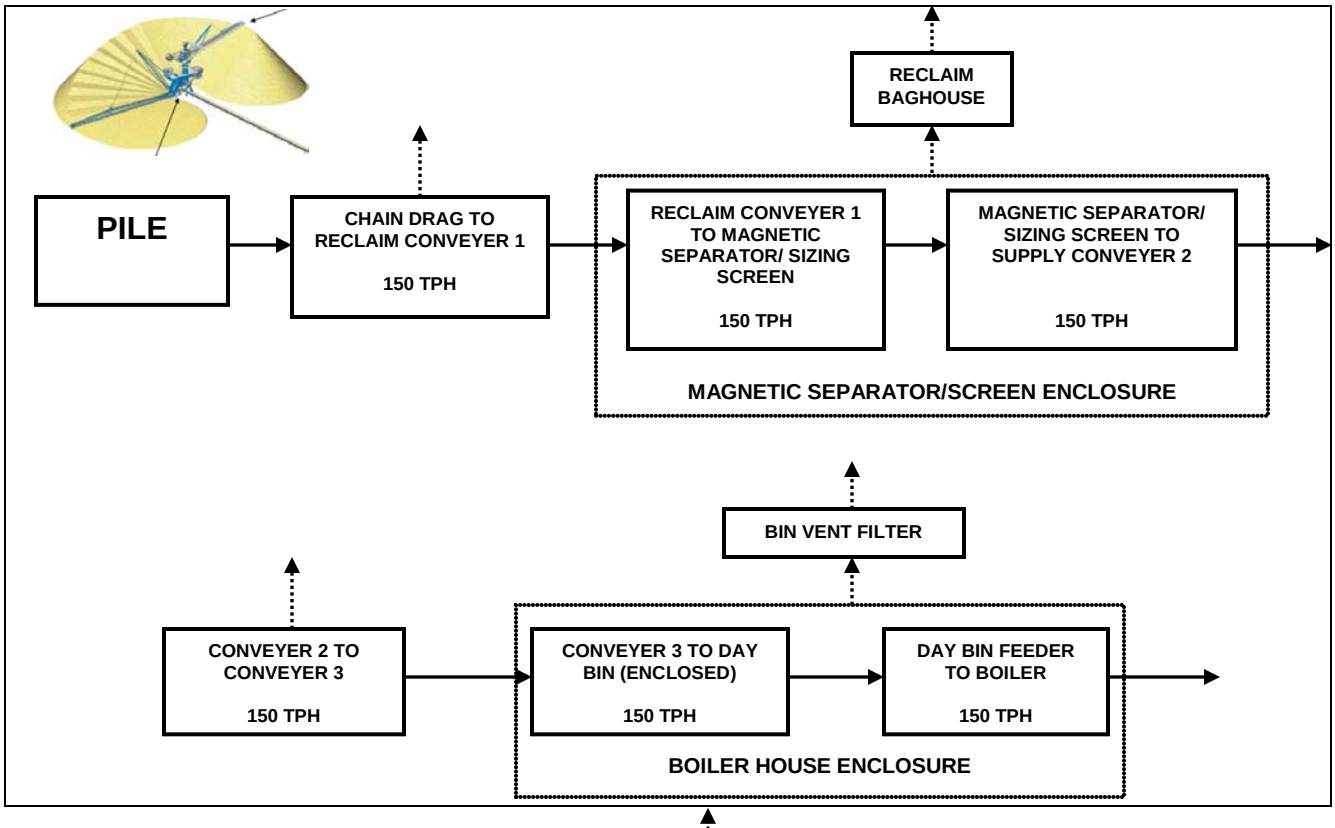

Figure 5 – Material Handling – Reclaim (Emission Point ⋮ Material Flow ⟶)

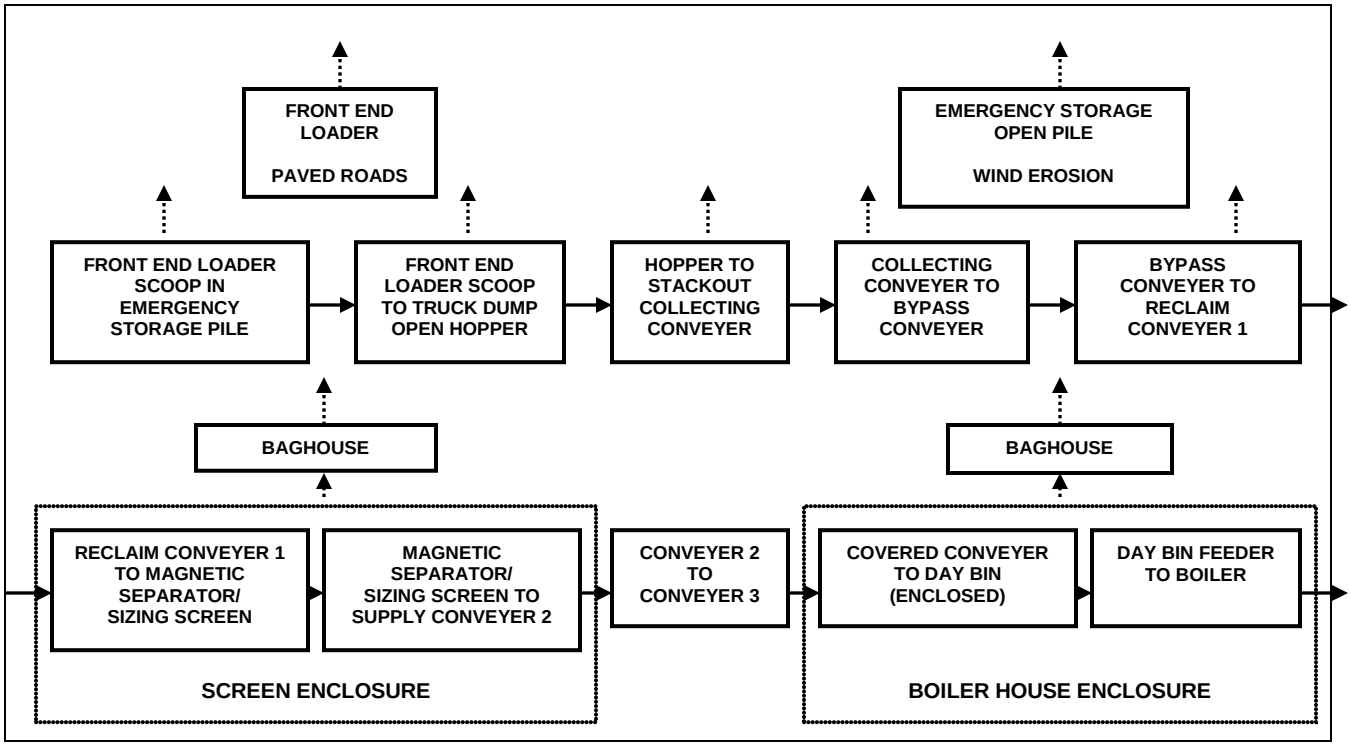

Figure 6 – Material Handling –Short-Term Feed System (Emission Point ⋮ Material Flow ⟶)

3.6. Material Handling, Ash and Sorbent

The material handling systems for the ash and sorbent streams are depicted in Figure 7. Sodium Bicarbonate ($NaHCO_3$) will be delivered to the site via truck and will be unloaded to bicarbonate storage silos. The storage silos will be equipped with fabric filters to minimize PM emissions from the unloading process. The sorbent will then be injected by the dry sorbent injection control system.

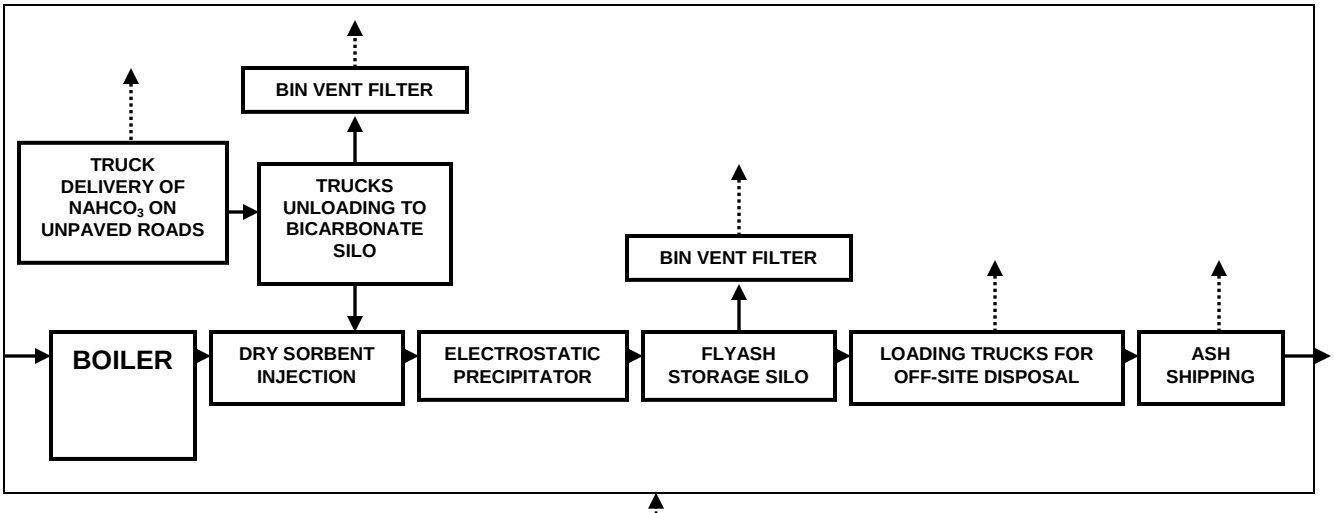

Figure 7 – Ash and Sorbent Handling (Emission Point ⋮ Material Flow ⟶)

Bottom ash will be collected from the boiler by a submerged drag-chain conveyor, which will deliver a wet material to the ash silo. Fly ash captured by the ESP will be transported by an enclosed conveyor or similar configuration to the ash storage silo. The storage silo will be equipped with a fabric filter to minimize any PM emissions from the transfer operation. Ash from the storage silo will then be loaded, via an ash conditioning mixer which produces a non-dusting material, to a truck for removal off-site.

3.7. FBE's Best Management Practices Plan Proposal

In response to a request for additional information, FBE submitted the principles and specifics listed below for a preliminary BMP plan. The Department incorporated these principles and specifics along with additional requirements in a BMP plan given in Section 6 that will be incorporated into the permit.

FBE Best Management Plan to manage the fuel pile will have as its goals:

1. *Avoidance of conditions giving rise to spontaneous combustion, supported by the fire control systems to be provided after approval by State and insurance entities, which specifically will provide fuel pile fire control, and these systems will be reviewed and approved as part of the overall fire prevention plans by the County Fire Marshall;*
2. *Minimization of fugitive dust emissions, also using fuel pile fire protection facilities for dust suppression as required; and*
3. *Blending of the various fuels received to ensure reasonably consistent fuel properties as delivered to the boiler.*

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

Measures to Minimize Spontaneous Combustion

1. *Daily inspection for fire hazards, plus video surveillance;*
2. *The stack-out/reclaim plan will ensure reclaim of older material to avoid accumulation of fuel with a significant age. The first-in/first-out (FIFO) procedure will be slightly modified to ensure blending of*

older and newer fuel for consistent fuel properties. The equipment, by design, will manage and handle the approximate 10 to 14 day supply of fuel (approximately 20,000 to 25,000 tons depending on moisture content). This will ensure a quick turnover of feedstock in order to make more room for deliveries. Additional space has been reserved for the potential short term handling of material such as processed storm debris from sources such as FEMA, the County and State. Short term material stored on-site will be protected from fire hazard and will be moved to the primary fuel storage, generally within 14 to 21 days.

