4.0 Emission Source Information

4.1 Proposed Facility Emission Sources

4.1.1 Regulated Pollutants

The principal sources of emissions from the proposed Facility will be the Fluidized Bed (FB) boiler(s), auxiliary boiler, fuel processing and handling equipment, and the ash handling and storage equipment. The FB boiler will be primarily fired on biomass (100% biomass capability). The boiler(s) will also be designed to burn a maximum of 15% fossil fuel (coal, Pet Coke, TDF) as a supplemental fuel based on heat input, or approximately 5% based on weight, for combustion control purposes. From a measurement perspective, if either one or two boilers are used, it/they will exhaust into a single pollution control train and single exhaust stack and will be operated together in order to meet the electrical supply commitments. The emissions for all potential scenarios at maximum and partial load are provided in Table 4-1. Table 4-1 also provides a summary of maximum hourly emissions (lb/hr) for the auxiliary boiler, fuel processing buildings, and fly ash silo baghouse. Due to electricity supply commitments and energy efficiency considerations, the FB boiler(s) will not be operated at partial loads less than 80 percent of its base load rating except during start-up and shut down conditions.

The FB boiler emissions are based on vendor data and the control efficiencies of proposed pollution controls. The auxiliary boiler emissions were estimated based on emission factors from U.S. EPA *AP-42 Section 1.3*. The estimates of emission rates on an hourly basis were determined on the basis of the following assumptions:

- Maximum sulfur content of biomass is 0.02 percent.
- Maximum sulfur content of fossil fuels is 6.5 percent.
- Maximum sulfur content of fuel oil is 0.05 percent.
- All particulate emissions from point sources are less than or equal to 10 micrometers (PM-10).

Table 4-1
Summary of Maximum Hourly Emissions and Emission Characteristics
Yellow Pine Energy
Clay County, Georgia

Parameter		**Emission Source**				
		FB Boiler				
Scenario		100% Biomass	85% Biomass 15% Coal	85% Biomass 15% Pet Coke	85% Biomass 15% TDF	Worst Case Partial Load 85% Biomass 15% Coal
Load	**%**	100	100	100	100	80
Net Unit Output	**MW**	110	110	110	110	88
Heat Input	**MMBtu/hr**	1529	1529	1529	1529	1237
Fuel		Biomass	Biomass/Coal	Biomass/Pet Coke	Biomass/TDF	Biomass/Coal
		Stack Parameters				
Stack Temperature	**^{o}F**	286	286	286	286	271
Stack Height	**ft**	210	210	210	210	210
Stack Diameter	**ft**	10.0	10.0	10.0	10.0	10.0
Exit Velocity	**ft/sec**	118.8	118.8	118.8	118.8	95.0
UTM Easting						
UTM Northing						
		Stack Emissions				
NO_X	**lb/MMBtu**	0.10	0.10	0.10	0.10	0.10
	lb/hr	153	153	153	153	124
CO	**lb/MMBtu**	0.30	0.30	0.30	0.30	0.30
	lb/hr	459	459	459	459	371
VOC	**lb/MMBtu**	0.020	0.018	0.018	0.018	0.018
	lb/hr	30.58	30.1	30.1	30.1	24.4
PM-10	**lb/MMBtu**	0.033	0.033	0.033	0.033	0.033
	lb/hr	50.5	50.5	50.5	50.5	40.8
SO_2	**lb/MMBtu**	0.060	0.19	0.18	0.14	0.19
	lb/hr	91.7	291	268	214	235

Note:
[1] The VOC emission factor for Biomass firing is 0.02 lb/MMBtu. The VOC emission factor for fossil fuel firing is 0.007 lb/MMBtu.

Table 4-1 (Continued)
Summary of Maximum Hourly Emissions and Emission Characteristics
Yellow Pine Energy
Clay County, Georgia

Parameter		Emission Source				
		Auxiliary Boiler [1]	FPB1 Baghouse	FPB2 Baghouse	Silo Baghouse	Fly Ash Silo Baghouse
Load	**%**	100				
Heat Input	**MMBtu/hr**	25				
Fuel		No. 2 Fuel Oil				
Heat Content of Fuel	**Btu/gal**	139,600				
Sulfur Content of Fuel	**wt%**	0.050				
Stack Parameters						
Stack Temperature	**^oF**	330	70	70	70	70
Stack Height	**ft**	100	24.0	24.0	186	186
Stack Diameter	**ft**	2.0	0.70	0.70	0.70	0.70
Exit Velocity	**ft/sec**	39.2	28.7	28.7	28.7	28.7
Stack Location						
UTM Easting						
UTM Northing						
Stack Emissions						
NO_X	**lb/MMBtu**	0.14				
	lb/hr	3.58	0	0	0	0
CO	**lb/MMBtu**	0.036				
	lb/hr	0.90	0	0	0	0
VOC	**lb/MMBtu**	0.0024				
	lb/hr	0.061	0	0	0	0
PM-10	**lb/MMBtu**	0.017				
	lb/hr	0.43	0.0023	0.0035	0.0041	4.4E-07
SO_2	**lb/MMBtu**	0.051				
	lb/hr	1.27	0	0	0	0

Note:
[1] The auxiliary boiler will operate a maximum of 250 hours per year.

