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REFINED PSD CLASS I SIGNIFICANT IMPACT AND
REGIONAL HAZE ANALYSES
FOR THE
PROPOSED IPS VANDOLAH POWER PROJECT

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1.0 INTRODUCTION

This report is a supplement to the air permit application and Prevention of Significant Deterioration (PSD) analysis for the IPS Vandolah Power Project submitted by the IPS Avon Park Corporation to the Florida Department of Environmental Protection (DEP) on August 29, 1999. This report presents the results of the refined significant impact and regional haze analyses at the PSD Class I area of the Chassahowitzka National Wildlife Refuge (CNWR) performed for the Project. The Project consists of a nominal 680-megawatt (MW) independent power production facility, which will have four 170-MW dual-fuel, General Electric Frame 7FA combustion turbines (CTs), designed for peaking service. The primary fuel fired by the CTs will be natural gas with distillate fuel oil used as backup fuel. Fuel oil will be limited to a maximum of 1,000 hours per year and contain a maximum sulfur content of 0.05 percent.

As part of the new source review requirements under PSD regulations, new sources are required to address air quality impacts at PSD Class I areas. The evaluation of air quality impacts are not only concerned with determining compliance with PSD Class I increments but also assessing a source's impact on Air Quality Related Values (AQRVs), such as regional haze. Further, compliance with PSD Class I increments can be evaluated by determining if the source's impacts are less than the proposed U.S. Environmental Protection Agency (EPA) Class I significant impact levels. The significant impact levels are threshold levels that are used to determine the type of air impact analyses needed for the project. If the new source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance with Class I increments.

Currently there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and Federal Land Managers (FLM) of Class I areas who are

responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM) Phase 1 Report: Interim Recommendations for Modeling Long Range Transport and Impacts on Regional Visibility* (EPA, 1993), referred to as the Phase 1 report; and
- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the Phase 2 report.

The recommended modeling approaches from these documents are as follows:

- Phase 1 report: screening analysis (Level 1)
- Phase 2 report: screening analysis
- Phase 2 report: refined analysis

For this Project, air quality analyses have already been performed and presented that assessed the Project's impacts relative to the significant impact levels in the PSD Class I area of the Chassahowitzka NWR using the screening analysis approaches as recommended in the Phase 1 and Phase 2 reports. However, based on comments made by the Florida DEP, additional analyses are required to satisfy the PSD new source review requirements that further address air quality impacts at the PSD Class I area.

In response to the Florida DEP's comments, the following analyses have been performed and are presented in this report to address the Project's impact at the PSD Class I area:

- Significant impact analysis using the refined approach from the Phase 2 report; and
- Regional haze analysis using the screening and refined approaches from the Phase 2 report.

2.0 AIR MODELING ANALYSIS APPROACH AND MODEL INPUTS

2.1 SUMMARY OF PREVIOUS MODELING ANALYSES

As part of the PSD analysis report submitted to the Florida DEP, a significant impact analysis was performed to address the Project's impacts in the PSD Class I area of the CNWR which is located approximately 139 km northeast of the Project. This analysis was based on using the Industrial Source Complex Short-term model (ISCST3, Version 98356) and the long-range transport model, California Puff model (CALPUFF, Version 5.0). The ISCST3 model is applicable for estimating the air quality impacts in areas that are within 50 km from a source. At distances beyond 50 km, the ISCST3 model is considered to overpredict air quality impacts because it is a steady-state model. At those distances, the CALPUFF model is recommended for use. As a result, a significant impact analysis was also performed to assess the Project's impacts at the CNWR using the CALPUFF model in a screening approach.

The methods and assumptions used in the ISCST3 model were based on the recommendations for a screening analysis (Level 1) as presented in the *Interagency Workgroup on Air Quality Models (IWAQM) Phase 1 Report: Interim Recommendations for Modeling Long Range Transport and Impacts on Regional Visibility* (EPA, 1993). The methods and assumptions used in the CALPUFF model were based on the latest recommendations for a screening analysis as presented in the *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998).

With the ISCST3 model, the Project's impacts were predicted to be less than the proposed EPA PSD Class I significant impact levels for sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and particulate matter (PM₁₀) when the CTs would be firing natural gas. When firing distillate fuel oil, the Project's impacts were also predicted to be less than the proposed PSD Class I significant impacts levels, except for the 3- and 24-hour average SO₂ concentrations. As a result, the Project's SO₂ impacts at the Class I area were predicted using the CALPUFF model in a screening analysis mode. This analysis

showed that, when the Project's SO_2 impacts were predicted at the Class I receptors, the Project would not have a significant impact.

However, based on discussions with the Florida DEP, when the CALPUFF model is used in a screening mode, the Project's impacts should be based on concentrations predicted at receptors located in a circle with radials separated by 2-degree intervals. The receptors should be located on each radial at a distance that passes through the closest distance from the source to the PSD Class I area. For this Project, a radius of 139 km was used which is the closest distance from the Project to the PSD Class I area.

From the results presented in the PSD analysis report, the Project's 24-hour average SO_2 impacts were predicted to be greater the significant impact levels. As a result, more detailed analyses were performed to predict the Project's 24-hour average SO_2 impacts with the CALPUFF model in a refined mode.

In addition, based on comments from the Florida DEP, a refined regional haze analysis has been performed to determine the affect that the Project's emissions will have on background regional haze levels at the CNWR. In the regional haze analysis, the change in visual range, as calculated by a deciview change, was estimated for the Project in accordance with the IWAQM recommendations. Based on those recommendations, the CALPUFF model is used to predict the maximum 24-hour average sulfate (SO_4), nitrate (NO_3), and fine particulate (PM_{10}) concentrations as well as ammonium sulfate ($(\text{NH}_4)_2\text{SO}_4$) and ammonium nitrate (NH_4NO_3) concentrations. The change in visibility due to a source, estimated as a percentage, is then calculated based on the change from background data .

The following sections present the methods, assumptions, and results used to assess the refined significant impact and regional haze analyses performed for the IPS Vandolah Power Project.

2.2 PROJECT EMISSIONS

Performance data for the IPS Vandolah Power Project were based on vendor data from General Electric, which are presented in detail in the PSD Analysis Report. These data are provided for CTs operating in simple-cycle mode for design loads of 50, 75, and 100 percent with natural gas- and distillate fuel oil- firing at ambient air inlet temperatures of 32, 59, and 95°F.