3. *Use of daily inspections and fire-water cannons, mounted on elevated structures, together with mobile equipment to uncover and rapidly extinguish any smoldering materials found; and*
4. *The size of the fuel storage pile will not exceed the design value – this is a primary control measure, based upon the limited on-site fuel storage of about 2 weeks' worth of fuel. Specifically, the stacker will build a pile in zones up to 40 feet high and the reclaimer will start with the first zone built and reclaim the pile down to within two inches of grade.*

Measures to Minimize Fugitive Dust

1. *The size of the fuel storage pile, about 2 weeks' worth of fuel, minimizes the area subject to wind erosion and reduces the travel time required for mobile equipment;*
2. *Conveyor transfer points are enclosed or partially enclosed;*
3. *Drop points to the fuel storage areas are designed to minimize the exposed drop height;*
4. *Transfer points and fuel bins are equipped with vent filters;*
5. *Underpile fuel reclaimers do not generate fugitive dust;*
6. *Fuel handling equipment is observed daily for proper operation and for maintenance requirements;*
7. *Plant fuel handling personnel will implement a procedure for observing and controlling unplanned fugitive dust emissions, including truck handling and unloading, and dirt or fuel on roads; and*
8. *All major roadways will be paved. Plant personnel will spray, scrape, or otherwise remove dirt or spilled fuel on plant roads.*

Storage Pile Management

1. *Operational plans will recognize conditions such as high winds likely to result in excessive fugitive dust and will curtail movement of fuel by mobile equipment under such conditions;*
2. *Mobile equipment will be used to maintain the pile's design shape and to ensure adherence to FIFO in reclaim operations; and*
3. *The area surrounding the fuel storage as well as bordering the property will have significant landscape screening that will provide further shielding of the fuel pile from winds.*

3.8. Power Generation

Biomass Fired-Boiler

FBE will utilize grate stoker technology within a conventional waterwall furnace. Modern stoker units for wood firing are normally mechanical rotating grates or water/air-cooled vibrating grates depending on the fuel moisture content. Fuel is typically introduced into the boiler through multiple fuel chutes. Preheated combustion air is supplied under the grate as well as above via an overfire air (OFA) system. Depending on the fuel moisture content, the combustion air is pre-heated to 350 to 650 °F.

Due to high shaft velocities in the lower furnace and the manner by which fuel is spread or thrown onto the grate, some unburned fuel is carried out of the furnace. In order to recover the energy value stoker-fired boilers typically include a re-injection system that recycles the carbonaceous ash back into the furnace.

Because of the hot particle carryover and possible effects on fabric filters, ESP technology is usually incorporated into wood biomass stoker technology projects. A mechanical dust collector is also typically installed to prevent heavy (possibly abrasive) particle carryover from reaching the precipitator.

The grate for the project boiler will be provided by Detroit Hydro-Grate. Figure 8 includes a diagram of such a grate and a typical stoker-based process schematic. Sized fuel is metered to a series of distribution devices which spread it uniformly over the stoker grate surface. Fine particles of fuel are rapidly burned in suspension assisted by overfire air (OFA). Coarser, heavier fuel particles are spread evenly on the grate forming a thin, fast-burning fuel bed.

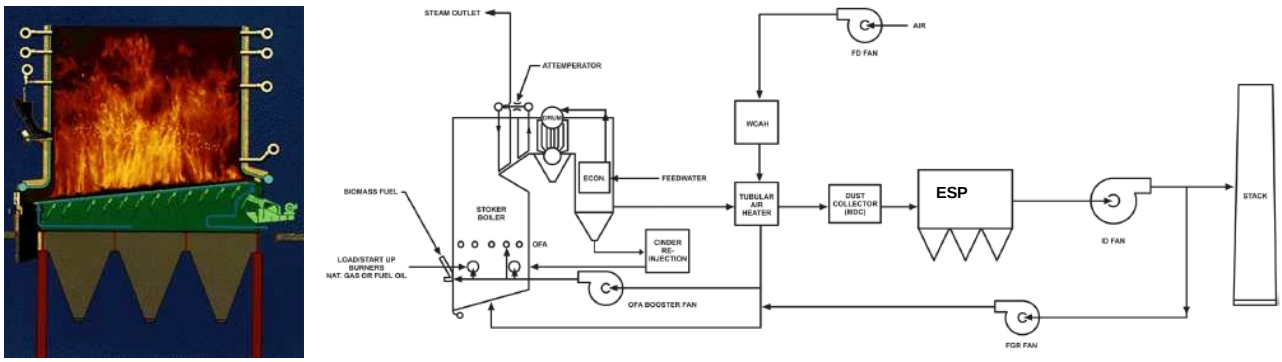

Figure 8 – Detroit Hydro-Grate and Typical Stoker-based Process Schematic

The Detroit Hydro-Grate stoker includes an automatic ash discharge system and water-cooled grates. The higher combustion air temperature needed to burn high moisture fuel can be maintained without damaging the grates.

The boiler will be rated at 757 mmBtu/hr (833 mmBtu/hr maximum). The average heat content of the fuel is estimated to be approximately 5,600 mmBtu/lb on a higher heating value (HHV) basis. The planned layout differs from that given in Figure 8 because the dust collector and ESP as well as SCR and ox-cat systems (not shown) will be placed upstream of the air heater.

The GSB will generate 560,000 pounds per hour of (lb/hr) of steam at 1,550 psi and 960 degrees °F in conventional waterwall boiler tubes. The boiler will be equipped with start-up ignition burners using biodiesel fuel and as a backup ULSD FO. The boiler will be a top-mounted unit in which the boiler pressure parts are suspended from a steel structure and support grid. The boiler is complete with all necessary fans, economizers, air heaters, duct-work and controls, as well as steam soot-blowers.

A 133 foot stack will be located downstream of the final heat recovery equipment. The stack will be adjacent to the boiler structure and will include a dedicated platform for stack testing.

Steam Turbine

The steam cycle consists of a single STG with a minimum of three extraction points at which steam at different pressures is extracted for regenerative heating of the boiler feed water, as well as stripping the feed water of dissolved oxygen in the de-aerator section to minimize corrosion. Feed water to the boiler economizer is supplied at 440 degrees °F.

Turbine exhaust steam enters the condenser, where its heat is rejected to atmosphere by heating and evaporating water. From the condenser, turbine condensate is pumped through heat exchangers first to the de-aerator, and then by high pressure boiler feed water pumps to the boiler economizer to complete the cycle.

Cooling Tower

The heat absorbed by the circulating cooling water in the condenser tubes must also be removed to maintain the ability of the water to cool as it circulates. This is done by pumping the warm water from the condenser

through a cooling tower that reduces the temperature of the water by evaporation and expelling the heat to the atmosphere.

FBE is evaluating the alternatives of a conventional separate condenser fed by cooling water from a cooling tower and circulating pumps and a wet surface evaporative condenser.

3.9. Emergency Support Equipment

The proposed plant will also require:

- One 500 kilowatt (kW) emergency electrical generator fueled by biodiesel or backup ULSD FO;
- One 250 kW emergency fire water pump fueled by biodiesel or backup ULSD FO; and
- Two above ground storage tanks for biodiesel and backup ULSD FO.

3.10. State Regulations

The project is subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.) and to the following rules in the F.A.C.

F.A.C. Rule	Description
62-4	Permits
62-204	Air Pollution Control – General Provisions
62-210	Stationary Sources of Air Pollution – General Requirements
62-212	Stationary Sources - Preconstruction Review
62-213	Operation Permits for Major Sources of Air Pollution
62-214	Requirements for Sources Subject To the Federal Acid Rain Program
62-296	Stationary Sources - Emission Standards
62-297	Stationary Sources - Emissions Monitoring

3.11. Potential Emissions and PSD Non-Applicability Determination

The Department regulates major stationary sources of air pollution in accordance with Florida's Prevention of Significant Deterioration (PSD) program, as defined in Rule 62-212.400, F.A.C. Per Rule 62-210.200, (Definitions), F.A.C., a major stationary source is

1. *Any of the following stationary sources of air pollutants which emits, or has the PTE, 100 TPY or more of any PSD pollutant:*
    - *Fossil fuel-fired steam electric plants of more than 250 mmBtu/hr heat input,*
    - *Coal cleaning plants (with thermal dryers),*
    - *Kraft pulp mills,*
    - *Portland cement plants,*
    - *Primary zinc smelters,*
    - *Iron and steel mills,*
    - *Primary aluminum ore reduction plants,*
    - *Primary copper smelters,*
    - *Municipal incinerators capable of charging more than 250 tons per day of refuse,*
    - *Hydrofluoric, sulfuric, or nitric acid plants,*
    - *Petroleum refineries,*
    - *Lime plants,*
    - *Phosphate rock processing plants,*
    - *Coke oven batteries,*
    - *Sulfur recovery plants,*
    - *Carbon black plants (furnace process),*
    - *Primary lead smelters,*

- *Fuel conversion plants,*
- *Sintering plants,*
- *Secondary metal production plants,*
- *Chemical process plants,*
- *Fossil-fuel boilers (or combination thereof) totaling more than 250 mmBtu/hr heat input,*
- *Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels,*
- *Taconite ore processing plants,*
- *Glass fiber processing plants,*
- *Charcoal production plants; or*

2. *Any stationary source which emits, or has the PTE, 250 TPY or more of a PSD pollutant; or*
3. *Any physical change that would occur at a stationary source not otherwise qualifying as a major stationary source, if the change would constitute a major stationary source by itself.*

The proposed plant category is not among the bulleted stationary sources listed in paragraph 1 above, that would be classified as a major stationary source based on the PTE 100 TPY of a regulated PSD air pollutant. To be considered a major stationary source, it would be necessary for the PTE from this project to equal or exceed 250 TPY of any regulated PSD air pollutant.

The project will result in emissions of NO_X, CO, particulate matter (PM, PM_{10} and $PM_{2.5}$), SO_2, small amounts of SAM (sometimes expressed as H_2SO_4), VOC and HAP.

Table 1 summarizes the applicant's estimates of key regulated air pollutants from the proposed woody biomass electric power plant.

Potential emissions of any regulated PSD air pollutant will not equal or exceed 250 TPY, based on operational design and associated emission limits. Therefore, the proposed woody biomass electric power plant will not be subject to the PSD rules including PSD ambient air modeling or a requirement for a best available control technology (BACT) determination under that program.

Table 1 - Estimated PTE Criteria Air Pollutants (in TPY)

Source Operation	PM	PM_{10}	$PM_{2.5}$	NO_X	SO_2	H_2SO_4	CO	VOC	HAP
Boiler	33.16			66.31	53.05	1.19	97.81	9.95	24.94
Emergency Generator	0.055			0.99	0.002	minimal	1.0	0.12	0.003
Emergency Fire Pump	0.014			0.25	0.0005	minimal	0.24	0.03	0.001
Material Handling	8.91	2.58	0.43	--	--	--	--	--	--
Cooling Tower	2.44	0.38	0.38						
Project Total	44.6	36.2	34.0	67.6	53.1	1.2	99.0	10.1	24.95

3.12. New Source Performance Standards and National Emissions Standards for HAP

The proposed project is subject to the following NSPS regulations:

- NSPS Subpart A – General Provisions;
- NSPS Subpart Db – Industrial, Commercial, Institutional Steam Generating Units; and
- NSPS Subpart IIII – Stationary Compression Ignition Internal Combustion Engines.

