7.0 Ambient Air Quality Impact Analysis

The dispersion modeling analyses documented here were designed to assess the potential impact on ambient air quality attributable to the operation of the proposed Facility. Prior to initiation of the air quality impact analysis, a dispersion modeling protocol was submitted to EPD on June 4, 2007. The dispersion models, meteorological data, modeling methodology, and results of the analyses described in this application are consistent with the previously submitted modeling protocol.

7.1 Dispersion Models

With the exception of the toxic air pollutant analysis (see below), dispersion modeling was performed using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD), version 07026 (EPA, 2007). The model was used exclusively to determine short-term concentrations (i.e., 1-hour to 24-hour averaging periods) as well as annual average concentrations. The complete AERMOD modeling system is comprised of three parts: the AERMET pre-processor, the AERMAP pre-processor, and the AERMOD model. The AERMET pre-processor compiles the surface and upper-air meteorological data and formats the data for AERMOD input. The AERMAP pre-processor is used to obtain elevation and controlling hill heights for AERMOD input.

A toxic dispersion modeling results were obtained using EPA's SCREEN3 model, version 96043 (EPA, 1996). Modeling results for one pollutant in one of the cases, arsenic from biomass, were obtained using EPA's short-term Industrial Source Complex Model (ISCST3), version 02035 (EPA, 2002) because the initial modeling results exceeded the EPD defined screening levels. The ISCST3 model was used to determine the 24-hour and annual averaging period concentrations for arsenic.

7.2 Meteorological Input Data

EPD staff provided AERMOD-ready AERMET files for use in the analysis. The AERMET files consist of five years (1989 – 1993) of surface observations from Columbus, Georgia and upper air data from Centreville, Alabama. The Profile Base Elevation of the Columbus, Georgia station from 1989 to 1990 and 1991 to 1993 was 30 feet and 32 feet, respectively as indicated by EPD staff. The meteorological data representativeness demonstration is included in Appendix F.

7.3 Receptor Grids

A Cartesian-based receptor grid was utilized for all analyses, with a receptor spacing of 100 meters from the fenceline out to 1 km, 250 m from 1 km to 5 km, and 500 meter spacing out to 10 km. The modeling approach was based on the assumption that a refined grid (minimum 100 meter spacing) would be used as necessary in order to determine maximum predicted concentrations in various areas of the initial grid.

7.4 Other Modeling Considerations

The AERMOD model contains options that determine the way in which calculations are made. The choice of options was made consistent with EPA's current recommended approach, including the regulatory default option. The options utilized in the analysis included stack tip downwash, PRIME algorithm for sources influenced by building downwash, default wind profile exponents, default vertical potential temperature gradients, and rural dispersion coefficient. Because the population density of Clay County, Georgia is less than 750 people per square km, the urban modeling option was not selected. Building heights and any other significant structures were specified for modeling purposes to facilitate the calculation of downwash and building wake effects by the model. Actual terrain elevations were obtained from Micropath Corporation (Golden, Colorado) which supplies USGS 3-meter digital (7.5 minute quad maps). Receptor elevations were determined for all receptor points in order to account for the influence of terrain on the dispersion of pollutants in the area.

7.5 Dispersion Modeling Methodology and Results

7.5.1 Facility Emission Sources

The dispersion modeling results reported in this section are based on the emission source information discussed previously in Section 3.0. Tables 4-1 and 4-2 summarize the emissions and emission source characteristics for the proposed Facility. The emissions summarized in these tables are the maximum expected hourly emission rates that will occur during plant operation at maximum proposed production. It is noted that these emissions are also representative of BACT as previously demonstrated in Section 5.0. With the exception of SO_2, all emissions were modeled at the maximum hourly rate. In the case of SO_2, the requested 3-hour permit limit of 0.19 lb/MMBtu for 85% Biomass/15% Coal was specified in all modeling analyses.

For NO_X, the Guideline on Air Quality Models permits the adjustment of NO_X to NO_2 by application of the "Ambient Ratio" method. The Tier 2 adjustment of this Method is to multiply NO_X modeled concentrations by a factor of 0.75. This factor is considered to conservatively represent the proportion of NO_2 to NO_X within a short distance of the NO_X source. Rather than make this conversion to the modeled concentrations, and since each emission rate is directly proportional to the modeled receptor concentration, each modeled emission rate of NO_X was multiplied by this factor prior to entry into the model. It is noted that the NO_X values shown in Table 4-1 have not been corrected; however, the emissions that were input to the dispersion model have been corrected by multiplying the Table 4-1 NO_X emission rates by 0.75.

7.5.1.1 Maximum Impact and Radius of Significant Impact

The maximum predicted impact and radii of significant impact for each pollutant emitted from the proposed Facility were determined by modeling the maximum expected emissions as previously presented in Tables 4-1 and 4-2. This analysis was performed for NO_X (modeled as NO_2 at a rate of 75 percent of the NO_X emission rate), PM-10, CO, and SO_2 since the emissions for these pollutants will be greater than the EPA-defined significant emission rates. Although VOC emissions are emitted in amounts that are greater than the significant emission rate, VOC is not a modeled pollutant per PSD Rules for PSD increment consumption or NAAQS demonstrations.