The pollutant emission rates used in the regional haze modeling analysis are based on fuel oil operation under base load and at 32°F operating temperature. The maximum pollutant emissions for the Project are produced for these conditions. The stack, operating, and pollutant emission data are presented in Table 2-1.

2.3 MODEL SELECTION AND SETTINGS

The California Puff (CALPUFF, version 5.0) air modeling system was used to model to assess since the Project's impacts were predicted to be greater than the PSD Class I significant impact levels and could affect visibility at the CNWR. CALPUFF is a non-steady state Lagrangian Gaussian puff long-range transport model that includes algorithms for building downwash effects as well as chemical transformations (important for visibility controlling pollutants), and wet/dry deposition. The California Puff meteorological and geophysical data preprocessor (CALMET, Version 5), a preprocessor to CALPUFF, is a diagnostic meteorological model that produces a three-dimensional field of wind and temperature and a two-dimensional field of other meteorological parameters. CALMET was designed to process raw meteorological, terrain, and land-use databases to be used in the air modeling analysis. The CALPUFF modeling system uses a number of FORTRAN preprocessor programs that extract data from large databases and converts the data into formats suitable for input to CALMET. The processed data produced from CALMET was input to CALPUFF to assess the pollutant specific impact. Both CALMET and CALPUFF were used in a manner that is recommended by the IWAQM Phase 2 Report (EPA, 1998).

2.3.1 CALPUFF MODEL APPROACHES AND SETTINGS

The IWAQM has recommended approaches for performing a Phase 2 screening and refined modeling analyses that are presented in Tables 2-2 and 2-3, respectively. These approaches involve use of meteorological data, selection of receptors and dispersion conditions, and processing of model output.

The specific settings used in the CALPUFF model are presented in Table 2-4.

2.3.2 BUILDING WAKE EFFECTS

The CALPUFF model included the Project's building dimensions to account for the effects of building-induced downwash on the emission sources. Dimensions for all significant building structures were processed with the Building Profile Input Program (BPIP), Version 95086, and were included in the CALPUFF model input. The PSD Analysis Report presents a listing of all structures included in the analysis.

2.4 RECEPTOR LOCATIONS

For the screening analyses, pollutant concentrations were predicted at receptors that were located along a circle that was centered over the Project and with a radius equal to the minimum distance between the Project and the CNWR (i.e., 139.2 km). The circle was comprised of 180 polar receptors, spaced at 2-degree intervals. Because the area's terrain is flat, all receptors were assumed to be at zero elevation.

For the refined analyses, pollutant concentrations were predicted in an array of 13 discrete receptors located at the CNWR area. These receptors are the same as those used in the PSD Class I analysis performed for the PSD Analysis Report.

2.5 METEOROLOGICAL DATA

2.5.1 SCREENING ANALYSIS

The meteorological data used in the screening analysis consisted of a five-year data record based on hourly surface observations and twice-daily mixing height data obtained from the National Weather Service (NWS) station located at the Tampa International Airport. The data record was for the years 1987 through 1991. The surface

and upper data were preprocessed into an ASCII modeling format by EPA's PCRAMMET meteorological preprocessing program. An anemometer height of 6.7 m was used for the modeling analysis.

Additional meteorological parameters were added to the meteorological data records for use with the CALPUFF model. The additional parameters included friction velocity; Monin-Obukhov length; surface roughness used for calculating dry deposition; precipitation type code and precipitation rate used for calculating wet deposition; and short-wave solar radiation and relative humidity used for calculating chemical transformation rates. The dry deposition parameters were added to the meteorological data records using the PCRAMMET model in dry deposition mode. Using the guidance provided in Section 3.1 of the PCRAMMET User's Manual (EPA, 1998), the following input values were selected:

1. Surface roughness at both application and measurement sites: 0.15 m
2. Noontime Albedo: 0.14
3. Bowen Ratio: 0.8
4. Anthropogenic Heat flux: 0
5. Minimum Monin-Obukhov Length: 2 m
6. Fraction of Net Radiation Absorbed by Ground: 0.15

Hourly precipitation amounts, relative humidity and short-wave radiation values were added to the meteorological data set. These parameters were obtained from the Tampa surface data available from Solar and Meteorological Surface Observation Network (SAMSON) data.

Based on the precipitation classification scheme provided in the CALPUFF User's Manual (Table 2-11) (EPA, 1995), each hour's precipitation code was set to 0 or 2. An hour in which no precipitation occurred received a code of 0. If precipitation occurred the code was set to 2. All precipitation is in the form of rain.

2.5.2 REFINED ANALYSIS

CALMET was used to develop the gridded parameter fields required for the refined modeling analyses. The follow sections discuss the specific data used and processed in the CALMET model.

2.5.3 CALMET SETTINGS

The CALMET settings contained in Table 2-5 were used for the refined modeling analysis. With the exception of hourly precipitation data files, all input data files need for CALMET were developed by the FDEP staff.

2.5.4 MODELING DOMAIN

A rectangular modeling domain extending 250 km in the east-west (x) direction and 280 km in the north-south (y) direction was used for the refined modeling analysis. The extent of the modeling domain was selected by the FDEP staff for predicting impacts at the CNWR. The southwest corner of the domain is the origin and is located at 27 degrees north latitude and 83.5 degrees west longitude. This location is in the Gulf of Mexico approximately 110 km west of Venice, Florida. For the processing of meteorological and geophysical data, the domain contains 25 grid cells in the x-direction and 28 grid cells in the y-direction. The domain grid resolution is 10-km. The air modeling analysis was performed in the UTM coordinate system.

2.5.5 MESOSCALE MODEL – GENERATION 4 (MM4) DATA

Pennsylvania State University in conjunction with the NCAR Assessment Laboratory developed the MM4 data set, a prognostic wind field or "guess" field, for the United States. The hourly meteorological variables used to create this data set (wind, temperature, dew point depression, and geopotential height for eight standard levels and up to 15 significant levels) are extensive and only allow for one data base set for the year 1990. The analysis used the MM4 data to initialize the CALMET wind field. The MM4 data have a horizontal spacing of 80 km and are used to simulate atmospheric variables within the modeling domain.