The relevant emission standards presented in Table 2 include the NSPS Subpart Db emission standards applicable to the GSB.

Table 2 - NSPS Subpart Db – Emission Standards Applicable to GSB

Source	SO_2 limit[1, 4] (lbs/mmBtu)	PM Limit[2] (lb/mmBtu)	Opacity[3] (%)	NO_X[4] (lb/mmBtu)
GSB	0.32	0.030	20%	0.20

1. Sources that achieve this limit are excluded from other SO_2 reductions under NSPS Db.
2. Filterable PM only.
3. 6-minute average, except for one 6-minute period per hour of not more than 27% opacity.
4. 30-day basis.

Tables 3 and 4 include the NSPS Subpart IIII emissions standards for the emergency generator and the emergency fire pump.

Table 3 - NSPS Subpart IIII – Emission Standards Applicable to Emergency Generator

Emergency Generator (> 450 kW and ≤ 560 kW)	CO (g/kW-hr)[1]	PM (g/kW-hr)	SO_2[2] (% S)	NMHC[3]+NO_X (g/kW-hr)
Subpart IIII (2007 and later)	3.5	0.20	0.0015	4.0

1. g/kW-hr means grams per kilowatt-hour
2. SO_2 emission standard will be met by using biodiesel or ULSD FO in the emergency generator with fuel sulfur (S) content of 0.0015% by weight.
3. NMHC means Non-Methane Hydrocarbons.

Table 4 - NSPS Subpart IIII – Emission Standards Applicable to Emergency Pumps

Emergency Pumps (≥ 175 hp and < 750 hp)	CO (g/hp-hr)[1]	PM (g/hp-hr)	SO_2[2] (% S)	NMHC+NO_X (g/hp-hr)
Subpart IIII (2009 and later)	2.6	0.15	0.0015	3.0

1. g/hp-hr means grams per horsepower-hour
2. SO_2 emission standard will be met by using biodiesel or ULSD FO in the emergency pump with a fuel sulfur content of 0.0015% by weight.

In addition to NSPS Subparts Db and IIII, other conditions and emission standards are required to insure that the facility-wide PTE of each PSD pollutant (excluding fugitive emissions) will be less than 250 TPY.

The emergency equipment associated with the proposed woody biomass power plant is also subject to the applicable area source requirements of NESHAP Subpart ZZZZ. This subpart requires all affected area source units to meet the applicable emission standards of Subpart IIII.

3.13. Other Department Rules Potentially Applicable to the Project

- Rule 62-296.401, F.A.C. - Incinerators;
- Rule 62-296.410, F.A.C. - Carbonaceous Fuel Burning Equipment;
- Rule 62-296.416, F.A.C. - Waste-to-Energy Facilities;
- Rule 62-296.406, F.A.C. – Fossil Fuel Steam Generators with Less than 250 mmBtu Heat Input, New and Existing Units; and
- Rule 62-296.320, F.A.C. - General Pollutant Emission Limitation Standards.

Incinerators and waste to energy facilities combust waste. The fuel slate authorized by this permit does not constitute a waste or municipal solid waste according to the Department's rules. Therefore, Rules 62-296.401 and 62-296.416, F.A.C. do not apply to this project.

Carbonaceous fuel is defined in Rule 62-210.200, F.A.C. as "solid materials composed primarily of vegetative matter such as tree bark, wood waste, or "bagasse". The fuel slate described by the applicant falls into this category. Therefore, Rule 62-296.410, F.A.C. applies to this project. This provision includes a visible emissions standard of 30% opacity, a PM standard of 0.1 lb/mmBtu for the fossil fuel component and 0.2 lb/mmBtu for the carbonaceous fuel part.

The GSB will use biodiesel or as a backup ULSD FO for startup, shutdown and bed stabilization. But the fossil fuel capability will be less than 250 mmBtu/hr of heat input. Therefore, Rule 62-296.406, F.A.C. applies to the extent that fossil fuel is burned in the GSB. This section requires a BACT determination for PM and SO_2 and imposes a visible emissions standard of 20%. The BACT requirement for the fossil fuels will be satisfied by use of ULSD FO, the requirements of 40 CFR Subpart Db and the permit requirements intended to insure that the facility-wide PTE of PM and SO_2 are less than 250 TPY.

The project is subject to Rule 62-296.320, F.A.C., including provisions on VOC storage and handling; objectionable odor; open burning; visible emissions; and reasonable precautions to control fugitive emissions.

4. EMISSIONS FORMATION AND CONTROL FOR THE GSB

4.1. NO_X Emissions

Discussion: The biomass-fueled GSB has a maximum heat input rate of 833 mmBtu/hr on a 4 hour average basis with a maximum heat input of less than 250 mmBtu/hr from fossil fuel (backup ULSD FO) for startup, shutdown and bed stabilization. Following are the general characteristics of the biomass-fueled GSB for the FBE project:

Table 5 - Characteristics of the Biomass-fueled GSB

Parameter	Description
Boiler Type	Grate stoker, conventional waterwall boiler tube design
Primary Fuel	Clean woody biomass at average of 68 TPH, basis 5,600 Btu/pound (HHV)
Supplemental Fuel	Biodiesel and ULSD FO as backup
Bottom Ash Removal	Transported wet by submerged drag-chain conveyor to ash silo
Fly Ash Removal	Transported by enclosed conveyer from ESP to ash storage silo
Heat Input Rate	Nominal 757 mmBtu/hr (maximum 833 mmBtu/hr on a 4-hour average basis) of which less than 250 mmBtu/hr is from fossil fuels
Thermal Efficiency	To be established
Steam Production	Approximately 560,000 lb/hour at 1,550 pounds per square inch (psi), 960 °F
Stack Parameters	Approximately 9.3 feet diameter; 145 feet tall
Flue Gas	Approximately 266,000 actual cubic feet per minute (acfm) at 300 °F
Particulate Control	Mechanical cyclone(s) and ESP greater than 99% efficiency
NO_X Control	Furnace design, OFA, SCR
SO_2 Control	IDSIS before ESP, low sulfur in wood, biodiesel and backup ULSD FO
VOC and CO Control	GCP, ox-cat

NO_X formation may occur by three different mechanisms: fuel NO_X is formed from nitrogen compounds contained in fuel (fuel nitrogen); thermal NO_X is formed from molecular or atomic nitrogen (N_2) and

oxygen (O_2) present in combustion air; and prompt NO_X is formed in the proximity of the flame front as intermediate combustion products. The biomass GSB is expected to emit 66.3 TPY of NO_X the majority of which will be thermal NO_X.

There are several NO_X reduction processes available including pre and post combustion control equipment. Selective non-catalytic reduction (SNCR) is a technology whereby NO_X emissions are controlled by reaction with NH_3 or urea at high temperature in the furnace. The products of the reaction are N_2 and water vapor (H_2O). SCR involves the same reaction but in the presence of catalyst and at lower temperature. The catalyst is typically located in the dusty, medium temperature zone *upstream* of the air heater and other control equipment including particulate control devices.

FBE will locate both the ESP and SCR systems upstream of the air heater. The SCR system will be located between the ESP and the air heater.

Applicant's Proposal for NO_X: The NSPS Subpart Db establishes a limit of 0.20 lbs NO_X/mmBtu on a 30-day rolling average. The applicant proposes a limit of 15.1 lb/hr on a 12-month average (equal to 66.3 TPY), rolled monthly achieved by an SCR system located downstream of the ESP. The proposed limit equates to approximately 0.02 lb NO_X/mmBtu.

Department's Review: For reference, some biomass projects comparable to the FBE project are listed in Table 6. The characteristics of the FBE project (though not actually proposed as limits) are given in the first row.

Some of the projects listed in the table triggered PSD for NO_X while others took synthetic minor limits to avoid triggering PSD or Non-Attainment New Source Review. All include use of biomass, wood chips or woody debris. Most projects, especially those imbedded within the RACT/BACT/LAER Clearinghouse (RBLC) survey, rely on SNCR or SCR.

The NO_X emission characteristic of the FBE project (0.02 lb/mmBtu) is much lower than the limits from projects that trigger PSD and a BACT determination as well as projects that took limits to avoid PSD and a BACT determination. Because the value is so low compared with comparable projects, the Department required FBE to provide reasonable assurance that such a low limit is achievable.

The applicant provided a quotation from Haldor-Topsoe (HT), a reputable provider of SCR catalyst. HT would provide its high temperature titanium (Ti) and tungsten (W) formulation (DNX-949) for high temperature SCR applications (~ 800 °F) under "clean" (after ESP) conditions to reduce emissions from 0.30 to 0.02 lb/mmBtu for a reduction of greater than 93 percent (%).

Given the experience of HT in providing SCR catalysts for high temperature non-dusty applications (such as simple cycle gas turbines) and the willingness to quote the guarantee for the biomass application, the Department has reasonable assurance that the FBE project can meet the proposed limits.

The Department accepts the NO_X proposal of 15.1 lb/hr on a 12-month average basis, rolled monthly as requested by FBE. This equates to 0.02 lb/mmBtu and 66.3 TPY. The Department will also incorporate the 30-day limit of 0.20 lb/mmBtu required by 40 CFR 60, Subpart Db. Compliance with the mass emission rate limit and the Subpart Db concentration limit shall be by demonstrated by a NO_X continuous emission monitoring system (CEMS).

4.2. SO_2 Emissions

Discussion: SO_2 is formed from sulfur compounds contained in biomass. According to the application, the biomass GSB is expected to emit 53.0 TPY of SO_2. The clean woody biomass to be used by FBE will be typically low in sulfur content. A conservatively (high) figure of 0.07% sulfur was provided in the application for short-term emissions and 0.02% sulfur on a long-term basis. These values are included in Table 7 along with heating value, ash and sulfur content of various types of biomass and fossil fuels. The values are on a dry basis except as otherwise noted.