The results of this analysis are summarized in Tables 7-1 (100 percent load) and 7-2 (80 percent load). As illustrated in the tables, the maximum predicted concentrations attributable to the Facility's proposed emissions are only greater than the significant impact

Table 7-1
Maximum Predicted Offsite Concentrations and Radii of Significant Impact at 100% Load (85% Biomass and 15% Coal Firing, by Heat Input)
Yellow Pine Energy
Clay County, Georgia

			Maximum Predicted Offsite Concentration (ug/m^3)					
Pollutant	**Averaging Period**	**Significant Impact Level (ug/m^3)**	**1989**	**1990**	**1991**	**1992**	**1993**	**Maximum Radius of Significant Impact (km)**
PM-10	Annual	1	0.50 Location (685714, 3488710)	0.58 Location (685714, 3488710)	**0.61** Location (685714, 3488710)	0.58 Location (685714, 3488710)	0.55 Location (685714, 3488710)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
	24-hour	5	3.84 Location (685714, 3488710)	**3.93** Location (685714, 3488710)	3.08 Location (685714, 3488710)	3.07 Location (685714, 3488710)	3.07 Location (685714, 3488710)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
NO_X	Annual	1	0.60 Location (686773, 3488865)	0.61 Location (685600, 3488600)	**0.63** Location (685600, 3488500)	0.60 Location (686806, 3488778)	0.61 Location (686806, 3488778)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
SO_2	Annual	1	1.18 Location (686800, 3489100)	1.24 Location (685600, 3488600)	**1.27** Location (685500, 3488500)	1.12 Location (686900, 3488800)	1.15 Location (686900, 3488800)	
			ROI = 1.1 km Location (687200, 3489300)	ROI = 1.1 km Location (685200, 3488500)	ROI = 1.2 km Location (685100, 3488400)	ROI = 1.0 km Location (685300, 3488400)	ROI = 1.0 km Location (687200, 3488500)	1.2
	24-hour	5	10.6 Location (686600, 3489400)	11.9 Location (686400, 3489500)	12.2 Location (686300, 3489600)	11.1 Location (686900, 3488900)	**14.1** Location (686400, 3489700)	
			ROI = 2.5 km Location (686350, 3487400)	ROI = 2.5 km Location (687600, 3490850)	ROI = 2.6 km Location (686600, 3491250)	ROI = 3.0 km Location (683800, 3486900)	ROI = 2.8 km Location (686650, 3491450)	3.0
	3-hour	25	27.0 Location (687000, 3489200)	28.0 Location (686740, 3488593)	**29.3** Location (686500, 3488200)	29.2 Location (686900, 3488900)	28.5 Location (687100, 3489000)	
			ROI = 1.1 km Location (687200, 3489300)	ROI = 1.0 km Location (687200, 3488600)	ROI = 1.0 km Location (686400, 3489700)	ROI = 0.9 km Location (687100, 3489000)	ROI = 1.1 km Location (686400, 3489800)	1.1
CO	1-hour	2000	**54.2** Location (686400, 3489200)	51.9 Location (687000, 3488900)	54.1 Location (686400, 3489200)	51.8 Location (686900, 3488900)	51.3 Location (686400, 3489500)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
	8-hour	500	30.0 Location (686805, 3488778)	30.2 Location (686800, 3489100)	**32.3** Location (686800, 3489600)	28.7 Location (686000, 3489500)	29.1 Location (686400, 3489700)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0

Notes:
Location = (UTM Coordinates)
Bold indicates maximum value
A refined grid was used to determine the ROI for the 24-hr averaging period

Table 7-2
Maximum Predicted Offsite Concentrations and Radii of Significant Impact at 80% Load (85% Biomass and 15% Coal Firing, by Heat Input)
Yellow Pine Energy
Clay County, Georgia

Pollutant	Averaging Period	Significant Impact Level (ug/m^3)	Maximum Predicted Offsite Concentration (ug/m^3) 1989	1990	1991	1992	1993	Maximum Radius of Significant Impact (km)
PM-10	Annual	1	0.50 Location (685714, 3488710)	0.59 Location (685714, 3488710)	**0.61** Location (685714, 3488710)	0.58 Location (685714, 3488710)	0.55 Location (685714, 3488710)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
	24-hour	5	3.89 Location (685714, 3488710)	**3.97** Location (685714, 3488710)	3.07 Location (685714, 3488710)	3.07 Location (685714, 3488710)	3.07 Location (685714, 3488710)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
NO_X	Annual	1	0.61 Location (686773, 3488865)	0.61 Location (685600, 3488600)	**0.65** Location (685600, 3488500)	0.60 Location (686806, 3488778)	0.62 Location (686806, 3488778)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
SO_2	Annual	1	1.18 Location (686800, 3489000)	1.24 Location (685600, 3488600)	**1.28** Location (685600, 3488500)	1.12 Location (685600, 3488500)	1.15 Location (686900, 3488800)	
			ROI = 1.0 km Location (687100, 3489200)	ROI = 1.0 km Location (685300, 3488500)	ROI = 1.1 km Location (685250, 3488300)	ROI = 1.0 km Location (685300, 3488400)	ROI = 1.0 km Location (687200, 3488600)	1.1
	24-hour	5	9.75 Location (686806, 3488778)	11.1 Location (686400, 3489500)	11.5 Location (686300, 3489500)	10.4 Location (686900, 3488900)	**12.8** Location (686400, 3489500)	
			ROI = 2.3 km Location (688192, 3487500)	ROI = 2.2 km Location (687400, 3490600)	ROI = 2.3 km Location (686500, 3491000)	ROI = 2.7 Location (684050, 3487050)	ROI = 2.5 km Location (686550, 3491200)	2.7
	3-hour	25	25.4 Location (686616, 3489040)	25.9 Location (686740, 3488953)	**27.8** Location (686500, 3488200)	26.9 Location (686806, 3488778)	26.3 Location (687100, 3489000)	
			ROI = 0.5 km Location (686616, 3489040)	ROI = 0.7 km Location (686700, 3488200)	ROI = 0.7 km Location (686900, 3488800)	ROI = 0.8 km Location (687000, 3488900)	ROI = 0.9 km Location (687100, 3489000)	0.9
CO	1-hour	2000	50.7 Location (686400, 3489200)	47.4 Location (686076, 3489280)	**51.4** Location (686400, 3489200)	49.4 Location (686000, 3489300)	48.9 Location (686526, 3489040)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0
		500	**30.0** Location (686805, 3488778)	28.4 Location (686707, 3489040)	29.9 Location (686300, 3489500)	28.0 Location (686800, 3489000)	26.6 Location (686700, 3488900)	
			ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	ROI = 0 km	0

Notes:
Location = (UTM Coordinates)
Bold indicates maximum value
A refined grid was used to determine the ROI for the 24-hr averaging period

levels for SO_2. The maximum predicted radius of significant impact (ROI) for SO_2 is only 3.0 km. The emissions of PM-10, NO_X and CO result in an insignificant impact at all offsite locations.