The MM4 subset domain was provided by FDEP and consisted of a 6 x 6- cell rectangle, with 80 km grid resolution, extending from the MM4 grid points (49,10) to (54, 15). These data were processed to create a MM4.DAT file, for input to the CALMET model.

The MM4 data set used in the CALMET, although advanced, lacks the fine detail of specific temporal and spatial meteorological variables and geophysical data. These variables were processed into the appropriate format and introduced into the CALMET model through the additional data files obtained from the following sources.

2.5.6 SURFACE DATA STATIONS AND PROCESSING

The surface station data processed for the CALPUFF analyses consisted of data from five NWS stations or Federal Aviation Administration (FAA) Flight Service stations for Gainesville, Tampa, Daytona Beach, Vero Beach, Fort Myers and Orlando. A summary of the surface station information and locations are presented in Table 2-6. The surface station parameters include wind speed, wind direction, cloud ceiling height, opaque cloud cover, dry bulb temperature, relative humidity, station pressure, and a precipitation code that is based on current weather conditions. The surface station data were processed by FDEP into a SURF.DAT file format for CALMET input.

Because the modeling domain extends largely over water, C-Man station data from Venice was obtained. These data were processed by FDEP into an over-water surface station format (i.e., SEA*.DAT) for input to CALMET. The over-water station data includes wind direction, wind speed and air temperature.

2.5.7 UPPER AIR DATA STATIONS AND PROCESSING

The analysis included three upper air NWS stations located in Ruskin, Apalachicola, and West Palm Beach. Data for each station were obtained from the FDEP in a format for CALMET input.

The data and locations for the upper air stations are presented in Table 2-6.

2.5.8 PRECIPITATION DATA STATIONS AND PROCESSING

Precipitation data were processed from a network of hourly precipitation data files collected from primary and secondary NWS precipitation-recording stations located within the latitude and longitudinal limits of the modeling domain. Data for 14 stations were obtained in NCDC TD-3240 variable format and converted into a fixed-length format. The utility programs PXTRACT and PMERGE were then used to process the data into the format for the PRECIP.DAT file that is used by CALMET. A listing of the precipitation stations used for the modeling analysis is presented in Table 2-7.

2.5.9 GEOPHYSICAL DATA PROCESSING

The land-use and terrain information data were developed by the FDEP for the modeling domain and were provided in a GEO.DAT file format for input to CALMET. Terrain elevations for each grid cell of the modeling domain were obtained from Digital Elevation Model (DEM) files obtained from US Geographical Survey (USGS). The DEM data was extracted for the modeling domain grid using the utility extraction program LCELEV. Land-use data was obtained from the USGS GIS.DAT which is based on the ARM3 data. The resolution of the GIS.DAT file is one-eighth of a degree in the east-west direction and one-twelfth of a degree in the north-south direction. Land-use values for the domain grid were obtained with the utility program CAL-LAND. Other parameters processed for the modeling domain by CAL-LAND include surface roughness, surface Albedo, Bowen ratio, soil heat flux, and leaf index field. The land-use parameter values were based on annual averaged values.

2.6 VISIBILITY ANALYSIS

Visibility is an AQRV for the CNWR. Visibility can take the form of plume blight for nearby areas, or regional haze for long distances (e.g., distances beyond 50 km). Because the CNWR lies beyond 50 km from the proposed facility, the change in visibility is analyzed as regional haze. Current regional haze guidelines characterize a change in visibility by either of the following methods:

1. Change in the visual range, defined as the greatest distance that a large dark object can be seen, or
2. Change in the light-extinction coefficient (b_{ext}).

The b_{ext} is the attenuation of light per unit distance due to the scattering and absorption by gases and particles in the atmosphere. A change in the extinction coefficient produces a perceived visual change that is measured by a visibility index called the deciview. The deciview (dv) is defined as:

$$dv = 10 \ln (1 + b_{\text{exts}} / b_{\text{extb}})$$

where: b_{exts} is the extinction coefficient calculated for the source, and
 b_{extb} is the background extinction coefficient

A similar index that simply quantifies the percent change in visibility due to the operation of a source is calculated as:

$$\Delta\% = (b_{\text{exts}} / b_{\text{extb}}) \times 100$$

2.6.1 IWAQM RECOMMENDATIONS

The CALPUFF air modeling analysis followed the recommendations contained in the IWAQM Phase 2 Summary Report (EPA, 1998). Air quality impacts for the refined analyses were calculated as follows:

1. Obtain maximum 24-hour SO_4 and NO_3 impacts, in units of micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).
2. Convert the SO_4 impact to $(\text{NH}_4)_2\text{SO}_4$ by the following formula:

$$(\text{NH}_4)_2\text{SO}_4 (\mu\text{g}/\text{m}^3) = \text{SO}_4 (\mu\text{g}/\text{m}^3) \times \text{molecular weight } (\text{NH}_4)_2\text{SO}_4 / \text{molecular weight } \text{SO}_4$$

$$(\text{NH}_4)_2\text{SO}_4 (\mu\text{g}/\text{m}^3) = \text{SO}_4 (\mu\text{g}/\text{m}^3) \times 132/96 = \text{SO}_4 (\mu\text{g}/\text{m}^3) \times 1.375$$
3. Convert the NO_3 impact to NH_4NO_3 by the following formula:

$$\text{NH}_4\text{NO}_3 (\mu\text{g}/\text{m}^3) = \text{NO}_3 (\mu\text{g}/\text{m}^3) \times \text{molecular weight } \text{NH}_4\text{NO}_3 / \text{molecular weight } \text{NO}_3$$

$$\text{NH}_4\text{NO}_3 (\mu\text{g}/\text{m}^3) = \text{NO}_3 (\mu\text{g}/\text{m}^3) \times 80/62 = \text{NO}_3 (\mu\text{g}/\text{m}^3) \times 1.29$$

4. Compute b_{exts} (extinction coefficient calculated for the source) with the following formula:

$$b_{\text{exts}} = 3 \times \text{NH}_4\text{NO}_3 \times f(\text{RH}) + 3 \times (\text{NH}_4)_2\text{SO}_4 \times f(\text{RH}) + 3 \times \text{PM}_{10}$$

5. Compute b_{extb} (background extinction coefficient) using the background visual range (km) from the FLM with the following formula:

$$b_{\text{extb}} = 3.912 / \text{Visual range (km)}$$

6. Compute the change in extinction coefficients:
in terms of deciviews:

$$dv = 10 \ln (1 + b_{\text{exts}} / b_{\text{extb}})$$

in terms of percent change of visibility:

$$\Delta\% = (b_{\text{exts}} / b_{\text{extb}}) \times 100$$

Based on the predicted SO_4 , NO_3 , and PM_{10} concentrations, the Project's emissions are compared to a 5 percent change in light extinction of the background levels. This is equivalent to a change in deciview of 0.5.