The fuel processing building and fly ash silo baghouse emissions are based on the use of the Facility's primary fuel (biomass) which represents the maximum emissions attributable to materials handling. Far more biomass must be handled per plant unit output than fossil fuels because of their respective energy contents per pound. Summaries of maximum hourly emissions (lb/hr) for fugitive emissions (conveyor transfer towers, storage piles, paved roads, and cooling tower) are summarized in Table 4-2. Detailed calculations for the fuel processing buildings, ash silo baghouse, and fugitives are included in Appendix E. With the exception of the cooling tower, fugitive emissions are based on 100 percent biomass firing.

The cooling tower system at the proposed Facility will consist of a multi-cell mechanical draft cooling tower and a non-contact recirculating water system. Based on the proposed configuration, these systems will be emitters of small amounts of particulate matter, as cooling tower drift. The cooling tower emissions were estimated based on U.S. EPA emission factors from *AP-42 Section 13.4*.

It is estimated that the majority (over 95 percent) of the particulate emissions from the cooling tower will be greater than 10 microns in diameter. The majority of the mass-containing particles that are emitted in the cooling tower droplets are larger-diameter particles that, upon evaporation of the water droplets, will fall to the ground in close proximity to the cooling tower. Therefore, for the purpose of this application, all particulate matter emissions from the cooling tower are assumed to be Total Suspended Particulate Matter (TSP). Detailed calculations for the cooling towers are included in Appendix E.

The maximum expected annual emissions from the Facility and the corresponding PSD significant emission rates are as follows:

Pollutant	Maximum Expected Annual Emissions (tons/yr)[a]	PSD Threshold for Major Sources (tons/yr)
NO_X	670	40
CO	2009	100
VOC	134	40
PM-10[b]	222	15
SO_2	603	40

[a] Emissions include auxiliary boiler.
[b] All PM from point sources are assumed to be PM-10.

Table 4-2
Summary of Fugitive Emission Sources
Yellow Pine Energy
Clay County, Georgia

ID	Emission Unit	PM lb/hr	PM-10 lb/hr	Release height ft	Area Acres
	Material Handling				
BCU1	Barge/Clamshell Unloading	8.49E-03		10	1.24E-03
T1	Conveyor Transfer Tower #1	5.07E-02	2.32E-02	10	8.26E-04
T2	Conveyor Transfer Tower #2	6.75E-02	3.09E-02	10	8.26E-04
T3	Conveyor Transfer Tower #3	8.17E-05		10	8.26E-04
SPL1	Storage Pile Load-in (Limestone/Sand)	2.04E-05		45	9.18E-05
ASP2	Active Storage Pile #2 (Limestone/Sand)	1.37E-01		45	0.48
ASP3	Active Storage Pile #3 (Biomass)	4.22E-03	1.93E-03	23	0.25
T5	Conveyor Transfer Tower #5	8.17E-05		10	8.26E-04
T6	Conveyor Transfer Tower #6	5.06E-02	2.32E-02	10	8.26E-04
RSP	Reserve Storage Pile	6.33E-03	2.90E-03	23	0.25
T7	Conveyor Transfer Tower #7	5.06E-02	2.32E-02	10	8.26E-04
ASP4	Active Storage Pile #4 (Biomass)	6.33E-03	2.90E-03	45	0.66
T8	Conveyor Transfer Tower #8	5.06E-02	2.32E-02	10	8.26E-04
TRUCK	Fly Ash Loading		4.39E-07	10	1.10E-02
	Roadway Particulate Sources				
PR1	Paved Road #1	2.12E-02	1.35E-02	5	0.52
PR2	Paved Road #2	6.55E-02	4.02E-02	5	1.84
	Cooling Tower Emissions				
CT	Cooling Tower Emissions	2.37E-01		24	8.42E-02

Note:
Fugitive emissions are based on 100% biomass combustion.

Since the projected emissions of these pollutants are all greater than their respective PSD thresholds, the project will be a major source as defined by the regulations governing PSD. As such, a PSD permit application will be required, including a demonstration of best achievable control technology (BACT), and a dispersion modeling analysis to demonstrate that there will not be a violation of any National Ambient Air Quality Standards (NAAQS) and that no PSD increments will be exceeded.

4.1.2. Non-regulated Pollutants

EPA's guidance on the assessment of non-regulated "toxic pollutants" requires that permit applicants evaluate emissions of toxic air emissions that could potentially be of concern to the public. In the case of the FB and auxiliary boilers, potential toxic air pollutants could include ammonia, benzene, ethylbenzene, formaldehyde, hexane, and heavy metals. Ammonia will be used in the selective non-catalytic reduction (SNCR) system for the control of NO_X emissions from the FB boiler. As a result, there will be some amount of unreacted ammonia that passes through the SNCR system. This unreacted ammonia is referred to as ammonia "slip." The maximum expected emission of ammonia will be less than 15 ppm (36.6 lb/hr), at maximum load. A more complete analysis of the impact of these non-regulated pollutants is provided in Section 6. No significant emissions of air toxics are expected from the FB boiler or auxiliary boiler.

4.2 Other Emission Sources

In order to facilitate the determination of PSD increment consumption and compliance with the NAAQS resulting from the operation of the Facility, an inventory of existing and permitted emission sources was developed with the assistance of the Georgia Environmental Protection Division (EPD) for all emission sources with the potential to interact with emissions from the proposed Facility. The inventory of existing and permitted emission sources are provided in Appendix F. Due to location of the proposed Facility, an inventory of existing and permitted emission sources was requested from the Alabama Department of Environmental Management (ADEM). ADEM responded that no sources were located within 53 km (i.e., the predicted radius of impact plus 50 km) of the proposed facility. Therefore, the dispersion modeling analysis of the proposed Facility (see Section 6.0) only includes sources located in the State of Georgia.