The Facility is located approximately 1.0 km west of the Alabama border and 59 km north of the Florida border. As discussed above, the impact of the Facility's SO_2 emissions will therefore extend approximately 2 km into Alabama. Therefore, additional modeling was performed as described below.

7.5.1.2 PSD Class II Increment Consumption

Federal regulations (40 CFR 52) specify that the air quality of an area cannot deteriorate by more than a specified amount by establishing "PSD increments". These increments represent the maximum allowable increase in ambient concentration in an area (by pollutant and averaging period) since the regulations were enacted in 1977 or since the first PSD increment consuming source was permitted, whichever is later. Currently, PSD increments exist for NO_X, SO_2, and PM-10. Prior to issuance of a construction permit for a major new or modified source, a facility must demonstrate that the PSD increments are not exceeded in the area as a result of the operation of the proposed new or modified facility.

Because the increase in emissions of SO_2 from the proposed Facility have been shown to result in significant impacts for this pollutant, it will be necessary to determine the amount of PSD increment consumption in the vicinity of the proposed Facility (i.e., within the predicted significant impact areas described and defined above) for that pollutant. Since the impacts of PM-10, NO_X, and CO are predicted to be insignificant, no increment is considered to be consumed for those pollutants and no additional modeling is required. The modeling analysis to determine the amount of PSD increment consumption for SO_2 was based on the proposed SO_2 emissions from the Facility, and all increment consuming (and expanding) sources identified by EPD in Georgia and ADEM in Alabama. ADEM did not identify any sources within 53 km (i.e., the predicted radius of impact plus 50 km) of the proposed Facility. An inventory of Georgia increment consuming sources was obtained from EPD's website and is included in Appendix G. This list was revised in two ways: 1) Sources greater than 100 km from the proposed facility were removed, and 2) The Q/D screening method was used to remove sources if the "short and long-term" distances exceed the distance threshold for that pollutant. The Q/D screening analysis is illustrated in Table 7-3 and indicates that sources at two facilities (Georgia-Pacific and Longleaf Energy) should be included in the SO_2 PSD increment analysis.

TABLE 7-3
Q/D Analysis – Georgia PSD Increment Consuming Sources
Yellow Pine Energy
Clay County, Georgia

Source	Allowable Emissions "Q" (tpy)	Pollutant	"Q"/20 Distance Threshold (km)	Actual Short-term Distance (km)	Actual Long-term Distance (km)
Duke Energy, LLC[1] Baker County	---	SO_2	---	---	---
Coats & Clark, Inc.[2] Dougherty County	126	SO_2	6.32	85.7	82.7
Cooper Tire & Rubber[3] Dougherty County	1,130	SO_2	56.5	93.3	90.3
Procter & Gamble[4] Dougherty County	819	SO_2	41.0	88.3	85.3
GP Cedar Springs[5] Early County	2,118	SO_2	106	39.5	36.5
Longleaf Energy, LLC[6] Webster County	6,493	SO_2	325	28.1	25.1

[1] Application later withdrawn.
[2] From Procter & Gamble TCAP PSD application, January 1996.
[3] The allowable emission rate is based on Boilers #2 & #3 SO_2 potential-to-emit emission rate.
[4] Allowable emission rate is based on the summation of all P&G PSD Increment Inventory sources running at 8760 hr/yr.
[5] Allowable emission rate is based on the summation of all GP PSD Increment Inventory sources running at 8760 hr/yr.
[6] Allowable emission rate is based on the S001, S002, S003 sources running at 8760 hr/yr

The Georgia increment consuming sources that are included in the modeling are included in Appendix G. The modeling analysis that was performed to determine PSD increment consumption was conducted within the radius of significant impact for SO_2 (3.0 km). The results of this analysis are summarized in Table 7-4, which indicates that the maximum predicted consumption of the Class II PSD increment for SO_2 by the proposed Facility as

Table 7-4
Summary of Dispersion Modeling Results
Maximum Predicted PSD Increment Consumption
Yellow Pine Energy
Clay County, Georgia

			Maximum Predicted Offsite Concentration (ug/m^3)					
Pollutant	**Averaging Period**	**PSD Increment (ug/m^3)**	**1989**	**1990**	**1991**	**1992**	**1993**	**Maximum PSD Increment Consumption (%)**
SO_2	Annual	20	1.40 Location (686800, 3489100)	1.44 Location (685600, 3488600)	**1.46** Location (685500, 3488500)	1.28 Location (686900, 3488800)	1.32 Location (686900, 3488800)	7.30%
	24-hour[1]	91	10.5 Location (686600, 3489400)	9.34 Location (686400, 3489500)	**12.2** Location (686300, 3489600)	10.2 Location (686900, 3488900)	9.88 Location (686700, 3489100)	13.4%
	3-hour[1]	512	25.4 Location (686806, 3488778)	25.0 Location (687200, 3488600)	25.2 Location (686773, 3488865)	25.8 Location (686740, 3488953)	**26.0** Location (687000, 3488900)	5.08%

Notes:
[1] The maximum values for the SO_2 3-hr and 24-hr averaging periods are the 2nd high concentrations.
Location = (UTM Coordinates)
Bold indicates maximum value

well as increment consuming sources in the vicinity of the proposed Facility is only 7.30 percent (annual averaging period), 13.4 percent (24-hour averaging period), and 5.08 percent (3-hour averaging period). It should be noted the maximum values for the SO_2 3-hour and 24-hour averaging periods are the 2nd highest predicted concentrations. Based on the results of the modeling analysis, it is concluded that no PSD Increment could be threatened or exceeded as a result of the operation of the proposed Facility.

7.5.1.3 Compliance with National Ambient Air Quality Standards

NAAQS are specified for SO_2, PM-10, NO_2, CO, ozone (O_3), and lead (Pb). Lead emissions will not exceed the significant emission threshold that would trigger PSD review and modeling is therefore not required. Since the emissions from the proposed Facility are predicted to result in a significant impact only for SO_2, it is necessary to demonstrate compliance with the NAAQS for this pollutant.