2.6.2 BACKGROUND VISUAL RANGES AND RELATIVE HUMIDITY FACTORS

The background visual range is based on data representative of the top 20-percentile of visual range data measured at CNWR. The background visual range for the CNWR is 65 km and was provided by the FLM. The average relative humidity factor for each day during which the highest concentrations were predicted was computed by averaging the hourly relative humidity factor based on the hourly relative humidity for the 24-hour period. This factor was estimated by using data presented in Figure B-1 of Appendix B of IWAQM Phase I Report (U.S. EPA 1993).

Table 2-1. Stack, Operating, and Pollutant Emissions Data for the IPS Vandolah Power Project

Parameter	Values for Distillate Oil Firing
<u>Stack Data</u>	
Height	60 ft (18.3 m)
Diameter	22 ft (6.71 m)
<u>Operating Data</u> ^a	
Exit gas velocity	122.4 ft/s (37.3 m/s)
Exit gas temperature	1,076°F (853 K)
<u>Pollutant</u> ^a	
NO _x	1448 lb/hr (182.4 g/s)
SO ₂	406 lb/hr (51.2 g/s)
PM/PM ₁₀	68.0 lb/hr (8.57 g/s)

^a Data presented for three CTs operating at baseload conditions with an ambient air inlet temperature of 32°F.

Table 2-2. IWAQM Phase 2 Screening Modeling Analyses Recommendations^a

Model Input/Output	Description
Meteorology	Use five years of PCRAMMET data with extended or enhanced output for deposition.
Receptors	Receptors at least every two degrees on rings that encircle source and pass through the Class I area(s) of interest.
Dispersion	<ol style="list-style-type: none"> 1. Convert ISCST3 model input file to CALPUFF model input file with ISC2PUF. 2. Use MESOPUFF II chemistry with wet and dry deposition. 3. Define domain average background values for ozone and ammonia for area. 4. Run CALPUFF using ISCST meteorology (define 6 to 10 layers in the vertical; top layer must extend above the maximum mixing depth expected); horizontal domain extends 50 to 80 km beyond outer receptors and sources being modeled
Processing ^b	<ol style="list-style-type: none"> 1. For PSD increments: Use the maximum 3-hour and 24-hour average SO₂ concentrations; maximum 24-hour average PM₁₀ concentrations; and maximum annual average SO₂, PM₁₀ and NO₂ concentrations. 2. For haze: Use the maximum 24-hour average SO₄, NO₃ and HNO₃ values; assume 90 percent relative humidity for f(RH) for day; calculate extinction coefficients for each pollutant; and compute percent change in extinction using the FLM supplied background extinction.

^a IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts (EPA, 1998)

^b For the haze analysis, the daily average relative humidity factor f(RH) was also calculated using the average of the hourly factors estimated from the hourly average relative humidity.

Table 2-3. IWAQM Phase 2 Refined Modeling Analyses Recommendations^a

Model Input/Output	Description
Meteorology	Use CALMET (minimum 6 to 10 layers in the vertical; top layer must extend above the maximum mixing depth expected); horizontal domain extends 50 to 80 km beyond outer receptors and sources being modeled; terrain elevation and land-use data is resolved for the situation.
Receptors	Within Class I area(s) of concern; obtain regulatory concurrence on coverage.
Dispersion	<ol style="list-style-type: none"> 1. CALPUFF with default dispersion settings. 2. Use MESOPUFF II chemistry with wet and dry deposition. 3. Define background values for ozone and ammonia for area.
Processing	<ol style="list-style-type: none"> 1. For PSD increments: Use highest, second highest 3-hour and 24-hour average SO₂ concentrations; highest, second highest 24-hour average PM₁₀ concentrations; and highest annual average SO₂, PM₁₀ and NO₂ concentrations. 2. For haze: process the 24-hour average SO₄, NO₃ and HNO₃ values; compute a 24-hour average relative humidity factor (f(RH)) for the day during which the highest concentration was predicted for each species; calculate extinction coefficients for each species; and compute percent change in extinction using the FLM supplied background extinction.

^a IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts (EPA, 1998)

Table 2-4. CALPUFF Model Settings

Parameter	Setting
Pollutant Species	SO ₂ , SO ₄ , NO _x , HNO ₃ , and NO ₃ , and PM ₁₀
Chemical Transformation	MESOPUFF II scheme
Deposition	Include both dry and wet deposition, plume depletion
Meteorological/Land Use Input	PCRAMMET (enhanced) for the screening analysis; CALMET for the refined analysis
Plume Rise	Transitional, Stack-tip downwash, Partial plume penetration
Dispersion	Puff plume element, PG /MP coefficients, rural mode, ISC building downwash scheme
Terrain Effects	Partial plume path adjustment
Output	Create binary concentration file including output species for SO ₄ , NO ₃ and PM ₁₀
Model Processing	Highest predicted 24-hour SO ₄ , NO ₃ and PM ₁₀ concentrations for year
Background Values ^a	Ozone: 60 ppb; Ammonia: 10 ppb

^a Recommended values by the FDEP.