Table 6 - Emissions in lb/mmBtu – Boilers with Uses or Capacities Similar to Proposed Project

Project Location	CO	VOC	NO_X	PM/PM_{10}	SO_2
FBE, Manatee County, FL GSB – woody biomass ~757 mmBtu/hr (equivalents)	~0.0295 12-month Ox-cat	~0.003 stack test Ox-cat	~0.020 12-month SCR	~0.01 stack test ESP	~0.016 12-month sorbent in ducts
GREC, Alachua County, FL BFB – woody biomass ~758 mmBtu/hr (equivalents)	~0.12 24-hour GCP	~0.013 stack test GCP	~0.070 24-hour SCR	~0.029 stack test fabric filter	~0.041 24-hour sorbent in ducts
ADAGE, Gretna County, FL BFB – woody biomass ~758 mmBtu/hr (equivalents)	~0.074 12-month GCP	~0.017 stack test GCP	~0.070 12-month SCR	~0.029 stack test fabric filter	~0.045 12-month sorbent in ducts
ADAGE, Hamilton County, FL BFB – woody biomass ~758 mmBtu/hr (equivalents)	~0.074 12-month GCP	~0.017 stack test GCP	~0.070 12-month SCR	~0.029 stack test fabric filter	~0.045 12-month sorbent in ducts
HEF, Highlands County, FL stillage, wood, gas, ULSD FO ~198 mmBtu each (proposed)	0.10 30-day GCP	0.005 stack test GCP	0.075 30-day SNCR	0.01 stack test fabric filter	0.06 30-day BFB limestone
Wheelabrator, Auburndale, FL GSB – wood and tires ~630 mmBtu/hr (1990s)	0.32 30-day GCP	0.035 stack test GCP	0.14 30-day SNCR	0.02 stack test fabric filter	0.10 30-day lime spray
U.S. Sugar Clewiston, FL GSB - bagasse ~1,000 mmBtu/hr (2003)	0.38 12-month GCP	0.05 Stack test GCP	0.14 30-day SNCR	0.26 stack test fabric filter	0.06 30-day no control
RBLC Survey All designs – any biomass $\geq$ 100 mmBtu/hr	0.1 – 0.63 typical 30-day GCP	0.005 – 0.05 stack test GCP	0.075-0.45 30-day various	0.0125 – 0.8 stack test various	0.02-1.54 typical 30-day various
Whitefield Power & Light, NH whole tree chips (WTC) 15 MW	Not known	Not known	0.075 guarantee RSCR	Not known	Not known
Boralex Stratton, ME WTC 50 MW	Not known	Not known	0.075 guarantee RSCR	Not known	Not known
Bridgewater Power, NH WTC 16 MW	Not known	Not known	0.075 guarantee RSCR	Not known	Not known
Burlington Electric, VT WTC 54 MW	Not known	Not known	0.065 guarantee RSCR	Not known	Not known
Palmer Springfield, MA construction/demolition (C&D) debris and WTC. 38 MW	Not known	Not known	0.065 guarantee RSCR	Not known	Not known
NSPS Subpart Db NG, wood, ULSD FO $\geq$ 100 mmBtu/hr	No standard	No standard	0.10-0.20 based on heat release rate	0.03 20% opacity wood basis	0.32 if achieved by low S fuels
NESHAP Subpart DDDDD[a] large solid fuel category $\geq$ 100 mmBtu/hr	~0.35 400 ppm @ 3% O_2[b] GCP	No standard	No standard	0.025 stack test	No standard

a. Subpart DDDDD was promulgated and then vacated

b. ppm @ 3% O_2 means parts per million by volume at 3 percent oxygen

Table 7 - Characteristics of Biomass and Fossil Fuels – Heating Value, Ash and S

Fuel Class	Fuel	Gross Heating Value Btu/lb	Ash (%)	S (%)
Bioenergy Feedstocks	**application basis**	**5,600**		**0.07, 0.02**
	hog fuel [1]	**5,301 (wet)**	**1.0**	**0.02**
	forest slash [1]	**4,879 (wet)**	**1.0**	**0.02**
	manufacturing waste [1]	**7,409**	**1.1**	**0.03**
	cellulosic ethanol stillage	4,200 (wet)	7	0.08
	sweet sorghum	6,570	5.5	0.15
	sugarcane bagasse	7,720	3.2-5.5	0.10-0.15
	hardwood	8,745	0.45	0.009
	softwood	8,360	0.3	0.01
	hybrid poplar	8,105	0.5-1.5	0.03
	bamboo	8,085	0.8-2.5	0.03-0.05
	switchgrass	7,810	4.5-5.8	0.12
	miscanthus	7,785	1.5-4.5	0.1
	arundo donax	7,295	5-6	0.07
Liquid Biofuels	bioethanol	11,940	~0	<0.01
	biodiesel	17,050	<0.02	0.0015 [2]
Fossil Fuels	coal (low rank)	6,400-8,100	5-20	1.0-3.0
	coal (high rank)	11,500-12,800	1-10	0.5-1.5
	ULSD FO	18,150	negligible	<0.0015
	Natural Gas	1,030 Btu/cubic foot	negligible	< 0.002
1. Database estimates given in FBE application				
2. Grade S15 biodiesel per ASTM D6751-09 required for FBE project				

Applicant's SO_2 Proposal. The applicant proposes a limit of 12.1 lb SO_2/hr on a 12-month average, rolled monthly achieved by the use of low sulfur fuel and an IDSIS system located upstream of the ESP. The value is equivalent to 53.0 TPY and 0.016 lb SO_2 /mmBtu. The IDSIS will use either sodium bicarbonate ($NaHCO_3$) or trona [$Na_3(CO_3)(HCO_3)\cdot 2(H_2O)$] to react with SO_2 in the gas stream with subsequent removal in particulate form in the ESP. According to the applicant the SO_2 removal efficiency of the IDSIS is 88%.

Department's Review. According to Table 7, the woody biomass, biodiesel and ULSD FO are all low in sulfur content. Per 40 CFR 60.42b(k)(2), units firing only very low sulfur oil, gaseous fuel, a mixture of these fuels, or a mixture of these fuels with any other fuels with a potential SO_2 emission rate of 0.32 lb/mmBtu or less are exempt from SO_2 emissions limits in 40 CFR 60.42b(k)(1). The language is as follows:

(k)

(1) Except as provided in paragraphs (k)(2), (k)(3), and (k)(4) of this section, on and after the date on which the initial performance test is completed or is required to be completed under §60.8, whichever date comes first, no owner or operator of an affected facility that commences construction, reconstruction, or modification after February 28, 2005, and that combusts coal, oil, natural gas, a mixture of these fuels, or a mixture of these fuels with any other fuels shall cause to be discharged into the atmosphere any gases that contain SO_2 in excess of 0.20 lb/mmBtu heat input or 8 percent (0.08) of the potential SO_2 emission rate (92 percent reduction)

and 1.2 lb/mmBtu heat input. For facilities complying with the percent reduction standard and paragraph (k)(3) of this section, only the heat input supplied to the affected facility from the combustion of coal and oil is counted in paragraph (k) of this section. No credit is provided for the heat input to the affected facility from the combustion of natural gas, wood, municipal-type solid waste, or other fuels or heat derived from exhaust gases from other sources, such as gas turbines, internal combustion engines, kilns, etc.

(2) Units firing only very low sulfur oil, gaseous fuel, a mixture of these fuels, or a mixture of these fuels with any other fuels with a potential SO_2 emission rate of 0.32 lb/mmBtu heat input or less are exempt from the SO_2 emissions limit in paragraph (k)(1) of this section.

Based on Table 7, the woody biomass to be burned by FBE will contain between 0.02 and 0.07% sulfur on a wet basis. The pre-control SO_2 emission potential is calculated as follows:

(0.02 - 0.07 lb S/100 lb fuel)(2 lb SO_2/lb S)(lb fuel/5,600 Btu)(10^6 Btu/mmBtu) = 0.07 - 0.25 lb SO_2/mmBtu.

The range is less than the 0.32 lb/mmBtu value given in 40 CFR 60.42b(k)(2). Any combination of biomass combustion with biodiesel or ULSD FO will result in even lower emissions. Therefore, it is reasonable to conclude that the potential (uncontrolled) SO_2 emission rate is less than 0.32 lb/mmBtu and that the project is exempt from any additional SO_2 emission limits in Subpart Db. The after-control limit proposed by FBE is equivalent to 5% of the 0.32 lb/mmBtu "low sulfur" fuel mixtures.

According to 40 CFR 60.49(r),

(r) The owner or operator of an affected facility who elects to use the fuel based compliance alternatives in §60.42b or §60.43b shall either:

(1) The owner or operator of an affected facility who elects to demonstrate that the affected facility combusts only very low sulfur oil, natural gas, wood, a mixture of these fuels, or any of these fuels (or a mixture of these fuels) in combination with other fuels that are known to contain an insignificant amount of sulfur in §60.42b(j) or §60.42b(k) shall obtain and maintain at the affected facility fuel receipts from the fuel supplier that certify that the oil meets the definition of distillate oil and gaseous fuel meets the definition of natural gas as defined in §60.41b and the applicable sulfur limit. For the purposes of this section, the distillate oil need not meet the fuel nitrogen content specification in the definition of distillate oil. ***Reports shall be submitted to the Administrator certifying that only very low sulfur oil meeting this definition, natural gas, wood, and/or other fuels that are known to contain insignificant amounts of sulfur were combusted in the affected facility during the reporting period****; or*

(2) The owner or operator of an affected facility who elects to demonstrate compliance based on fuel analysis in §60.42b or §60.43b shall develop and submit a site-specific fuel analysis plan to the Administrator for review and approval no later than 60 days before the date you intend to demonstrate compliance. Each fuel analysis plan shall include a minimum initial requirement of weekly testing and each analysis report shall contain, at a minimum, the following information:

(i) The potential sulfur emissions rate of the representative fuel mixture in ng/J heat input;

(ii) The method used to determine the potential sulfur emissions rate of each constituent of the mixture. For distillate oil and natural gas a fuel receipt or tariff sheet is acceptable;

(iii) The ratio of different fuels in the mixture; and

(iv) The owner or operator can petition the Administrator to approve monthly or quarterly sampling in place of weekly sampling.

The Department will include a limit of 12.1 lb SO_2/hr on a 12-month average, rolled monthly. The SO_2 emission characteristics of the FBE project are less than emission limits from projects that trigger PSD and a BACT determination as well as projects that took limits to avoid PSD and a BACT determination. Compliance with the mass emission rate limit shall be by demonstrated by a SO_2 CEMS.

The separate Department SO_2 BACT requirement under Rule 62-296.406, F.A.C. for the fossil fuels will be satisfied by use of biodiesel or as a backup ULSD FO.

4.3. SAM Emissions

Discussion: SAM is formed by further oxidation of SO_2 to sulfur trioxide (SO_3) prior to exiting the process. SO_3 readily combines with water vapor (H_2O) available in flue gas to form SAM (H_2SO_4). SAM condenses on the cool surfaces in the exhaust duct, air pollution control equipment or on fly ash particles.

Applicant's SAM Proposal: The applicant does not propose a limit for SAM. According to the application and as a worst case, the biomass GSB is expected to emit 0.3 lb SAM/hr from the boiler stack when burning woody biomass. Annual uncontrolled H_2SO_4 emissions are estimated at approximately 1.19 TPY from the boiler stack.

Department's Review: Excessive emissions of SAM are reflected as increased plume opacity. The Department will limit visible emissions to 10% opacity to insure compliance with PM/PM_{10} limits as discussed below. This requirement will discourage excessive emissions of SAM.

Sorbent injection coupled with $PM/PM_{10}/PM_{2.5}$ removal in the ESP will also tend to minimize SAM emissions. The Department will not establish an actual SAM limit because it is clear that emissions will be much less than 250 TPY. Control of SO_2, opacity limitations and the $PM/PM_{10}/PM_{2.5}$ controls will minimize SAM emissions. The Department will require an initial stack test to determine the SAM emission characteristics of the GSB.

4.4. CO Emissions

Discussion: CO is a product of incomplete combustion. Refer to Table 6 above for a listing of CO limits from biomass projects.

Applicant's CO Proposal: The applicant proposes a limit of 22.3 lb CO/hr on a 12-month average, rolled monthly achieved by GCP in the boiler and an ox-cat system after the ESP to further oxidize CO. The value is equivalent to 97.8 TPY and 0.0295 lb CO/mmBtu.