The method used to demonstrate compliance with the NAAQS for SO_2 was to assess the combined impact of: 1) The Facility's proposed emissions and all existing or proposed emission sources in the area as identified by EPD and ADEM; and 2) existing background air quality. Background ambient air quality concentrations in the region surrounding the facility site for each of these pollutants were also provided by EPD and are illustrated in Table 7-5.

TABLE 7-5
Background Air Quality Data for Clay County
Yellow Pine Energy
Clay County, Georgia

Pollutant	Averaging Period	Background Concentration[1] ($\mu g/m^3$)
SO2	Annual	5.2
	24-hr	21
	3-hr	64

[1] Provided by EPD for Clay County

An inventory of Georgia NAAQS sources was developed from EPD's 2005 National Emissions Inventory (NEI) database. The Q/D screening method was used to remove sources if the "short and long-term" distances exceed the distance threshold for that pollutant. The Q/D screening analysis is illustrated in Table 7-6 and indicates that emissions from six facilities (Georgia Power – Mitchell, Cooper Tire & Rubber, Miller Breweries East, Inc., Proctor & Gamble, Georgia-Pacific, Longleaf Energy) should be included in the SO_2 NAAQS analysis.

TABLE 7-6
Q/D Analysis – Georgia NAAQS Sources
Yellow Pine Energy
Clay County, Georgia

Source	Allowable Emissions "Q" (tpy)	Pollutant	"Q"/20 Distance Threshold (km)	Actual Short-term Distance (km)	Actual Long-term Distance (km)
Ga Power - Mitchell[1] Dougherty County	39,649	SO_2	1,982	86.2	83.2
Cooper Tire & Rubber[2] Dougherty County	1,993	SO_2	99.7	93.3	90.3
Miller Breweries East, Inc[3] Dougherty County	7,063	SO_2	353	90.4	87.4
Procter & Gamble[4] Dougherty County	1,923	SO_2	96.2	88.3	85.3
GP Cedar Springs[5] Early County	32,226	SO_2	1,611	39.5	36.5
Georgia Tubing Corp[6] Early County	---	SO_2	---	---	---
Tolleson Lumber Co Inc[7] Webster County	100	SO_2	5.00	83.1	80.1
Longleaf Energy, LLC[8] Webster County	6.493	SO_2	325	28.1	25.1

1 Allowable emissions calculated from all sources running at 8760 hrs/yr.
2 Allowable emissions calculated from all boiler sources running at 8760 hrs/yr.
3 Allowable emissions calculated from max hourly output (8760 hrs/yr) of 3 boilers.
4 Allowable emissions calculated from all sources running at worst case for 8760 hrs/yr.
5 Allowable emissions calculated from all sources running at worst case for 8760 hrs/yr.
6 Facility may no longer be in operation. Permit information could not be located on the GA EPD website.
7 Emission rate comes from Title V application emission total for SO2, "<100 tpy".
8 Allowable emissions calculated from all boiler sources running at 8760 hrs/yr.

ADEM did not identify any NAAQS sources within 53 km (i.e., the predicted radius of impact plus 50 km) of the proposed Facility. The Georgia NAAQS sources that are included in the modeling are summarized in Appendix G. A summary of the dispersion modeling analysis of all NAAQS consuming sources in the area that were identified by EPD and ADEM is contained in Table 7-7. It should be noted the maximum predicted values for the SO_2 3-hour and 24-hour averaging periods are the 2nd highest predicted concentrations. It should also be noted that the information included in Table 7-7 includes the results of the refined grid modeling analysis (to a 100 meter resolution) for all averaging periods. SO_2 concentrations attributable to the maximum operation of the proposed Facility are seen to be very low and less than 1.60 percent, 3.86 percent, and 2.25 percent of the annual, 24-hour, and 3-hour SO_2 standards, respectively. These maximum predicted impacts have been conservatively added to the regional background concentrations provided by EPD in Table 7-8 and compared with the NAAQS for each pollutant. As illustrated in Table 7-8, the maximum predicted combined impacts (including background) for SO_2, are only 11.6 percent of the annual standard, 11.9 percent of the 24-hour standard, and 12.5 percent of the 3-hour standard. Based on the results of the modeling analysis, and in consideration of background ambient air quality levels, it is concluded that no NAAQS could be threatened or exceeded as a result of the operation of the proposed Facility.

TABLE 7-8
NAAQS Compliance Assessment
Yellow Pine Energy
Clay County, Georgia

Pollutant	Averaging Period	A Maximum Predicted Facility Impact (µg/m³) [1]	B Maximum Impact of All Sources (µg/m³) [2]	C Background Concentration (µg/m³) [3]	(B+C) Maximum Estimated Impact (µg/m³)	NAAQS (µg/m³)
SO_2	Annual	1.28	4.06	5.2	9.26	80
	24-hour	14.1	22.6	21	43.6	365
	3-hour	29.3	110	64	174	1300

[1] Maximum predicted concentration due to facility operation.
[2] Maximum predicted concentration attributable to the proposed facility operation and all PSD and baseline emission sources.
[3] Regional background concentrations for the site area (as provided by GA EPD).