Table 2-5. CALMET Settings

Parameter	Setting
Horizontal Grid Dimensions	250 by 280 km, 10 km grid resolution
Vertical Grid	9 layers
Weather Station Data Inputs	6 surface, 3 upper air, 14 precipitation stations
Wind model options	Diagnostic wind model, no kinematic effects
Prognostic wind field model	MM4 data, 80 km resolution, 6 x 6 grid, used for wind field initialization
Output	Binary hourly gridded meteorological data file for CALPUFF input

Table 2-6. Surface and Upper Air Stations Used in the CALPUFF Analysis

Station Name	Station Symbol	WBAN Number	UTM Coordinates			Anemometer Height (m)
			Easting (km)	Northing (km)	Zone	
Surface Stations						
Tampa	TPA	12842	349.20	3094.25	17	6.7
Daytona Beach	DAB	12834	495.14	3228.05	17	9.1
Orlando	ORL	12815	468.96	3146.88	17	10.1
Gainesville	GNV	12816	377.40	3284.12	17	6.7
Vero Beach	VER	12843	557.52	3058.36	17	6.7
Fort Myers	FMY	12835	413.65	2940.38	17	6.1
Upper Air Stations						
Ruskin	TBW	12842	349.20	3094.28	17	NA
West Palm Beach	PBI	12844	587.87	2951.42	17	NA
Apalachicola	AQQ	12832	110.00 ^a	3296.00	16	NA

^a Equivalent coordinate for Zone 17; Zone 16 coordinate is 690.22 km.

Table 2-7. Hourly Precipitation Stations Used in the CALPUFF Analysis

Station Name (Florida)	Station Number	UTM Coordinates		
		Easting (km)	Northing (km)	Zone
Brooksville 7 SSW	81048	358.03	3149.55	17
Daytona Beach WSO AP	82158	495.14	3228.09	17
Deland 1 SSE	82229	470.78	3209.66	17
Inglis 3 E	84273	342.63	3211.65	17
Lakeland	84797	409.87	3099.18	17
Lisbon	85076	423.59	3193.26	17
Lynne	85237	409.26	3230.30	17
Orlando WSO McCoy	86628	468.99	3146.88	17
Parrish	86880	366.99	3054.39	17
Saint Leo	87851	376.48	3135.09	17
St. Petersburg	87886	339.04	3072.21	17
Tampa WSCMO AP	88788	349.17	3094.25	17
Venice	89176	357.59	2998.18	17
Venus	89184	466.756	2996.09	17

3.0 RESULTS

3.1 SIGNIFICANT IMPACT ANALYSIS

A summary of the Phase 2 screening analysis results using the CALPUFF model that was presented in the PSD Analysis Report is provided in Table 3-1. Since that report was issued, this table has been updated to include the maximum 3-hour average SO₂ concentrations due to the Project. As shown, for the screening analysis, the maximum 3-hour and 24-hour average SO₂ concentrations for the Project are less than the PSD Class I significant impact levels at receptors located at the PSD Class I area of the CNWR. However, when receptors are located in a circle with a 139-km radius and centered on the Project site, the maximum 3-hour average SO₂ concentrations are predicted to be less than the significant impact level whereas the maximum 24-hour average SO₂ concentrations are predicted to be greater than the significant impact level. As a result, a refined analysis was performed to determine the Project's maximum 24-hour average SO₂ concentrations at the Class I area.

As shown in Table 3-1, for the refined analysis, the maximum 24-hour average SO₂ concentration is predicted to be 0.13 µg/m³, which is less than the proposed PSD Class I significance level of 0.2 µg/m³. Therefore, a more detailed PSD Class I analysis is not required for this pollutant.

3.2 REGIONAL HAZE ANALYSIS

The results of the Phase 2 screening analysis for regional haze are summarized in Tables 3-2 through 3-4. As shown in Table 3-2, the maximum pollutant impacts were predicted to occur on November 30, 1989 at receptor location (-9.71, -138.86) km from the proposed plant. The calculated average relative humidity factor is 1.9 for that day, as presented in Table 3-3. Based on the results presented in Table 3-4, the maximum predicted change in visibility is approximately 5.6 percent or 0.56 deciview. Because the deciview is slightly higher than the criteria, a more refined regional haze analysis was performed. It should be noted that if a relative humidity of 90 percent was used (based on IWAQM recommendation), the change in visibility would be higher.

The results of the Phase 2 refined analysis for regional haze are summarized in Tables 3-5 through 3-7. As shown in Table 3-5, the maximum pollutant impacts were predicted to occur on July 4, 1990 (Julian Day 185) for NO_3 and August 16, 1999 (Julian Day 228) for SO_4 and PM_{10} . The calculated average relative humidity factors for these days are presented in Table 3-6. The maximum changes in visibility due to the Project for these days are summarized in Table 3-7. As shown in Table 3-7, the maximum change in visibility on July 4 is estimated to be 3.3 percent or 0.33 deciviews. This impact is below the criteria of 5 percent or 0.5 deciview change indicating that the Project would not have an adverse impact the existing regional haze at the CNWR.

Table 3-1. Maximum 3- and 24-Hour Average SO₂ Concentration Predicted for the IPS Vandolah Power Project
Significant Impact Analysis at the Chassahowitzka National Wilderness Refuge (NWR)

Averaging Time	Concentration	Year	Receptor Distance at 139 km Ring (1)		Chassahowitzka NWR (1)		Proposed EPA PSD Class I Significant Impact Level (ug/m ³)
	Rank		Concentration (ug/m ³)	Julian Day/Hr Ending	Concentration (ug/m ³)	Julian Day/Hr Ending	
SCREENING ANALYSIS ^a							
24-Hour	Highest	1987	0.25	285/24	0.122	229/24	0.2
		1988	0.26	281/24	0.132	21/24	0.2
		1989	0.28	338/24	0.153	343/24	0.2
		1990	0.24	263/24	0.177	47/24	0.2
		1991	0.24	351/24	0.095	73/24	0.2
3-Hour	Highest	1987	0.76	325/9	0.399	228/12	1.0
		1988	0.69	63/9	0.405	20/6	1.0
		1989	0.71	167/9	0.672	52/6	1.0
		1990	0.74	75/6	0.439	45/12	1.0
		1991	0.93	81/9	0.574	72/9	1.0
REFINED ANALYSIS							
24-Hour	Highest	1990	NA	NA	0.130	227/24	0.2

^a Concentrations predicted with CALPUFF model with ISCST meteorological data from the National Weather Service (NWS) stations from Tampa (surface) and Ruskin (upper air) for 1987 to 1991. See text for details.

For receptor distance at 139 km ring, concentrations were predicted along a circle with a radius equal to the minimum distance to the Class I area (i.e., 139 km). The circle contained 180 receptors, spaced at 2-degree intervals. Concentrations were also predicted at 13 receptors located at the Chassahowitzka NWR.