Department's Review: The Department will set a mass emission rate limit of 22.3 lb/hr on a 12 month average basis, rolled monthly as requested by the applicant. The limit will insure that the PTE of the entire project is much less than 250 TPY that would otherwise trigger a PSD review and a BACT determination. Additionally, the limit is consistent with the applicant's request for annual emission limits less than 100 TPY.

The CO emission characteristics of the FBE project are less than permitted emission limits for projects that trigger PSD and a BACT determination as well as projects that took limits to avoid PSD and a BACT determination. For reference, the recently vacated NESHAP Subpart DDDDD would have required compliance with a CO limit of 400 ppm @ 3% O_2 as a surrogate for organic HAP. This value is roughly equal to 0.35 lb CO/mmBtu. By comparison, the limit request by FBE is approximately $1/10^{th}$ of the previous Subpart DDDDD limit.

4.5. VOC Emissions

Discussion: VOC is a product of incomplete combustion. Refer to Table 6 above for a listing of VOC limits from biomass projects.

Applicant's VOC Proposal: The applicant does not propose a limit for VOC. Low emissions will be achieved by GCP and the ox-cat system. The applicant has estimated VOC emissions from the boiler at 2.3 lb/hr and 9.9 TPY.

Department's Review: The Department will not establish an actual VOC limit because it is clear that emissions will be much less than 250 TPY. However, the Department will require an initial stack test to determine the VOC emission characteristics of the GSB when controlled by GCP and an ox-cat system. The Department also notes that incorporation of the ox-cat will also reduce emissions of organic HAP. The SCR system for NO_X control will also help reduce VOC emissions including organic HAP emissions such as dioxin and furan (D/F).

4.6. PM/PM_{10}/$PM_{2.5}$ and Visible Emissions (VE)

Discussion: PM/PM_{10}/$PM_{2.5}$ are formed from ash contained in the biomass, products of incomplete combustion and from chemical reactions between products of combustion that form alkali and ammoniated chlorides, sulfates, nitrates and other such species.

Applicant's Proposal: The applicant proposes a PM/PM_{10} limit of 0.01 lb/mmBtu (filterable fraction), based on a 3-hour EPA Method 5. This limit will insure compliance with the NSPS Subpart Db PM limit of 0.03 lb/mmBtu (filterable fraction only) and the carbonaceous fuel PM limit under Rule 62-296.410, F.A.C. of 0.2 lb/mmBtu (filterable fraction only).

The proposal of 0.01 lb/mmBtu will limit emissions of PM/PM_{10} to 33.2 TPY (filterable) and well below 250 TPY PSD-threshold.

The applicant proposes to comply with a visible emissions (VE) limit of 20% based on an annual compliance test using EPA Method 9.

Department's Review: The Department will set a PM limit of 0.01 lb/mmBtu (filterable) using EPA Method 5. This limit will readily insure compliance with the Subpart Db and with Rule 62-296.410, F.A.C.

The separate Department PM BACT requirement under Rule 62-296.406, F.A.C. for the fossil fuels will be satisfied by use of biodiesel or as a backup ULSD FO.

The Department will also set a VE standard of 10% opacity (6-minute average), except for one 6-minute period per hour of not more than 20% opacity as measured by a continuous opacity monitoring system (COMS).

The Department will establish a NH_3 limit of 10 parts per million, by volume at 7% O_2 (ppmvd) to be demonstrated by initial and annual tests using EPA Method 320. The NH_3 limit will be readily achieved by SCR.

4.7. HAZARDOUS AIR POLLUTANTS

The applicant believes that the facility is not a major source of HAP because it will not have the PTE 10 TPY of any single HAP or 25 TPY of all HAP. If the PTE of any single HAP is equal to or greater than 10 TPY or if the PTE of all aggregated HAP is equal to or greater than 25 TPY then the source would be a major source of HAP and a case-by-case determination of Maximum Achievable Control Technology (MACT) would be required. MACT would require limitations for several HAP or surrogates for those HAP such as PM-metals or organic HAP.

Estimates of individual key HAP emissions are provided in Table 8. Only the GSB HAP emissions are listed because the contribution from other sources is only 0.01 TPY. The sum of HCl, metals and organic HAP is so close to 25 TPY that reasonable assurance in the form of limits and monitoring is required.

Table 8 – Applicant's Estimated PTE of HAP from the GSB in TPY

Pollutant [1]	HCl	HF	Metals	C_3H_4O	C_6H_6	CH_2O	C_8H_8	Other Organics	Total
Emissions	9.83	0.00	0.28	3.3	3.5	3.6	1.6	2.83	24.94

1. HCl is hydrogen chloride; HF is hydrogen fluoride; C_3H_4O is acrolein; C_6H_6 is benzene; CH_2O is formaldehyde; C_8H_8 is styrene

HCl Emissions

Discussion: Untreated woody biomass will typically contain less than 0.02% Cl. The biodiesel and ULSD FO are even lower in chloride (Cl) content. The Cl can be released as HCl and or it can be bound to the ash. Cl can also condense in the form of alkali salts (NaCl and KCl) or as NH_4Cl in the presence of NH_3. Some Cl can react further with organic species forming organic HAP including D/F.

According to the application the uncontrolled HCl emissions from the GSB would emit approximately 19.7 lb/hr (equal to 86.3 TPY).

Applicant's HCl Proposal: According to the application, the biomass GSB has the PTE 9.83 TPY of HCl after control by the IDSIS and the ESP. The applicant does not propose an emission limit or a compliance method to insure the HCl emissions are less than 10 TPY.

Department's Review: The Department will set a limit of 9.86 TPY of HCl on a 12-month rolling average, rolled monthly. Compliance shall be demonstrated by a HCl-CEMS. The 12-month limit equates to 2.25 lb/hr HCl. The limit, the IDSIS, the ESP and the continuous measurement requirement will provide reasonable assurance that HCl will not be emitted at the rate of 10 TPY or greater.

HF Emissions

Discussion: Fluorine (F) is a naturally occurring constituent of vegetative matter. The F can be released as HF and or it can be bound to the ash. F can also condense in the form of alkali salts (NaF, KF, alkali fluorosilicates, etc.).

Applicant's HF Proposal: According to the application, the biomass GSB has the PTE 0.00071 TPY (2.36 lb/yr) of HF after control by the IDSIS and the ESP. The applicant does not propose an emission limit or a compliance method to demonstrate the projected minimal HF emissions.

Department's Review: The Department believes the PTE of HF is much greater than the projection submitted by the applicant due to an error in the submittal. Actual annual emissions of HF should be on the order of several tons. The Department will set a limit of 2.25 lb HF/hr (9.86 TPY) to insure HF emissions do not exceed the 10 TPY HAP threshold. In addition, the Department will require a HF-CEMS.

The Department will also set a limit for combined emissions of HCl and HF to 11.5 TPY as part of an overall facility-wide cap discussed further below to insure aggregate HAP emissions will be less than 25 TPY.

Organic HAP and Chlorine (Cl_2)

Discussion: According to the application and Table 8, no single organic HAP will be emitted at a level approaching 10 TPY. Total organic HAP plus Cl_2 emissions will equal approximately 14.83 TPY.

Table 9 is a further breakdown of the key organic HAP plus Cl_2 expected by the applicant to be emitted at levels greater than or equal to 0.1 TPY.

Table 9 – Applicant's Estimated PTE of Organic HAP plus Cl_2 from the GSB in TPY

Pollutant [1]	**C_3H_4O**	**C_6H_6**	**CH_2O**	**C_8H_8**	**C_2H_4O**	**Cl_2**	**CH_2Cl_2**	**C_7H_8**	**Other**	**Total**
Emissions	3.3	3.5	3.6	1.6	0.69	0.64	0.24	0.76	0.49	14.83
1. C_2H_4O is acetaldehyde; CH_2Cl_2 is dichloromethane; C_7H_8 is toluene										

Applicant's Organic HAP Proposal: The applicant will install an SCR system and an ox-cat system that will provide additional control of organic HAP beyond that provided by good combustion methods. The applicant does not propose an emission limit or testing requirements for organic HAP or Cl_2.

Department's Review: The Department notes that this is the first known biomass boiler to incorporate both SCR and ox-cat systems. Therefore, organic HAP will be destroyed to a very high degree. Because organic HAP comprise almost 60% of all projected HAP emissions, it is necessary to limit these to insure the PTE of all HAP is less than 25 TPY.

According to the application, the sum of projected emissions of the seven key listed organic HAP (C_3H_4O, C_6H_6, CH_2O, C_8H_8, C_2H_4O, CH_2Cl_2 and C_7H_8) plus Cl_2 is 14.34 TPY of the listed total of 14.83 TPY. Rather than setting individual limits for each of the eight species identified in Table 9, the Department will limit their total emissions 2.75 lb/hr and 12 TPY as part of an overall facility-wide cap discussed further below to insure aggregate HAP emissions will be less than 25 TPY. Compliance will be determined by an initial and annual compliance tests conducted in accordance with EPA Method 320 for organic and inorganic HAP by Fourier Transform Infrared (FTIR) spectroscopy.

Good combustion practices, catalytic systems and low fuel chloride content will also tend to minimize and destroy D/F.

Overall HAP Emissions

To provide reasonable assurance that the potential to emit HAP is less than 25 TPY, combined emissions of HCl and HF based on CEMS data will be limited to 11.5 TPY and the combined emissions of the 7 key organic HAP plus Cl_2 will be limited to 12.0 TPY. These limits account for 23.5 TPY as shown in Table 10 below.

Table 10 – Department's Proposed Limitation on HAP emissions in TPY

Pollutant	HCl	HF	Σ 7 Organic HAP, Cl_2	Total [1]
Limit	9.86	9.86	12.0	23.5
	Σ HCl, HF = 11.5			

1. By adding the estmates 0.28, 0.49 and 0.01 for metals, other organic and miscellaneous HAP, respectively, to this limit, the Department estimates annual emissions of 24.28 TPY of HAP from the facility.

The remainder consists of metal HAP, other organic HAP and miscellaneous emissions equal 0.78 TPY. The total estimate for the facility is 24.28 TPY. Compliance with the permitted PM/PM_{10} limits will provide reasonable assurance that emissions of metal HAP will be as low as projected.

The Department has reasonable assurance that the facility is not a major source of HAP because:

- The IDSIS and ESP will control acid gases and metal HAP;
- A HCl-CEMS and a HF-CEMS will be installed to monitor emissions of the two HAP expected to be emitted at the highest levels;
- There will be an annual cap of 11.5 TPY on HF and HCl combined;
- Good combustion practices will minimize formation of organic HAP;
- SCR and ox-cat systems will destroy organic HAP including D/F;
- There will be an annual cap of 12 TPY and required tests for the 7 key organic HAP identified by the applicant plus Cl_2;
- Measurement, whether by CEMS or by annual test, will be conducted to demonstrate total HAP emissions of 23.5 TPY excluding metal HAP, other organic HAP and miscellaneous HAP;
- PM/PM_{10} testing including visible emissions will serve as a surrogate for the metals HAP; and
- The total estimated HAP emissions from the facility will be 24.28.

Based on fuel properties, control equipment, and measurement requirements, the Department has reasonable assurance that the FBE facility will not equal or exceed 10 TPY of any single HAP or 25 TPY of all HAP and will not be a major source of HAP.