Table 7-7
Summary of Dispersion Modeling Results
Maximum Predicted Impact - Proposed Yellow Pine Energy Emissions and all NAAQS Consuming Emission Sources

		Maximum Predicted Offsite Concentration (ug/m^3)				
Pollutant	**Averaging Period**	**1989**	**1990**	**1991**	**1992**	**1993**
SO_2	Annual	3.57 Location (686900, 3489000)	**4.06** Location (685600, 3488600)	3.90 Location (685500, 3488500)	3.39 Location (686806, 3488778)	3.16 Location (686900, 3488800)
	24-hour[1]	16.8 Location (686750, 3486250)	**22.6** Location (685600, 3488700)	20.2 Location (686100, 3487800)	18.0 Location (685600, 3488700)	17.8 Location (685800, 3488300)
	Refined Grid 100 m Spacing	16.9 Location (686750, 3486250)				
	3-hour[1]	98.20 Location (686500, 3486750)	89.6 Location (688500, 3487250)	**110** Location (686000, 3487500)	83.1 Location (688500, 3488250)	87.1 Location (686500, 3486750)
	Refined Grid 100 m Spacing	98.3 Location (686500, 3486750)	89.6 Location (688600, 3487250)		83.1 Location (688500, 3488250)	87.1 Location (686300, 3486850)

Notes:
[1] The maximum values for the SO_2 3-hr and 24-hr averaging periods are the 2nd high concentrations.
Location = (UTM Coordinates)
Bold indicates maximum value

7.5.1.4 Impact on PSD Class I Areas

There are two PSD Class I Areas within 300 km of the proposed Facility (Bradwell Bay Wilderness Area and St. Marks National Wildlife Refuge). These areas are located approximately 165 km and 180 km southeast of the Facility. Federal Land Managers from the U.S. Forest Service and U.S. Fish and Wildlife Service were contacted to verify that additional modeling or impact analyses would not be required in the Class I Areas. The Federal Land Manager for the Bradwell Bay Wilderness Area stated that a Class I air quality analysis is not necessary for this project due to the relatively low emissions from the Facility. To date, a response has not been received from the Federal Land Manager for the St. Marks National Wildlife Refuge.

7.5.1.5 Ambient Air Quality Monitoring

The maximum predicted ambient air quality impacts attributable to the proposed Facility emissions are below the applicable de minimis impact levels for NO_X, PM-10, CO, Lead, and Fluorides for all averaging periods. Air toxic emissions, including lead and hydrogen fluoride, are detailed in Section 7.5.2. The maximum predicted impact of Facility operation is above the de minimis impact level for SO_2 for the 24-hour averaging period. A comparison of maximum predicted impacts and the de minimis impact levels is shown in Table 7-9:

TABLE 7-9
Comparison of Maximum Predicted Impacts and De Minimis Impact Levels
Yellow Pine Energy
Clay County, Georgia

Pollutant	Yellow Pine Energy Maximum Predicted Concentration ($\mu g/m^3$)	EPA De Minimis Impact Level ($\mu g/m^3$)
NO_X (annual)	0.63	14
PM-10 (24-hour)	3.93	10
SO_2 (24-hour)	14.1	13
CO (8-hour)	32.3	575
Lead (24-hour)	0.0035	0.25
Fluorides (24-hour)	0.00028	0.25

The maximum SO_2 concentration is located within 700 meters of the fenceline and the de minimis impact level is reached within approximately 900 meters of the fenceline. Additionally, the emission inventories provided by EPD (PSD increment consuming sources and 2005 National Emission Inventory database) were reviewed and no existing or proposed emission sources are located in Clay County. Furthermore, EPD provided estimated background air quality data that they believe are representative of Clay County (Table 7-5). Yellow Pine Energy requests that they be granted an exemption from any requirements for preconstruction monitoring to establish background air quality levels, because the SO_2 level is only slightly above de minimis levels and the area within 900 meters of the Facility is pine plantation, wooded areas and farm lands. Therefore, there is not an imminent risk to require preconstruction monitoring.

7.5.2 Air Toxics Impact Assessment

The U.S. EPA's guidance on the assessment of non-regulated "toxic pollutants" requires that permit applications evaluate emissions of toxics air pollutants that the proposed Facility could emit in amounts potentially of concern to the public. Additional information is provided on the various operating scenarios, as well as an estimate of other emissions (including heavy metals) from the proposed Facility.

EPD has an air toxics policy, the purpose of which is to evaluate the potential impacts of toxic air pollutants during the new source (construction) permitting process. The first step in EPD's air toxics guidelines involves the calculation of acceptable ambient concentrations (AACs) for each air toxic pollutant, modeling of predicted impacts, and comparing the modeled results with the AACs. If the modeled result for a given air toxic is less than the applicable AAC, no further analysis is required.

The AACs were determined in accordance with EPD's Air Toxics guidance. More specifically, the AACs for the annual averaging period were derived from the EPA's Integrated Risk Information System web site. AACs for the 15-minute averaging period were derived from OSHA/NIOSH ceilings and the 24-hour averaging period AACs were derived from OSHA/NIOSH time weighted averages (TWA). A safety factor of 10 is applied to the AACs for the 15-minute averaging period. Safety factors of 100 or 300 are applied to the 24-hour AACs for non-human carcinogens and known human carcinogens, respectively.

7.5.2.1 Fluidized Bed Boiler Emissions

The FB boiler(s) will be primarily fired on biomass (100% biomass capability). The boiler will also be designed to burn up to a maximum of 15% (based on heat input or approximately 5% by weight) fossil fuel (Coal, Pet Coke and TDF) as a supplemental fuel for combustion control purposes. With the exception of acrolein, air toxic emissions from biomass firing are estimated using emission factors for wood residue combustion in Chapter 1.6 of the Fifth Edition of U.S. EPA AP-42 "Compilation of Emission Factors Volume I: Stationary and Area Sources". The acrolein emission factor was obtained from a Technical Memorandum dated November 1, 2005 from David Dixon to the Maine Air Toxics Initiative Emissions Inventory Subcommittee titled "*Dealing with Uncertainty of Acrolein Emissions in MATI Inventory*". The Technical Memorandum references a NCASI published acrolein emission factor of 7.8 E-05 lb/MMBtu for wood-fired boilers. Acrolein emissions from biomass firing were estimated using the NCASI published emission factor. Emissions were calculated based on the boiler heat input rating of 1,529 MMBtu/hr. Detailed emissions calculations are included in Appendix E.

Emissions from the 85% Biomass/15% Coal fuel mix firing are estimated using the previously mentioned wood residue emission factors and coal emission factors found in Chapter 1.1 of U.S. EPA AP-42. Detailed emissions calculations are included in Appendix E. Emissions from the 85% biomass/15% Pet Coke fuel mix firing were estimated using the previously mentioned wood residue emission factors and Pet Coke emission factors from the California Air Toxics Emission Factor search engine operated by the California Air Resources Board (http://www.arb.ca.gov/ei/catef/catef.htm). Detailed emissions calculations are included in Appendix E. Emissions from the 85% biomass/15% TDF fuel mix were estimated using the previously mentioned wood residue emission factors and TDF emission factors from *Air Emissions from Scrap Tire Combustion* (October 1999), a publication of the U.S. EPA Office of Research and Development. Detailed emissions calculations are included in Appendix E.