^b Concentrations predicted with CALPUFF model with CALMET meteorological data.

Table 3-2. Maximum Pollutant Concentrations Predicted for the IPS Vandolah Power Project
for the Regional Haze Analysis- Phase 2 Screening Analysis

Pollutant	Maximum Concentration ^a (ug/m ³)	Date	Receptor Location with respect to the Project	
			X (km)	Y (km)
SO ₄	0.0910	November 30, 1989	-9.71	-138.86
NO ₃	0.345	November 30, 1989	-9.71	-138.86
PM10	0.0667	November 30, 1989	-9.71	-138.86

^a Maximum concentrations predicted using meteorological data from the National Weather Service station at the Tampa International Airport.

Table 3-3. Computed Daily Average RH Factor for the Day during which
the Maximum Pollutant Concentrations were Predicted

Hour	Data for November 30, 1989	
	Relative Humidity (%)	f(RH)
100	57	1.56
200	62	1.74
300	72	2.42
400	74	2.54
500	71	2.36
600	71	2.36
700	74	2.54
800	69	2.18
900	62	1.74
1000	54	1.47
1100	52	1.41
1200	49	1.34
1300	49	1.34
1400	47	1.31
1500	47	1.31
1600	49	1.34
1700	55	1.50
1800	61	1.69
1900	63	1.78
2000	67	1.95
2100	70	2.30
2200	77	2.96
2300	75	2.60
2400	77	2.96
Average		1.9

^a Relative humidity data from the National Weather Service station at the Tampa International Airport.

Table 3-4. Visibility Change Estimated for the IPS Vandolah Power Project
for the Regional Haze Analysis- Phase 2 Screening Analysis

Parameter	Units	Predicted Values for November 30, 1989
<u>Maximum 24-hour Average Concentration</u>		
PM10	ug/m ³	0.0667
SO ₄	ug/m ³	0.0910
NO ₃	ug/m ³	0.345
<u>Computed 24-hour Average Concentration</u>		
(NH ₄) ₂ SO ₄	ug/m ³	0.125
NH ₄ NO ₃	ug/m ³	0.444
Average Relative Humidity Factor ^b		1.9
Background Visual Range ^a , Vr	km ⁻¹	65
Background Extinction Coeff. (bext)	km ⁻¹	0.0602
<u>Source Extinction Coeff (bexts)</u>		
(NH ₄) ₂ SO ₄	km ⁻¹	0.000713
NH ₄ NO ₃	km ⁻¹	0.00253
PM10	km ⁻¹	0.000200
Total bexts	km ⁻¹	0.00345
Percent Change (%) ^c		5.57
Deciview Change ^c		0.557

^a Provided by U.S. Fish and Wildlife Service^b Based on daily average of hourly relative humidity factor.^c If a 90 percent relative humidity factor used (per IWAQM recommendation from Phase 2 report screening approach), visibility and deciview changes are 15.6 percent and 1.56, respectively, based on relative humidity factor of 5.81.

Table 3-5. Maximum Pollutant Concentrations Predicted for the IPS Vandolah Power Project for the Regional Haze Analysis- Phase 2 Refined Analysis

Species Predicted	Maximum Concentration ($\mu\text{g}/\text{m}^3$)	Date	UTM Receptor Location	
			Easting (km)	Northing (km)
SO ₄	0.0491	August 16	340.3	3165.7
NO ₃	0.0753	July 4	339.0	3183.4
PM ₁₀	0.0278	August 16	340.3	3165.7

Table 3-6. Computed Daily Average RH Factor for the Day during which the Maximum Pollutant Concentrations were Predicted

Hour	July 4, 1990 (185) ^a		August 16, 1990 (228) ^a	
	RH(%)	f(RH)	RH(%)	f(RH)
100	94	9.67	88	5.35
200	91	6.04	91	6.04
300	94	9.67	88	5.35
400	94	9.67	88	5.35
500	94	9.67	85	4.65
600	94	9.67	88	5.35
700	88	5.35	91	6.04
800	79	3.32	77	2.96
900	79	3.32	75	2.60
1000	75	2.60	68	2.07
1100	72	2.42	60	1.65
1200	61	1.69	59	1.62
1300	54	1.47	58	1.59
1400	58	1.59	54	1.47
1500	61	1.69	52	1.41
1600	59	1.62	56	1.53
1700	63	1.78	61	1.69
1800	79	3.32	56	1.53
1900	88	5.35	63	1.78
2000	91	6.04	70	2.30
2100	94	9.67	74	2.54
2200	88	5.35	82	3.96
2300	88	5.35	88	5.35
2400	88	5.35	88	5.35
Average		5.07		3.31

^a Relative humidity data from the National Weather Service station at the Tampa International Airport.

Table 3-7. Visibility Change Estimated for the IPS Vandolah Power Project
for the Regional Haze Analysis- Phase 2 Screening Analysis

Parameter	Units	Predicted Values for	
		July 4, 1990	August 16, 1990
<u>Maximum 24-hour Average Concentration</u>			
PM ₁₀	ug/m ³	0.0234	0.0278
SO ₄	ug/m ³	0.0234	0.0491
NO ₃	ug/m ³	0.075	0.0192
<u>Computed 24-hour Average Concentration</u>			
(NH ₄) ₂ SO ₄	ug/m ³	0.0321	0.0675
NH ₄ NO ₃	ug/m ³	0.0971	0.0248
Average Relative Humidity Factor ^a		5.07	3.31
Background Visual Range ^b , Vr	km ⁻¹	65	65
Background Extinction Coeff. (bext)	km ⁻¹	0.0602	0.0602
<u>Source Extinction Coeff (bexts)</u>			
(NH ₄) ₂ SO ₄	km ⁻¹	0.000488	0.000670
NH ₄ NO ₃	km ⁻¹	0.00148	0.000246
PM ₁₀	km ⁻¹	0.000070	0.000083
Total b _{exts}	km ⁻¹	0.00204	0.00100
Percent Change (%) ^c		3.33	1.65
Deciview Change ^c		0.333	0.165

^a Provided by U.S. Fish and Wildlife Service^b Based on daily average of hourly relative humidity factor.