For reference, the vacated MACT standard (40 CFR 63, Subpart DDDDD) would have allowed HCl emissions of 66 TPY and would not have limited HF emissions. The vacated Subpart DDDDD had no limits on organic HAP and relied on CO control which would have been 1,160 TPY, compared with 99 TPY allowed for this project and limited by CO-CEMS.

In addition to having reasonable assurance that the plant will not be a major source of HAP, the Department concludes that it will be much better controlled than EPA believed necessary for a major source of HAP.

5. STARTUP, SHUTDOWN AND MALFUNCTIONS

The boiler will be designed to accommodate biodiesel and backup ULSD FO for boiler startup, shutdown and boiler bed stabilization only. The maximum burner heat input will be limited to less than 250 mmBtu/hr.

The applicable CEMS-based SO_2, NO_X, CO, HCl and HF emissions limits are largely 30-day or 12-month rolling limits that do not provide for data exclusion per the applicable NSPS Subpart or the nature of emission caps for the purposes of avoiding PSD. PM/PM_{10} and VOC emissions are measured by a once per year test. The Department will not allow exclusion of any measured emission data.

The only other limit for which the excess emission rule could apply is opacity. In the case of the NSPS Subpart Db requirements, the 20% opacity standard (6-minute average) applies at all times except for one 6-minute period per hour of not more than 27 percent opacity and during periods of startup, shutdown, or malfunction.

The Department proposes a separate 10% opacity standard except for a single 6-minute period per hour of during which VE may not exceed 20% opacity. The Department will allow excess visible emissions by applying a standard of 20% during startups, shutdown and malfunctions except for one 6-minute period per hour of not more than 27% opacity during periods of startup, shutdown and malfunction.

It is important to limit the occurrences of startups, shutdowns and malfunctions as well as the visible emissions (opacity) during those occurrences to insure that PSD is not triggered.

6. BEST MANAGEMENT PRACTICES PLAN TO CONTROL FUGITIVE EMISSIONS

Table 11 is a listing of the estimated fugitive emissions from the project.

Table 11 - Estimated PTE of Criteria Air Pollutants (TPY)

Source Operation	PM	PM_{10}	$PM_{2.5}$
Truck Traffic on Paved Roads	7.65	1.51	0.22
Stack Out Operations	0.07	0.03	0.00
Reclaim Operations	0.018	0.009	0.001
Screens and Hog Mill	0.232	0.089	0.061
Material Storage Silos	0.94	0.94	0.14
Project Total Fugitive Sources	8.91	2.58	0.42

Fugitive emissions are not counted in determining whether this particular project is subject to PSD. However, the Department requires adherence to Rule 62-296.320(4)(c), F.A.C., which specifies the types of reasonable precaution required to control unconfined emissions of PM.

Accordingly, the applicant submitted a preliminary BMP plan that described the principles and specifics of fugitive dust control measures and storage pile management to comply with the rule and additional measures for fire prevention and response procedures to excess fugitive dust emissions. The Department incorporated these principles and specifics along with additional requirements into a BMP plan that is provided in Tables 12, 13, 14 and 15 below.

Table 12 - BMP for Storage Pile Management

- A woody biomass storage pile fugitive dust management plan shall be developed and maintained onsite. The plan shall identify warning signs and identify corrective actions for conditions that could result in excessive wind erosion and fugitive dust formation. Plant personnel shall be trained to recognize such warning signs.
- Operational plans will recognize conditions such as high winds likely to result in wind erosion and excessive fugitive dust and will instruct plant personnel to curtail movement of fuel by mobile equipment under such conditions.
- Mechanical moving of woody biomass by front end loaders and other supporting equipment shall be minimized on high wind event days.
- First in first out biomass utilization shall be implemented to minimize objectionable odors.
- The woody biomass storage areas shall be monitored and if conditions are conducive to wind erosion and fugitive dust formation, procedures from the fugitive dust plan shall be implemented.
- Mobile equipment will be used to maintain the pile's design shape and to ensure adherence to FIFO in reclaim operations

Table 13 - BMP for Minimization of Fugitive Dust Emissions

- Conveyor systems and associated drop points shall be enclosed to the extent practicable to minimize exposure to air currents. Enclosed conveyors means that the conveyance belt for the biomass is totally enclosed from above thus preventing wind from causing fugitive dust emissions. However, the bottom of the conveyance belt shall be accessible for maintenance and repairs.
- Drop points to woody biomass storage areas shall be designed to minimize the overall drop height exposed to air current.
- Periodic equipment inspection and maintenance shall be performed to maintain the integrity of conveyor systems and associated drop point enclosures. Appropriate plant records shall be maintained on equipment maintenance performed.
- Fuel silos shall be equipped with vent filters.
- Plant personnel shall conduct daily inspections of the conveyor systems and associated drop point integrity to identify any equipment abnormalities.
- Signs shall be posted identifying warning signs of potential equipment malfunction.
- Plant personnel shall be trained on identification of warning signs for potential equipment malfunction.
- Procedures shall be established for defining excessive fugitive dust from woody biomass truck unloading operations. Plant personnel shall monitor truck unloading operations and if excessive fugitive dust is detected plant personnel shall implement appropriate fugitive dust minimization techniques. Plant personnel shall be trained on procedures for defining and minimizing excessive

dust from the truck unloading operations.

- All major roadways at the plant shall be paved.
- Mud, dirt, spilled biomass or similar debris shall be removed promptly from the paved roads.
- Plant personnel shall be trained on what constitutes excessive dust on paved roads.
- Transfer points and fuel bins are equipped with vent filters.
- Fuel handling equipment shall be inspected for proper operation and for maintenance requirements.
- Plant fuel handling personnel shall implement procedures for monitoring and controlling unplanned fugitive dust emissions, including truck handling and unloading, and dirt or spilled biomass fuel on roads.
- Plant personnel shall spray, wash, scrape, or otherwise remove dirt or spilled biomass fuel on plant roads as necessary to reduce fugitive emissions

Table 14 - BMP for Fire Prevention / Spontaneous Combustion Minimization Practice

- A fire management plan (FMP) shall be developed to identify and list the causes and conditions giving rise to spontaneous combustion.
- Contact local fire marshal to develop fire management plan. The FMP shall be maintained on site.
- The FMP shall include: a) requirement to train onsite personnel to handle incipient fires and training on the identification of potential fire hazards; and, b) install and maintain equipment for plant personnel to handle incipient fires. The local fire department shall be invited to participate in onsite training.
- Sufficient inspections of the woody biomass storage areas shall be performed by plant personnel to identify potential fire hazards. Plant personnel shall be trained on identification of potential fire hazards.
- Signs which identify potential fire hazards shall be posted at the plant.
- Incoming unprocessed materials shall be stored in areas in accordance with clearance ranges between each storage area as described in the FMP.
- The stacker reclaimer shall maximize the removal of older material in order to minimize the stacking of newer material on top of older material.
- Compaction of woody biomass materials in the storage areas shall be minimized.
- Fuel pile fire protection equipment may be used for minimization of fugitive dust emissions and dust suppression as required.
- Plant personnel shall conduct daily inspection for fire hazards and monitor the hazards using video surveillance.
- The FMP shall describe the use of fire-water cannons, mounted on elevated structures, together with mobile equipment to uncover and rapidly extinguish any smoldering materials.
- The size of the fuel storage pile will not exceed the design value – this is a primary control measure, based upon the limited on-site fuel storage of about 2 weeks' worth of fuel. Specifically, the stacker will build a pile in zones up to a maximum of 60 feet high (an average of 40 feet high) and the reclaimer will start with the first zone built and reclaim the pile down to within two inches of grade.

Table 15 - BMP for Quality Assurance of Clean Woody Biomass

Clean woody biomass shall mean: the feedstock will consist of woody biomass that will be processed at a remote fuel preparation area (or areas) where it will be sorted, screened and chipped to size. Woody biomass is characterized by cellulose, hemicellulose, lignin and mineral content. The biomass for this project is limited to clean woody biomass meaning trees and woody plants, including limbs, tops, trunks, needles, leaves, stalks and other woody parts, grown in a forest, urban and suburban environments, utility rights-of-way, woodland, rangeland environment, tree farm or agricultural crop farm. The term also includes the residues and rejects from the physical (non-chemical) processing of such woody biomass. The woody biomass feedstock will be delivered via truck to the site at a rate of approximately 65 trucks per day.

Clean Woody Biomass can include: saw dust; hogged fuel; processed butt cuts, and fuel crop.

- *Saw Dust* is defined as a by-product of forest and forest product operations.
- *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.
- *Butt Cuts* are untreated round residues that are either of oversized or undersized non processible materials from post or pole manufacturers.
- *Fuel Crop* is a vegetative product specifically grown for energy use or a waste product of agricultural operations (e.g., corn stover, peanut hulls, etc.).

The following is required from the permittee:

1) Woody biomass feedstocks shall be obtained from vendors that certify that the woody biomass feed stocks they supply to FBE meet the definition of woody biomass specified above. In addition, the vendor must certify that the woody biomass does not contain any of the prohibited items listed in **Item 10,** below.
2) Any such vendor certification shall include, in legible fashion, the name of the vendor's representative making the certification as well as the representative's signature. The permittee shall retain records of the certifications for 5 years.
3) The woody biomass feedstock will be delivered to the FBE facility in vehicles designed to prevent release. Woody biomass feedstock shall be delivered to FBE primarily by trucks.
4) The permittee shall inspect each shipment of woody biomass upon receipt for any material not specifically identified in this plan. If the permittee identifies any such material, the material shall be rejected and/or marshaled in specified areas until proper disposal can be arranged. Rejected materials shall be moved off site in a logistically reasonable time period.
5) For each original source of woody biomass feedstock, the permittee shall retain documentation of the original source's procedures to prevent the contamination of the woody biomass with any materials not specifically authorized by this permit. Such documentation shall explicitly identify the procedures used to prevent the introduction of any treated wood or any other prohibited materials into the woody biomass.
6) The permittee shall retain documentation of the off-site material handling facility's procedures for receiving, segregating and loading the woody biomass from the original sources. In addition, the permittee shall retain documentation of the quality assurance procedures in place at the off-site handling facility to ensure the woody biomass is not contaminated with any materials not specifically authorized by this permit. Such documentation shall explicitly identify the procedures used to prevent the introduction of any treated wood or any other prohibited materials into the woody biomass.

7) For each shipment of woody biomass, the permittee shall record the date received, the original source and the material description of the woody biomass and the quantity received, and the name of the inspector, in a legible fashion, and the signature of the individual(s) responsible for performing the visible inspection in **Item 8**, below.

8) The permittee shall inspect each shipment of woody biomass upon receipt and during unloading for any material not specifically authorized by this permit. If the permittee identifies any such material, the material must be removed from the shipment and the material vendor notified. The rejected material must be disposed of following all applicable Department regulations. The permittee shall maintain a record of rejected materials, the amount of material rejected and the reason(s) for rejection.

9) The permittee shall maintain records of rejected shipments and disposition thereof. Such records shall be made available to the Department upon request and kept for a period of 5 years.

10) The following items are not considered woody biomass and are expressly prohibited:
   a) those materials that are prohibited by state or federal law;
   b) plastics;
   c) woody biomass that has been chemically treated or processed;
   d) yard trash;
   e) municipal solid waste;
   f) paper;
   g) treated wood such as CCA or creosote;
   h) painted wood; and
   i) wood wastes from landfills.