7.5.2.2 Auxiliary Boiler Emissions

The auxiliary boiler will be fired on No. 2 low sulfur fuel oil. Emissions were estimated using distillate oil emission factors in Chapter 1.3 of U.S. EPA AP-42 and a heat input of 25 MMBtu/hr. Detailed emissions calculations are included in Appendix E.

7.5.2.3 Impacts Analysis

Maximum predicted 1-hour concentrations were conservatively estimated by modeling the FB Boiler(s) and the Auxiliary Boiler emissions using the SCREEN3 model with a unitary emission rate (1 gram per second). The unitized maximum impacts were then scaled for each source and each pollutant by the ratio of the emission rate to the modeled emission rate (i.e., 1.0 g/s or 7.937 lb/hr) for each air toxic pollutant. The 1-hour averages were adjusted to 15-minute, 24-hour, and annual averages by multiplying by the following conversion factors, as recommended by EPD:

Averaging Period	Conversion Factor
15-minute	1.32
24-hour	0.40
Annual	0.08

The maximum predicted concentrations of arsenic were obtained using the U.S. EPA's short-term Industrial Source Complex Model (ISCST3). The maximum predicted concentrations obtained using these methods for each pollutant and for each averaging period are shown in Table 7-10. It is noted that the air toxic emissions from the fluidized bed boiler presented in Table 7-10 are the maximum between the 100% biomass and 85% biomass/15% fossil fuel mix scenarios and include ammonia “slip” from the SNCR NO_X control system.

The results illustrated in Table 7-10 demonstrate that the maximum predicted ambient concentrations of all air toxics are below the respective AACs for each air toxic and for each applicable averaging period. This demonstrates compliance with EPD’s air toxics guidance.

Electronic copies of all relevant input and output files used in the dispersion modeling analyses presented herein are being submitted on a CD-ROM as part of this application.

Table 7-10
Air Toxics Impact Analysis
Yellow Pine Energy
Clay County, Georgia

HAPs/Toxics Pollutant[1]	Emission Rate (lb/hr)		Total Emission Rate	Averaging Period	Maximum Predicted Concentration	AAC[2]
	FB Boiler	Aux. Boiler	(lb/hr)		(ug/m^3)	(ug/m3)
1,1,1-Trichloroethane	4.74E-02	0.00E+00	4.74E-02	24-hr	2.75E-03	4.52E+03
				15-min	9.08E-03	2.46E+04
1,2-Dichloroethane	4.43E-02	0.00E+00	4.43E-02	24-hr	2.57E-03	4.82E+02
				15-min	8.50E-03	4.05E+04
1,2-Dichloropropane	5.05E-02	0.00E+00	5.05E-02	Annual	5.86E-04	4.00E+00
				24-hr	2.93E-03	8.33E+02
				15-min	9.67E-03	5.08E+04
2,3,7,8-Tetrachlorodibenzo-p-dioxins	1.31E-08	0.00E+00	1.31E-08	24-hr	7.63E-10	6.90E-02
2,4-Dinitrotoluene	3.06E-06	0.00E+00	3.06E-06	24-hr	1.78E-07	3.57E+00
2-Chloroacetophenone	7.65E-05	0.00E+00	7.65E-05	Annual	8.88E-07	3.00E-02
				24-hr	4.44E-06	7.52E-01
Acenaphthene	1.39E-03	0.00E+00	1.39E-03	24-hr	8.08E-05	4.76E-01
Acetaldehyde	1.27E+00	0.00E+00	1.27E+00	Annual	1.47E-02	9.00E+00
				24-hr	7.37E-02	2.86E+02
				15-min	2.43E-01	4.50E+03
Acetone	2.91E-01	0.00E+00	2.91E-01	24-hr	1.69E-02	5.85E+03
				15-min	5.57E-02	1.84E+05
Acetophenone	1.68E-04	0.00E+00	1.68E-04	24-hr	9.75E-06	1.17E+02
Acrolein[3]	1.19E+00	0.00E+00	1.19E+00	Annual	1.38E-02	2.00E-02
				24-hr	6.91E-02	5.45E-01
				15-min	2.28E-01	2.29E+01
Aluminum	5.28E-03	0.00E+00	5.28E-03	24-hr	3.07E-04	3.57E+01
Ammonia	3.96E+01	0.00E+00	3.96E+01	Annual	4.60E-01	1.00E+02
				24-hr	2.30E+00	8.28E+01
				15-min	7.58E+00	2.43E+03
Anthracene	4.59E-03	0.00E+00	4.59E-03	24-hr	2.66E-04	4.76E-01
Antimony	1.21E-02	0.00E+00	1.21E-02	24-hr	7.01E-04	1.19E+00
Arsenic[4]	3.36E-02	1.00E-04	3.37E-02	Annual	1.40E-04	2.00E-04
				24-hr	1.60E-03	7.94E-03
Barium	2.60E-01	0.00E+00	2.60E-01	24-hr	1.51E-02	1.19E+00
Benzene	6.42E+00	0.00E+00	6.42E+00	Annual	7.46E-02	4.50E-01
				24-hr	3.73E-01	2.54E+00
				15-min	1.23E+00	1.60E+03
Benzo(a)anthracene	9.94E-05	0.00E+00	9.94E-05	24-hr	5.77E-06	4.76E-01
Benzo(a)pyrene	3.98E-03	0.00E+00	3.98E-03	24-hr	2.31E-04	4.76E-01
Benzo(b)fluoranthene	1.53E-04	0.00E+00	1.53E-04	24-hr	8.88E-06	4.76E-01
Benzo(j,k)fluoranthene	2.45E-04	0.00E+00	2.45E-04	24-hr	1.42E-05	4.76E-01
Benzo(k)fluoranthene	5.50E-05	0.00E+00	5.50E-05	24-hr	3.20E-06	4.76E-01
Benzyl chloride	7.65E-03	0.00E+00	7.65E-03	24-hr	4.44E-04	4.11E+00
				15-min	1.47E-03	5.00E+02
Beryllium	1.68E-03	7.50E-05	1.76E-03	Annual	3.71E-05	4.00E-03
				24-hr	1.85E-04	4.76E-03
				15-min	6.12E-04	5.00E-01
Biphenyl	1.86E-05	0.00E+00	1.86E-05	24-hr	1.08E-06	3.00E+00
bis(2-Ethylhexyl)phthalate	7.19E-05	0.00E+00	7.19E-05	24-hr	4.17E-06	1.19E+01
				15-min	1.38E-05	1.00E+03
Bromoform	4.26E-04	0.00E+00	4.26E-04	Annual	4.95E-06	9.00E+00
				24-hr	2.47E-05	4.10E+00
Cadmium	6.27E-03	7.50E-05	6.34E-03	Annual	9.03E-05	6.00E-03
				24-hr	4.52E-04	1.19E-02
Carbon disulfide	1.42E-03	0.00E+00	1.42E-03	Annual	1.65E-05	7.00E+02
				24-hr	8.24E-05	1.48E+02
				15-min	2.72E-04	9.34E+03
Carbon tetrachloride	6.88E-02	0.00E+00	6.88E-02	Annual	7.99E-04	7.00E-01
				24-hr	3.99E-03	4.99E+01
				15-min	1.32E-02	6.29E+03
Chlorine	1.21E+00	0.00E+00	1.21E+00	24-hr	7.01E-02	3.45E+00
				15-min	2.31E-01	1.45E+02
Chlorobenzene	5.05E-02	0.00E+00	5.05E-02	24-hr	2.93E-03	8.21E+02
Chloroform	4.28E-02	0.00E+00	4.28E-02	Annual	4.97E-04	4.00E-01
				24-hr	2.49E-03	1.16E+02
				15-min	8.20E-03	9.78E+02
Chromium	3.21E-02	7.50E-05	3.22E-02	24-hr	1.95E-03	1.19E+00
				15-min	6.44E-03	1.00E+01
Chromium VI	5.41E-03	0.00E+00	5.41E-03	Annual	6.28E-05	8.00E-05
				24-hr	3.14E-04	7.94E-03
Chrysene	5.81E-05	0.00E+00	5.81E-05	24-hr	3.37E-06	4.76E-01
Cobalt	9.94E-03	0.00E+00	9.94E-03	24-hr	5.77E-04	2.38E-01