APPENDIX A

**CALMET/CALPUFF
PARAMETER SETTING**

Table A-1. IWAQM Phase II CALMET Option Settings Used for Refined Regional Haze Analysis			
IPS-Vandolah Site, Hardee Co, Florida			
Variable	Description	Default Value	Modeled Value
GEO.DAT	Name of Geophysical data file	GEO.DAT	GEO.DAT
SURF.DAT	Name of Surface data file	SURF.DAT	SURF.DAT
PRECIP.DAT	Name of Precipitation data file	PRECIP.DAT	PRECIP.DAT
NUSTA	Number of upper air data sites	User Defined	3
Upn.DAT	Names of NUSTA upper air data files	Upn.DAT	varies
NOWSTA	Number of Overwater met stations	User Defines	1
IBYR	Beginning year	User Defines	90
IBMO	Beginning month	User Defines	1
IBDY	Beginning day	User Defines	6
IBHR	Beginning hour	User Defines	0
IBTZ	Base time zone	User Defines	5
IRLG	Number of hours to simulate	User Defines	8616
IRTYPE	Output file type to create (must be 1 for CALPUFF)	1	1
LCALGRD	Are w-components and temperature needed?	T	T
NX	Number of east-west grid cells	User Defines	25
NY	Number of north-south grid cells	User Defines	28
DGRIDKM	Grid spacing	User Defines	10
XORIGKM	Southwest grid cell X coordinate	User Defines	250
YORIGKM	Southwest grid cell Y coordinate	User Defines	2990
XLAT0	Southwest grid cell latitude	User Defines	27.011
YLONO	Southwest grid cell longitude	User Defines	83.52
IUTMZN	UTM Zone	User Defines	17
LLCONF	When using Lambert Conformal map coordinates, rotate winds from true north to map north?	F	F
XLAT1	Latitude of 1st standard parallel	30	30
XLAT2	Latitude of 2nd standard parallel	60	60
RLON0	Longitude used if LLCONF = T	90	NA
RLAT0	Latitude used in LLCONF = T	40	NA
NZ	Number of vertical layers	User Defines	9
ZFACE	Vertical cell face heights (NZ+1 values)	User Defines	varies
LSAVE	Save met.data fields in an unformatted file?	T	T
INFORMO	Format of unformatted file (1 for CALPUFF)	1	1
NSSTA	Number of stations in SURF.DAT file	User Defines	6
NPSTA	Number of stations in PRECIP.DAT	User Defines	14
ICLOUD	Is cloud data to be input as gridded fields? (0 = No)	0	0
IFORMS	Format of surface data (2 = formatted)	2	2
IFORMP	Format of precipitation data (2 = formatted)	2	2
IFORMC	Format of cloud data (2 = formatted)	2	2
IWFCOD	Generate winds by diagnostic wind module? (1 = Yes)	1	1

Table A-1. IWAQM Phase II CALMET Option Settings Used for Refined Regional Haze Analysis			
IPS-Vandolah Site, Hardee Co, Florida			
Variable	Description	Default Value	Modeled Value
IFRADJ	Adjust winds using Froude number effects? (1 = Yes)	1	1
IKINE	Adjust winds using kinematic effects? (1 = Yes)	0	0
IOBR	Use O'Brien procedure for vertical winds? (0 = No)	0	0
ISLOPE	Compute slope flows? (1 = Yes)	1	1
IEXTRP	Extrapolate surface winds to upper layers? (-4 = use similarity theory and ignore layer 1 of upper air station data)	-4	-4
ICALM	Extrapolate surface calms to upper layers? (0 = No)	0	0
BIAS	Surface/upper-air weighting factors (NZ values)	NZ*0	NZ*0
I PROG	Using prognostic or MM-FDDA data? (0 = No)	4	4
L VARY	Use varying radius to develop surface winds?	F	F
RMAX1	Max surface over-land extrapolation radius (km)	User Defines	100
RMAX2	Max aloft over-land extrapolation radius (km)	User Defines	300
RMAX3	Maximum over-water extrapolation radius (km)	User Defines	500
RMIN	Minimum extrapolation radius (km)	0.1	0.1
RMIN2	Distance (km) around an upper air site where vertical extrapolation is excluded (Set to -1 if IEXTRP = +/-4)	4	4
TERRAD	Radius of influence of terrain features (km)	User Defines	10
R1	Relative weight at surface of Step 1 field and obs	User Defines	10
R2	Relative weight aloft of Step 1 field and obs	User Defines	25
DIVLIM	Maximum acceptable divergence	5.00E-06	5.00E-06
NITER	Max number of passes in divergence minimization	50	50
NSMTH	Number of passes in smoothing (NZ values)	2,4*(NZ-1)	2,4*(NZ-1)
NINTR2	Max number of stations for interpolations (NZ values)	NZ*99	NZ*99
CRITFN	Critical Froude number	1	1
ALPHA	Empirical factor triggering kinematic effects	0.1	0.1
IDIOPT1	Compute temperatures from observations (0 = True)	0	0
ISURFT	Surface station to use for surface temperature (between 1 and NSSTA)	User Defines	2
IDIOPT2	Compute domain-average lapse rates? (0 = True)	0	0
IUPT	Station for lapse rates (between 1 and NUSTA)	User Defines	2
ZUPT	Depth of domain-average lapse rate (m)	200	200
IDIOPT3	Compute internally initial guess winds? (0 = True)	0	0
IUPWND	Upper air station for domain winds (-1 = 1/r**2 interpolation of all stations)	-1	-1
ZUPWND	Bottom and top of layer for 1st guess winds (m)	1, 1000	1, 5000

Table A-1. IWAQM Phase II CALMET Option Settings Used for Refined Regional Haze Analysis