7. AMBIENT AIR QUALITY

7.1. Introduction

The proposed project will not increase emissions at levels in excess of PSD significant amounts. Therefore, an ambient air quality modeling analysis was not required for this project. However, the applicant provided an ambient air quality analysis to show compliance with the Ambient Air Quality Standards (AAQS). The following sections include the AAQS analysis, a review of current air quality in the vicinity of the project, and information regarding this project and how it relates to other nearby sources of pollution.

7.2. Major Stationary Sources Near the Proposed FB Energy Site

The proposed project is in the northern part of Manatee County and within 3 km of the Hillsborough and Manatee county line. Tables 16 through 20 are lists of the largest stationary sources, by pollutant, in Manatee and Hillsborough counties. The information is from annual operating reports submitted by the operators to the Department for 2008. The future emissions from the FBE project are included for comparison purposes.

The largest sources in the area are the TECO Big Bend Station approximately 26 km north, northeast and the FPL Manatee Power Plant approximately 20 km east of the proposed FBE site. For reference, emissions have greatly decreased from the power plants in the area since 1998 when emissions from TECO Big Bend and FPL Manatee were 107,400 and 33,500 tons of SO_2, respectively. In 2008, the TECO Big Bend and FPL Manatee SO_2 emissions were 9,615 and 8,241 tons, respectively. The TECO Bayside Station (formerly TECO Gannon) emitted approximately 64,600 tons of SO_2 in 1998 and only 16 tons in 2008. Similar reductions occurred for NO_X. In 1998, TECO Big Bend and FPL Manatee emitted 37,500 and 10,400 tons of NO_X respectively while TECO Bayside emitted 30,800 tons. In 2008 the three plants emitted 17,200, 2,085 and 385 tons respectively.

Table 16 - Largest Sources of SO_2 (2008)

Owner	Site Name	TPY
Tampa Electric Company (TECO)	TECO Big Bend Station	9,615
Florida Power and Light (FPL)	FPL Manatee Power Plant	8,241
Mosaic Fertilizer	Mosaic Fertilizer Riverview Facility	3,037
Envirofocus Technologies	Envirofocus Technologies	1,108
FBE	**FBE Port Manatee (Proposed)**	**53**
City of Tampa	McKay Bay Refuse to Energy Facility	18
TECO	TECO Bayside Station	16

Table 17 - Largest Sources of NO_X (2008)

Owner	Site Name	TPY
TECO	TECO Big Bend Station	17,200
FPL	FPL Manatee Power Plant	2,082
Hillsborough County	Hillsborough Resource Recovery Facility	621
TECO	TECO Bayside Station	385
City of Tampa	McKay Bay Refuse to Energy Facility	377
Mosaic Fertilizer	Mosaic Fertilizer Riverview Facility	149
Tropicana Manufacturing	Tropicana Bradenton	87
CF Industries Phosphate	CF Industries Plant City Complex	82
FBE	**FBE Port Manatee (Proposed)**	**68**
Trademark Nitrogen	Trademark Nitrogen	55

Table 18 - Largest Sources of PM/PM_{10} (2008)

Owner	Site Name	TPY
TECO	TECO Big Bend Station	1,015
FPL	FPL Manatee Power Plant	713
TECO	Bayside Power Station	178
Kinder Morgan	Kinder Morgan Tampa Terminal	117
CF Industries Phosphate	CF Industries Plant City Complex	57
Kinder Morgan	Kinder Morgan Sutton Terminal	57
Conagra Foods	Conagra	56
FBE	**FBE Port Manatee (Proposed)**	**45**
Tropicana Manufacturing	Tropicana Bradenton	34
Manatee County Utility Operations	Manatee County Landfill	31

Table 19 - Largest Sources of CO (2008)

Owner	Site Name	TPY
TECO	FPL Big Bend Station	6,777
FPL	FPL Manatee Power Plant	959
Envirofocus Technologies	Envirofocus Technologies	743
Tampa Electric Company	Bayside Power Station	358
Tropicana Manufacturing	Tropicana Bradenton	101
FBE	**FBE Port Manatee (Proposed)**	**99**
Hillsborough County	Hillsborough Resource Recovery Facility	75

Table 20 - Largest Sources of VOC (2008)

Owner	Site Name	TPY
Tropicana Manufacturing	Tropicana Bradenton	527
TECO	TECO Bayside Power Station	190
Central Florida Pipeline	Central Florida Pipeline Tampa Terminal	164
Manatee County Utility Operations	Manatee County Landfill	149
Dart Container	Dart Container	133
FPL	FPL Manatee Power Plant	106
Marathon Petroleum	Marathon Petroleum Tampa	95
Ball Metal Container	Ball Metal Container	94
TECO	TECO Big Bend Station	94
Hess Corporation	Hess Corporation Tampa Terminal	84
Citgo Petroleum	Citgo Tampa Terminal	81
Flowers Baking Company	Flowers Baking Company Bradenton	56
FBE	**FBE Port Manatee (Proposed)**	**10**

The overall reduction in NO_X and SO_2 emissions from the three largest facilities has been roughly 70 and 90%, respectively. Substantial reductions occurred in nearby Pinellas County where the Progress Energy Bartow Plant was repowered to use natural gas instead of residual fuel oil in 2007. The FBE project will be a small emission source compared with the past and present emissions of the large sources in Manatee and Hillsborough counties.

For reference, further emission reductions are expected at TECO Big Bend due to an ongoing improvement program that added an SCR unit on Unit 2 in 2009 and will add one on Unit 1 in 2010, thus cutting future emissions of NO_X by more than 50% when compared with 2008.

The emission trends provide some insight regarding the likely direction of regional ambient air quality drivers (excluding meteorology) for pollutants like ozone and $PM_{2.5}$ that are formed from precursors such as NO_X and SO_2.

7.3. Ambient Air Monitoring – Ozone

Ozone is a key indicator of the overall state of regional air quality. It is not emitted directly from combustion processes. Rather it is formed from VOC and NO_X emitted primarily from regional industrial and transportation sources. VOC is also emitted from fires and vegetation (e.g. isoprene). These two precursors participate in photochemical reactions that occur on an area-wide basis and are highly dependent on meteorological factors.

There are three ozone monitors in Manatee County and four in Hillsborough County as shown in Figure 9. Ozone limits and measurements are summarized on three year blocks, rolled annually. The reported value was calculated by taking the maximum 8-hour readings recorded each day during the three years. The fourth highest of the recorded maxima are identified for each year and then the average of those three values is identified as the compliance value.

The average of the annual fourth highest measurements (design value) over the period 2006-2008 at the monitor (designated as G.T. Bray) recording the highest readings was 78 parts per billion (ppb) in Manatee County. The result is shown in Figure 10 along with similarly calculated values throughout the state.

The values in Manatee and Hillsborough counties are greater than the compliance value limit of 75 ppb. However an official designation has not yet been made by EPA who recently announced that they will reconsider and lower the present standard to the range of 60-70 ppb in the summer of 2010.

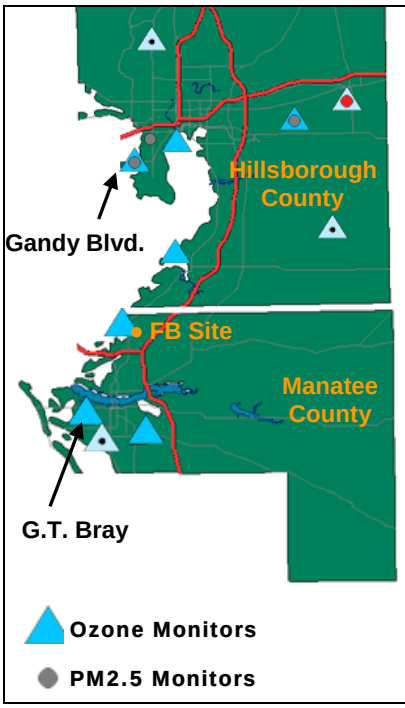

Figure 9 – Ozone and $PM_{2.5}$ Monitors

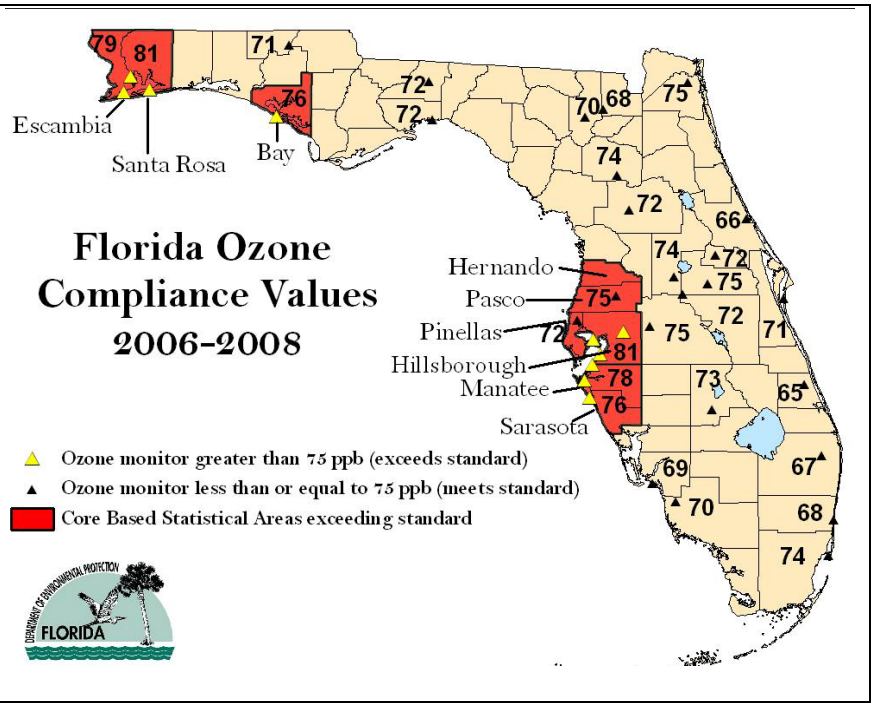

Figure 10. Florida Ozone Compliance Values

FBE limited emissions from the project to less than 100 TPY of any of the PSD-pollutants (including ozone precursors NO_X and VOC) such that the project will not trigger PSD or more stringent Non-Attainment Area New Source Review (NAANSR) requirements (that could have applied had EPA not reconsidered the ozone regulation). Such limitations also minimize the extent to which the project contributes to regional ozone formation.

7.4. Ambient Air Monitoring – $PM_{2.5}$

$PM_{2.5}$ (also known as PM_{fine}) is another key indicator of the overall state of regional air quality. Some is directly emitted as a product of combustion from transportation and industrial sources as well as fires. Much of it consists of particulate nitrates and sulfates formed through chemical reactions between gaseous precursors such as SO_2 and NO_X from combustion sources and ammonia (NH_3) naturally present in the air or added by other industrial sources.

There are no $PM_{2.5}$ monitors in Manatee County. However there are three in Hillsborough County that are suitable for this analysis given the similar setting of the two counties with respect to Tampa Bay and the Gulf of Mexico.

$PM_{2.5}$ limits and measurements are summarized on three year blocks, rolled annually. The reported value for $PM_{2.5}$ given in Table 21 was calculated by taking the average 24-hour readings recorded each day during the three years (2006-2008). The value for each year that exceeds 98% of all daily measurements within that year is identified for each year and then the average of those three numbers is identified as the value compared with the standard. The value calculated in the described manner for $PM_{2.5}$ measured at the U.S. Marine Corps Reserve Station on Gandy Boulevard is given in Table 21 as 22.5 micrograms per cubic meter ($\mu g/m^3$) compared with a standard of 35 $\mu g/m^3$.