Table 7-10
Air Toxics Impact Analysis
Yellow Pine Energy
Clay County, Georgia

HAPs/Toxics Pollutant[1]	Emission Rate (lb/hr)		Total Emission Rate	Averaging Period	Maximum Predicted Concentration	AAC[2]
Copper	7.49E-02	1.50E-04	7.51E-02	24-hr	4.53E-03	2.38E-01
				15-min	1.49E-02	1.00E+01
Crotonaldehyde	1.51E-02	0.00E+00	1.51E-02	24-hr	8.79E-04	1.37E+01
				15-min	2.90E-03	8.61E+01
Cumene	5.79E-05	0.00E+00	5.79E-05	Annual	6.72E-07	4.00E+02
				24-hr	3.36E-06	5.85E+02
Dimethyl sulfate	5.24E-04	0.00E+00	5.24E-04	24-hr	3.04E-05	1.23E+01
Ethyl chloride	2.00E-06	0.00E+00	2.00E-06	Annual	2.32E-08	1.00E+04
				24-hr	1.16E-07	6.28E+03
Ethylbenzene	4.74E-02	0.00E+00	4.74E-02	Annual	5.50E-04	1.00E+03
				24-hr	2.75E-03	1.04E+03
				15-min	9.08E-03	5.45E+04
Ethylene dibromide	1.31E-05	0.00E+00	1.31E-05	Annual	1.52E-07	2.00E-02
				24-hr	7.61E-07	1.22E+02
				15-min	2.51E-06	2.31E+04
Ethylene dichloride	4.37E-04	0.00E+00	4.37E-04	Annual	5.07E-06	4.00E-01
				24-hr	2.54E-05	1.61E+02
				15-min	8.37E-05	4.05E+04
Fluoranthene	2.45E-03	0.00E+00	2.45E-03	24-hr	1.42E-04	4.76E-01
Formaldehyde	6.73E+00	0.00E+00	6.73E+00	Annual	7.81E-02	8.00E-01
				24-hr	3.91E-01	2.19E+00
				15-min	1.29E+00	2.45E+02
Hexane	7.32E-04	0.00E+00	7.32E-04	Annual	8.50E-06	7.00E+02
				24-hr	4.25E-05	4.29E+03
	5.77E-03	0.00E+00		24-hr	3.35E-04	5.85E+00
				15-min	1.11E-03	1.64E+02
Hydrogen chloride	2.91E+01	0.00E+00	2.91E+01	Annual	3.37E-01	2.00E+01
				15-min	5.57E+00	7.46E+02
Indeno(1,2,3,c,d)pyrene	1.33E-04	0.00E+00	1.33E-04	24-hr	7.72E-06	4.76E-01
Iron	1.51E+00	0.00E+00	1.51E+00	24-hr	8.79E-02	2.38E+01
Isophorone	6.33E-03	0.00E+00	6.33E-03	24-hr	3.68E-04	1.12E+02
				15-min	1.21E-03	2.83E+03
Lead[5]	2.75E-02	2.25E-04	2.77E-02	24-hr	1.86E-03	1.19E-01
Manganese	2.45E+00	1.50E-04	2.45E+00	Annual	2.84E-02	5.00E-02
				24-hr	1.42E-01	4.76E-01
				15-min	4.69E-01	5.00E+02
Mercury[5]	1.47E-03	7.50E-05	1.55E-03	Annual	3.46E-05	3.00E-01
				24-hr	1.73E-04	5.95E-02
				15-min	5.71E-04	1.00E+01
Methane	3.21E+01	0.00E+00	3.21E+01	24-hr	1.86E+00	1.56E+03
Methyl bromide	2.29E-02	0.00E+00	2.29E-02	Annual	2.66E-04	5.00E+00
				24-hr	1.33E-03	9.26E+00
				15-min	4.39E-03	7.77E+03
Methyl chloride	3.57E-02	0.00E+00	3.57E-02	Annual	4.15E-04	9.00E+01
				24-hr	2.07E-03	1.64E+02
				15-min	6.84E-03	4.13E+04
Methyl ethyl ketone	1.13E-02	0.00E+00	1.13E-02	Annual	1.31E-04	5.00E+03
				24-hr	6.56E-04	1.40E+03
				15-min	2.17E-03	8.85E+04
Methyl hydrazine	1.86E-03	0.00E+00	1.86E-03	24-hr	1.08E-04	4.49E-02
				15-min	3.56E-04	3.77E+01
Methyl methacrylate	2.18E-04	0.00E+00	2.18E-04	Annual	2.53E-06	7.00E+02
				24-hr	1.27E-05	9.75E+02
				15-min	4.18E-05	4.10E+04
Methyl tert butyl ether	3.82E-04	0.00E+00	3.82E-04	Annual	4.44E-06	3.00E+03
				24-hr	2.22E-05	4.29E+02
Methylene chloride	3.17E-03	0.00E+00	3.17E-03	24-hr	1.84E-04	4.14E+02
				15-min	6.07E-04	4.34E+04
Molybdenum	3.21E-03	0.00E+00	3.21E-03	24-hr	1.86E-04	1.19E+01
Naphthalene	1.48E-01	0.00E+00	1.48E-01	Annual	1.72E-03	3.00E+00
				24-hr	8.61E-03	1.25E+02
				15-min	2.84E-02	7.86E+03
Nickel	5.05E-02	7.50E-05	5.05E-02	24-hr	3.02E-03	3.57E-02
Pentachlorophenol	7.80E-05	0.00E+00	7.80E-05	24-hr	4.53E-06	1.19E+00
Phenanthrene	1.07E-02	0.00E+00	1.07E-02	24-hr	6.21E-04	4.76E-01
Phenol	7.80E-02	0.00E+00	7.80E-02	24-hr	4.53E-03	4.58E+01
				15-min	1.49E-02	6.00E+03
Phosphorus	4.13E-02	0.00E+00	4.13E-02	24-hr	2.40E-03	2.38E-01
Propionaldehyde	9.33E-02	0.00E+00	9.33E-02	24-hr	5.42E-03	1.13E+02
Pyrene	5.66E-03	0.00E+00	5.66E-03	24-hr	3.28E-04	4.76E-01

