The proposed project is subject to compliance testing and reporting requirements in accordance with F.A.C. Rule 17-2.700. Testing for PM, visible emissions, and SO_2 will be performed to demonstrate compliance with the proposed emission limits. Testing for CO, NO_x, and VOCs will be performed for informational purposes only. Compliance tests will be conducted using the following test methods in accordance with the 1989 version of 40 CFR 60 Appendix A:

a. EPA Method 5 or 17 for PM
b. EPA Method 9 for Visible Emissions
c. EPA Method 10 for CO
d. EPA Method 7E for NO_x
e. ASTM Fuel Analysis for SO_2
f. EPA Method 25a for VOCs

IV. Source Impact Analysis

A. Emission Limitations

The emission limitations for this project are shown in Table 1.

B. Air Quality Analysis

Preliminary modeling of the Sanford plant's increase in emissions indicated that the predicted SO_2 concentration were above the significant impact levels. The predicted PM concentrations were predicted to be below the significant impact levels. Therefore, the modeling analysis considered only the potential interaction of SO_2 emissions between the Sanford plant and other sources.

An emission inventory for other SO_2 sources was developed from the FDER's AIR10 and APIS inventories, permits, and prior modeling studies. These databases were used to obtain a list of all sources within 50 km of the Sanford plant. The counties included in this inventory were Volusia, Orange, Seminole, and Lake. For the FPL Sanford and the FPC Turner and DeBary plants, source parameters were obtained from permits and previous air dispersion modeling analyses. The AIR10 and APIS inventories were used to obtain stack parameters for other sources.

All facilities located within 50 km of the Sanford site with SO_2 emissions greater than 25 tons per year (TPY) were included for consideration in the modeling analysis. A listing of facilities, locations, relative position with respect to the Sanford plant, and maximum allowable emissions is enclosed with the application.

The air quality impact analysis required by the PSD regulations for SO_2 includes:

- An analysis of existing air quality;
- A PSD increment analysis;

- An Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, visibility, and growth-related air quality impacts; and
- A Good Engineering Practice (GEP) stack height determination.

The analysis of existing air quality generally relies on FDER monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analysis depend on air quality dispersion modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the Department has reasonable assurance that the proposed facility, as described in this permit and subject to the conditions of approval proposed herein, will not cause or contribute to violation of any PSD increment or ambient air quality standard.

a. Modeling Methodology

All modeling completed by the applicant followed the EPA Guideline on Air Quality Models (Revised), w/Supplement A (1987). The Industrial Source Complex Short-Term (ISCST) model (version 6-88207) was used to predict the current and proposed impacts of the fuel switch on the surrounding ambient air. The model determines ground-level concentrations of inert gases and small particles emitted into the atmosphere by point, area, or volume-type sources. It incorporates elements for plume rise, transport by the mean wind, and Gaussian dispersion. In addition, the model allows for the separation of sources, building wake downwash, adjustment for calm conditions, and various other input and output features.

Five years of sequential hourly meteorological data (1982-1986) from the National Weather Service (NWS) office in Orlando was used in the model. The model uses each hour of meteorology separately to calculate short-term concentrations. Since 5 years of data was used, the highest, second-high short-term predicted concentrations are compared with the appropriate ambient standards. For the annual averages, the highest predicted yearly average was compared to the standards.

The stack and emission characteristics used in the ISCST modeling are listed in Table 1. All other major SO_2 sources within 50 kilometers (km) of FPL Sanford were included in the analysis. A background value taken from air quality measurements, was added to the modeling impacts for the AAQS analysis. Building wake downwash effects were included in the modeling by inputting the appropriate building characteristics for Units 4 and 5. Unit 3, being below GEP, was affected by downwash. Units 4 and 5 are at GEP.

For the screening phase, receptors were located in radial grids that consisted of 36 radials with radials located at 10° increments. Two sets of receptor grids were used. The first set consisted of receptors located along each radial at distances of 1,000, 2,000, 3,000, 5,000, 7,500, 10,000, 20,000, 30,000, 40,000, and 50,000 meters (m) to determine the significant impact area. The second set of receptors, which were used to determine maximum impacts, were input at distances of 100, 400, 700, 1,000, 1,300, 1,600, 2,000, 3,000, 4,000, and 5,000 m along each radial. For both grids, the Sanford plant was assumed to be at the center of the grids. Modeling with the latter receptor grid indicated that maximum short-term impacts were occurring at the 5,000-m distance in the direction of the FPC Turner plant. Therefore, additional receptors located at distances of 5,500, 6,000, 6,500, 7,000, and 7,500 m were modeled for directions from 50° to 70° from the Sanford plant.

The refinement phase of the modeling used receptor grids with a radial receptor spacing of 100 m and a 2° spacing centered on the receptor at which the highest, second-highest maximum concentration was produced in the screening grid. The refined grids were bordered by the adjacent screening grid receptors. To ensure that a valid highest, second-highest concentration was calculated, concentrations were predicted for the entire year with the refined grid.

The nearest PSD Class I area to the Sanford plant is the Chassahowitzka National Wilderness Area, located 125 km west-southwest of the Sanford plant. Since this area is over 100 km from the plant, impact analyses are not required. In addition, impacts are not expected to be significant.