The simple average of all measurements within each three years (2006-2008) was also calculated and then the mean of the three annual averages (11.5 $\mu g/m^3$) was reported and compared with the standard of 15 $\mu g/m^3$. Although the $PM_{2.5}$ stations are not used for official attainment determinations, they accurately reflect regional $PM_{2.5}$ concentrations.

Table 21 - Ambient Air Quality Measurements Nearest to the Project Site (2008)

Pollutant	Location	Averaging Period	Ambient Concentration			
			Compliance Period	Value	Standard	Units
Ozone	G.T. Bray, Manatee	8-hour	2006-08	78 [a]	75 [a]	ppb
$PM_{2.5}$	USMC, Gandy Blvd. Hillsborough	24-hour	2006-08	22.5 [b]	35 [b]	$\mu g/m^3$
		Annual	2006-08	11.5 [c]	15 [c]	$\mu g/m^3$
PM_{10}	Gardinier Park Hillsborough	24-hour	2008	58	150 [d]	$\mu g/m^3$
		Annual	2008	23 [e]	50 [e]	$\mu g/m^3$
SO_2	Simmons Park Hillsborough	3-hour	2008	45	1300 [f]	$\mu g/m^3$
		24-hour	2008	18	260 [f]	$\mu g/m^3$
		Annual	2008	5	60 [f]	$\mu g/m^3$
NO_2	Simmons Park Hillsborough	Annual	2008	6	100 [f]	$\mu g/m^3$
CO	Seminole Adult Day School (SADS) Hillsborough	1-hour	2008	2,750	40,000 [f]	$\mu g/m^3$
		8-hour	2008	1,980	10,000 [f]	$\mu g/m^3$

a. Three year average of the 4th highest daily maximum.
b. Three year average of the 98th percentile of 24-hour concentrations.
c. Three year average of the weighted annual mean.
d. Not to be exceeded on more than an average of one day per year over a three-year period.
e. Arithmetic mean.
f. Not to be exceeded more than once per year.

7.5. Ambient Air Monitoring – NO_2, SO_2, PM_{10} and CO

Nitrogen dioxide (NO_2), SO_2, CO and PM_{10} are directly emitted from combustion sources. PM_{10} is also transported from distant sources or generated from local material processing operations, traffic, construction, farming and other human activities.

There are no active NO_2, SO_2, CO or PM_{10} monitors in Manatee County. However, the extensive network in Hillsborough County is adequate. The highest values from the Hillsborough monitors likely provide conservative (high) estimates for Manatee County.

The southernmost Simmons Park monitor is located approximately 16 km north, northeast of the FBE site and approximately 10 km southwest of the TECO Big Bend Station. Measured SO_2 and NO_2 values are much less than the applicable standards given in Table 21 and reflect the substantial emission reductions from the nearby power plants as well as the use of ultralow sulfur fuel diesel for transportation.

CO concentrations at the SADS site were also very low compared with the applicable standards.

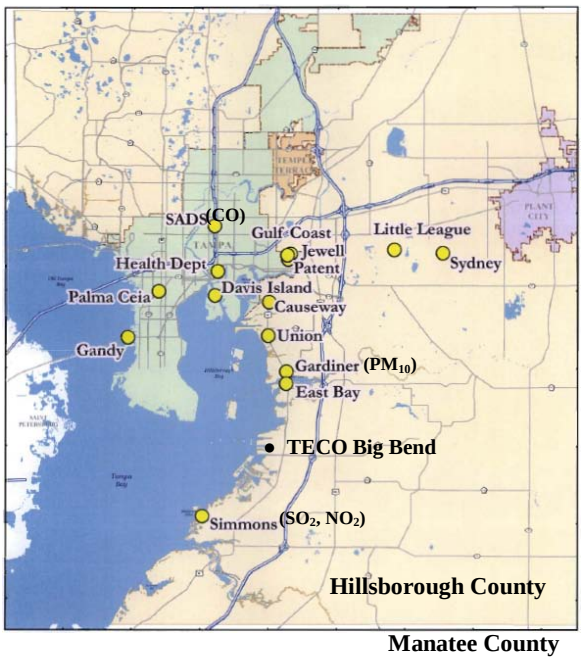

Figure 11 – Hillsborough County Monitors

The Gardinier PM_{10} monitor is well within the influence of industrial zones and exhibited values well below the applicable standard.

7.6. Air Quality Impact Analysis

FBE limited emissions from the project to less than 100 TPY of any of the PSD-pollutants. For that reason, little, if any, impact is expected from the project compared with the applicable standards. The applicant nevertheless submitted an assessment of the project on ground level concentrations of key air pollutants.

Significant Impact Analysis

Significant Impact Levels (SIL) are defined for SO_2, CO, PM/PM_{10}, and NO_2. A significant impact analysis (SIA) is performed on each of these pollutants to determine if a project is predicted to cause an increase in ground level concentration greater than the SIL for each pollutant.

In order to conduct a SIA, the applicant uses the proposed project's emissions at worst load conditions as inputs to the models. The models used in this analysis and any required subsequent modeling analyses are described below. The highest predicted short-term concentrations and highest predicted annual averages predicted by this modeling are compared to the appropriate SILs for the PSD Class II Area (everywhere except the closest Class I Area, the Chassahowitzka National Wilderness Area).

For the Class II analysis, a combination of fence line, near field and far field receptors were chosen for predicting maximum concentrations in the vicinity of the project. The receptor grid consisted of receptors spaced at 50-meter (m) intervals around the facility fence line. The remaining receptors were spaced at 100 m from the property line out to 2 kilometers (km) and 250m spacing from 2 to 4 km.

If this modeling at worst-load conditions shows ground-level increases less than the SIL, the applicant is exempted from conducting any further modeling. If the modeled concentrations from the project exceed the SIL, then additional modeling including emissions from all major facilities or projects in the region (multi-source modeling) is required to determine the proposed project's impacts compared to the AAQS and PSD increments. Since the proposed project is not PSD, a PSD Increment Analysis is not required. However, the applicant has provided a multi-source AAQS analysis to ensure that the project will not cause or contribute to a violation of an ambient air quality standard.

The results of applicant's SO_2, CO, PM/PM_{10} and NO_X air quality SIA for this project are shown below in Table 22.

Table 22 - Maximum Predicted Air Quality Impacts from FB Energy for Comparison to the PSD Class II SILs

Pollutant	Averaging Time	Max Predicted Impact ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	2008 Baseline Concentrations ($\mu g/m^3$)	Ambient Air Standard ($\mu g/m^3$)	Significant Impact?
PM_{10}	Annual	7	1	~58	50	Yes
	24-Hour	19	5	~23	150	Yes
SO_2	Annual	0.1	1	~5	80	No
	24-Hour	1	5	~18	365	No
	3-hour	3	25	~45	1300	No
NO_2	Annual	0.1	1	~6	100	No
CO	1-hour	6	2,000	~2,750	40,000	No
	8-hour	4	500	~1,980	10,000	No

Maximum predicted impacts from all pollutants are less than the applicable SIL for the Class II area except for PM_{10}. In addition, these impacts are compared with existing ambient air quality measurements from the local ambient monitoring network. It is clear that maximum predicted impacts from the project are much less than the respective AAQS.

For the Class I analysis, 360 receptors were located along a perimeter 50 km away from the property line. While the Chassahowitzka National Wilderness Refuge (CNWR) is 110 km away from the proposed project location, the applicant provided the SIA for 50 km out using Class II SIA (AERMOD) modeling methods to demonstrate that no further Class I analyses should be required based on distance and projected emission rates.

Maximum air quality impacts from the proposed project at a distance of 50 km are summarized in the Table 23. The results of the initial PM_{10}, NO_2 and SO_2 air quality impact analyses for this project indicated that maximum predicted impacts are much less than the applicable SILs for the Class I area.

Table 23 - Maximum Air Quality Impacts from FB Energy for Comparison to the PSD Class I SILs

Pollutant	Averaging Time	Max. Predicted Impact at 50 km µg/m^3)	Class I SIL (µg/m^3)	Significant Impact?
PM_{10}	Annual	0.001	0.2	No
	24-hour	0.02	0.3	No
NO_2	Annual	0.001	0.1	No
SO_2	Annual	0.001	0.1	No
	24-hour	0.02	0.2	No
	3-hour	0.1	1	No

Models and Meteorological Data Used in the Foregoing Air Quality Analysis

PSD Class I and II Areas: The AERMOD modeling system was used to evaluate the pollutant emissions from the proposed project in the surrounding Class II Area, and also in the Class I area. AERMOD was approved by the EPA in November 2005. The AERMOD modeling system incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including the treatment of both surface and elevated sources, and both simple and complex terrain. AERMOD contains two input data processors, AERMET and AERMAP. AERMAP is the terrain processor and AERMET is the meteorological data processor.

A series of specific model features, recommended by the EPA, are referred to as the regulatory options. The applicant used the EPA recommended regulatory options. Direction specific downwash parameters were used for all sources for which downwash was considered. The stacks associated with this project all satisfied the good engineering practice (GEP) stack height criteria.

The AERMET meteorological data used for this analysis consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from Sarasota-Bradenton Airport and the Tampa International Airport respectively. The 5-year period of meteorological data was from 2001 through 2005.

In reviewing this permit application, the Department has determined that the application complies with the applicable provisions of the stack height regulations as revised by EPA on July 8, 1985 (50 FR 27892). Portions of the regulations have been remanded by a panel of the U.S. Court of Appeals for the D.C. Circuit in NRDC v. Thomas, 838 F. 2d 1224 (D.C. Cir. 1988). Consequently, this permit may be subject to modification should EPA revise the regulation in response to the court decision. This may

result in revised emission limitations or may affect other actions taken by the source owners or operators. A more detailed discussion of the required analyses follows.

AAQS Analysis

The applicant provided an AAQS review to ensure compliance. The AAQS is determined by adding a "background" concentration to the maximum modeled concentration. This "background" concentration takes into account all sources of a particular pollutant that are not explicitly modeled, and was based on the highest-second high concentration measured at the Hillsborough Gardinier Park PM_{10} monitor during the five year period 2004-2008. The maximum predicted annual and maximum predicted high, sixth high short term average for the AAQS analysis are summarized in Table 24 below. As shown in this table, emissions from the proposed facility are not expected to significantly cause or contribute to a violation of an AAQS.

Table 24 – PM_{10} Ambient Air Quality Impacts

Pollutant	Averaging Time	Major Sources Impact ($\mu g/m^3$)	Background Conc. 2003- 2007 ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Total Impact Greater Than AAQS?	Florida AAQS ($\mu g/m^3$)
PM_{10}	24-hour	25	86	111	No	150
	Annual	8	28	35	No	50

8. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, review of the air quality impact analysis, and the conditions specified in the draft permit. Deborah Nelson is the project meteorologist responsible for reviewing and validating the air quality impact analysis. She may be contacted at deborah.nelson@dep.state.fl.us and 850-294-3870. David Read is the project engineer responsible for preparing the draft permit. He may be contacted at david.read@dep.state.fl.us and 850-414-7268. Alvaro Linero, program administrator supervised their work. He may be contacted at alvaro.linero@dep.state.fl.us and 850-921-9523.