Table 7-10
Air Toxics Impact Analysis
Yellow Pine Energy
Clay County, Georgia

HAPs/Toxics Pollutant[1]	Emission Rate (lb/hr)		Total Emission Rate	Averaging Period	Maximum Predicted Concentration	AAC[2]
Selenium	4.36E-03	3.75E-04	4.74E-03	24-hr	6.92E-04	4.76E-01
Silver	2.60E+00	0.00E+00	2.60E+00	24-hr	1.51E-01	2.38E-01
Styrene	2.91E+00	0.00E+00	2.91E+00	Annual	3.37E-02	1.00E+03
				24-hr	1.69E-01	1.01E+03
				15-min	5.57E-01	8.53E+04
Tetrachloroethylene	5.81E-02	0.00E+00	5.81E-02	24-hr	3.37E-03	1.61E+03
				15-min	1.11E-02	1.36E+05
Tin	3.52E-02	0.00E+00	3.52E-02	24-hr	2.04E-03	4.76E+00
Toluene	1.41E+00	0.00E+00	1.41E+00	Annual	1.63E-02	5.00E+03
				24-hr	8.17E-02	1.79E+03
				15-min	2.70E-01	1.13E+05
Trichloroethene	4.59E-02	0.00E+00	4.59E-02	24-hr	2.66E-03	1.28E+03
				15-min	8.79E-03	1.07E+05
Vanadium	1.50E-03	0.00E+00		24-hr	8.70E-05	2.38E-01
				15-min	2.87E-04	5.00E+00
Vinyl acetate	8.30E-05	0.00E+00	8.30E-05	Annual	9.64E-07	2.00E+02
				24-hr	4.82E-06	8.38E+01
				15-min	1.59E-05	5.28E+03
Vinyl Chloride	2.75E-02	0.00E+00	2.75E-02	Annual	3.20E-04	2.30E-01
				24-hr	1.60E-03	2.03E+00
				15-min	5.27E-03	1.28E+03
Xylenes	3.82E-02	0.00E+00	3.82E-02	Annual	4.44E-04	1.00E+02
				24-hr	2.22E-03	1.03E+03
				15-min	7.32E-03	6.51E+04
Yttrium	4.59E-04	0.00E+00		24-hr	2.66E-05	2.38E+00

	FB Boiler	Aux. Boiler
Maximum Predicted Concentration from SCREEN3 Model (ug/m^3) (based on 1 gram/sec)	1.152	23.2

Note:

1 Some of the the air toxic emissions are based on U.S. EPA AP-42 emission factors. Details on air toxic emission factors and emission calculations can be found in Appendix E.

2 AACs for annual averaging period are from U.S. EPA's Integrated Risk Information web site. AACs for 24-hr and 15-min averaging periods are from from OSHA/NIOSH TWAs and STELs (or ceiling limits).

3 Technical Memorandum dated November 1, 2005 from David Dixon to the Maine Air Toxics Initiative Emissions Inventory Subcommittee references a NCASI acrolein emission factor of 7.8 E-05 lb/MMBtu for wood-fired boilers.

4 Maximum predicted concentrations of arsenic were obtained using the U.S. EPA's short-term Industrial Source Complex Model (ISCST3).

5 Lead and Mercury emission rates are based on BACT determination.