A more detailed description of the modeling analysis, along with the model output, is contained in the Sanford application. The Department has reviewed the applicant's analysis and found that it conforms with the guidelines established by EPA and followed by the Department.

b. Analysis of Existing Air Quality

Volusia County has one continuous SO_2 monitor located in DeBary. Ambient air quality data from the year 1988 are summarized in Table 2. The highest measured concentrations reported by FDER in 1988 were assumed to represent the background SO_2 levels in the vicinity of the Sanford plant. These concentrations are 100, 28, and 4 $\mu g/m^3$ for the 3-hour, 24-hour, and annual averaging periods, respectively. It should be noted that the highest measurements most likely include contributions from the nearby DeBary and Turner plants. Because these plants are also modeled in the analysis, the background values are considered to provide a conservative estimate of total air quality.

c. PSD Increment Analysis

The results for SO_2 Class II increment consumption for the proposed Orimulsion test burn at the Sanford plant and other PSD sources in the Sanford plant's vicinity are presented in Table 3. The maximum 3-hour, 24-hour, and annual average concentrations are 348, 59, and 4.8 $\mu g/m^3$, respectively, which are 68, 65, and 24 percent of the allowable increments, respectively.

Table 2. Summary of Ambient SO_2 Data, Volusia County, 1988

Site No.	Site Name	Time Period	No. Obs.	Sulfur Dioxide Concentration ($\mu g/m^3$) Max. 3-hr	2nd Max. 3-hr	Max. 24-hr	2nd Max. 24-hr	Arith. Mean
0930001F02	DeBary	Jan-Dec	8425	100	90	28	25	4

Source: FDER, 1988.

Table 3. Maximum Predicted SO_2 Concentrations From the Refined Analysis for Comparison to PSD Class II Increments

Averaging Period	Maximum Concentration ($\mu g/m^3$)	Receptor Location[a] Direction (°)	Receptor Location[a] Distance (km)	Period Julian Day	Period Hour Ending	Period Year	PSD Class II Increment
3-Hour[b]	348	22	1.2	209	15	1984	512
24-Hour[b]	59	202	1.1	148	24	1985	91
Annual	4.8	126	4.4	-	-	1984	20

[a]Relative to the location of the Sanford plant.
[b]Highest, second-highest concentrations predicted for this averaging period.

d. Ambient Air Quality Standards (AAQS) Analysis

The maximum SO_2 impacts due to all sources in the vicinity of the Sanford plant are presented in Table 4. The maximum refined 3-hour, 24-hour, and annual average concentrations are 895, 254, and 31 micrograms per cubic meter ($\mu g/m^3$), respectively, which are below the AAQS of 1300, 260, and 60 $\mu g/m^3$, respectively. The Sanford plant's contributions to the maximum 3-hour, 24-hour, and annual concentrations are 23, 24, and 16 percent of the total concentration (including background) for each respective averaging time.

e. Additional Impacts Analysis

1. Impacts on Soils and Vegetation

The total ground-level ambient concentration of SO_2 is predicted to be less than the secondary air quality standard. The secondary standard for SO_2 is equal to the primary standard and is designed to protect public welfare-related values. As such, SO_2 is not expected to have a harmful effect on soils and vegetation.

2. Growth-Related Air Quality Impacts

The proposed Sanford facility is not expected to significantly change employment, population, housing, or commercial/industrial development in the surrounding area to the extent that a significant air quality impact will result.

3. GEP Stack Height Determination

Good Engineering Practice (GEP) stack height is defined as the greater of: (1) 65 meters or (2) the maximum nearby building height plus 1.5 times the building height or projected width, whichever is less. Applicants cannot take credit for additional pollutant dispersion from stacks built higher than GEP stack height. Both newly constructed stacks at the Sanford facility will meet this requirement.

V. Conclusion

The proposed Orimulsion test burn in Sanford Unit 4 will produce maximum predicted SO_2 and PM concentrations that are expected to comply with the AAQS and PSD Class II increments. These results are based on PM emission rates for the proposed test burn that include excess emissions occurring for 3 hours during a 24-hour period at all three units.

For PM, the maximum concentration due to the test burn alone is predicted to be less than the significant impact levels. For SO_2, the maximum concentrations due to emissions from the Sanford plant and other sources are predicted to be below the AAQS and PSD Class II increments.

Table 4. Maximum Predicted Total SO_2 Concentrations From the Refined Analysis for Comparison to AAQS

Averaging Period	Concentration (μg/m³) Total	Total Due To: Modeled Sources	Total Due To: Background	Receptor Location[a] Direction (°)	Receptor Location[a] Distance (km)	Period: Julian Day	Period: Hour Ending	Period: Year
3-hour[b]	895	795	100	60	7.0	165	12	1982
24-hour[b]	254	226	28	60	7.2	165	24	1982
Annual	31	27	4	346	3.0	--	--	1984

Note: AAQS are 1,300 μg/m³, 3-hour
260 μg/m³, 24-hour
60 μg/m³, annual

[a]Relative to the location of the Sanford plant.
[b]Highest, second-highest concentrations predicted for this averaging period.