IPS-Vandolah Site, Hardee Co, Florida		Default	Modeled
Variable	Description	Value	Value
IDIOPT4	Read surface winds from SURF.DAT? (0 = True)	0	0
IDIOPT5	Read aloft winds from UPn.DAT? (0 = True)	0	0
CONSTB	Neutral mixing height B constant	1.41	1.41
CONSTE	Convective mixing height E constant	0.15	0.15
CONSTN	Stable mixing height N constant	2400	2400
CONSTW	Over-water mixing height W constant	0.16	0.16
FCORIOL	Absolute value of Coriolis parameter	1.00E-04	1.00E-04
IAVEXZI	Spatial averaging of mixing heights? (1 = True)	1	1
MNMDAV	Max averaging radius (number of grid cells)	1	3
HAFANG	Half-angle for looking upwind (degrees)	30	30
ILEVZI	Layer to use in upwind averaging (between 1 and NZ)	1	1
DPTMIN	Minimum capping potential temperature lapse rate	0.001	0.001
DZZI	Depth for computing capping lapse rate (m)	200	200
ZIMIN	Minimum over-land mixing height (m)	50	50
ZIMAX	Maximum over-land mixing height (m)	3000	3000
ZIMINW	Minimum over-water mixing height (m)	50	50
ZIMAXW	Maximum over-water mixing height (m)	3000	3000
IRAD	Form of temperature interpolation (1 = 1/r)	1	1
TRADKM	Radius of temperature interpolation (km)	500	500
NUMTS	max number of station in temperature interpolations	5	5
IAVET	Conduct spatial averaging of temperature? (1 = True)	1	1
TGDEFB	Default over-water mixed layer lapse rate (K/m)	-0.0098	-0.0098
TGDEFA	Default over-water capping lapse rate (K/m)	-0.0045	-0.0045
JWAT1	Beginning landuse type defining water	999	55
JWAT2	Ending landuse type defining water	999	55
NFLAGP	Method for precipitation interpolation (2 = 1/r**2)	2	2
SIGMAP	Precip radius for interpolations (km)	100	100
CUTP	Minimum cut off precip rate (mm/hr)	0.01	0.01
SSn	NSSTA input records for surface stations	User Defines	6
USn	NUSTA input records for upper-air stations	User Defines	3
PSn	NPSTA input records for precipitation stations	User Defines	14
Legend			
DEFAULT	Uses defaults		
VAR	Variable Input		
NA	Not Applicable		
SAME	Same as recommended		

Table A-2. IWAQM Phase II Calpuff Parameter Settings Used in the Refined Regional Haze Analysis						
IPS-Vandolah Site, Hardee County, Florida						
Number	Input Group	Variable	Seq	Description	Default Value	Modeled Value
1	Run Control	METRUN	1	Do we run all periods (1) or a subset (0)?	0	0
1		IBYR	2	Beginning year	User Defined	90
1		IBMO	3	Beginning month	User Defined	1
1		IBDY	4	Beginning day	User Defined	6
1		IBHR	5	Beginning hour	User Defined	0
1		IRLG	5	Length of run (hours)	User Defined	8616
1		NSPEC	6	Number of species modeled (for MESOPUFF II chemistry)	5	6
1		NSE	7	Number of species emitted	3	3
1		ITEST	8		2	2
1		MRESTART	9	Restart options (0 = no restart) allows splitting runs into smaller segments	0	0
1		NRESPD	10		0	0
1		METFM	11	Format of input meteorology (1 = CALMET, 2 = ISC)	1	1
1		AVET	12	Averaging time lateral dispersion parameters (minutes)	60	60
2	Tech Options	MGAUSS	1	Near-field vertical distribution (1 = Gaussian)	1	1
2		MCTADJ	2	Terrain adjustments to plume path (3 = Plume path)	3	3
2		MCTSG	3	Do we have subgrid hills? (0 = No) allows CTDM-like treatment for subgrid scale hills	0	0
2		MSLUG	4	Near-field puff treatment (0 = No slugs)	0	0
2		MTRANS	5	Model transitional plume rise? (1 = Yes)	1	1
2		MTIP	6	Treat stack tip downwash? (1 = Yes)	1	1
2		MSHEAR	7	Treat vertical wind shear? (0 = No)	0	1
2		MSPLIT	8	Allow puffs to split? (0 = No)	0	0
2		MCHEM	9	MESOPUFF-II Chemistry? (1 = Yes)	1	1
2		MWET	10	Model wet deposition? (1 = Yes)	1	1
2		MDRY	11	Model dry deposition? (1 = Yes)	1	1
2		MDISP	12	Method for dispersion coefficients (3 = PG & MP)	3	4
2		MTURBVW	13	Turbulence characterization? (Only if MDISP = 1 or 5)	3	0
2		MDISP2	14	Backup coefficients (Only if MDISP = 1 or 5)	3	4
2		MROUGH	15	Adjust PG for surface roughness? (0 = No)	0	0
2		MPARTL	16	Model partial plume penetration? (0 = No)	1	1
2		MTINV	17	Elevated inversion strength (0 = compute from data)	0	0
2		MPDF	18	Use PDF for convective dispersion? (0 = No)	0	0
2		MSGTIBL	19	Use TIBL module? (0 = No) allows treatment of subgrid scale coastal areas	0	0
2		MREG	20	Regulatory default checks? (1 = Yes)	1	0
3	Species List	CSPECn		Names of species modeled (for MESOPUFF II must be SO2-SO4-NOX-HNO3-NO3, PM10)	User Defined	ALL 6
3		Specie Groups		Grouping of species if any	User Defined	NA
3		Specie Names		Manner species will be modeled	User Defined	
4	Grid Control	NX	1	Number of east-west grids of input meteorology	User Defined	25
4		NY	2	Number of north-south grids of input meteorology	User Defined	28
4		NZ	3	Number of vertical layers of input meteorology	User Defined	9

Table A-2. IWAQM Phase II Calpuff Parameter Settings Used in the Refined Regional Haze Analysis						
IPS-Vandolah Site, Hardee County, Florida						
Number	Input Group	Variable	Seq	Description	Default Value	Modeled Value
4		DGRIDKM	4	Meteorology grid spacing (km)	User Defined	10
4		ZFACE	5	Vertical cell face heights of input meteorology	User Defined	10 values
4		XORIGKM	6	Southwest corner (east-west) of input User	Defined meteorology	250
4		YORIGIM	7	Southwest corner (north-south) of input User	Defined meteorology	2990
4		IUTMZN	8	UTM zone	User Defined	17
4		XLAT	9	Latitude of center of meteorology domain	User Defined	28.25
4		XLONG	10	Longitude of center of meteorology domain	User Defined	82.25
4		XTZ	11	Base time zone of input meteorology	User Defined	5
4		IBCOMP	12	Southwest X-index of computational domain	User Defined	1
4		JBCOMP	13	Southwest Y-index of computational domain	User Defined	1
4		IECOMP	14	Northeast X-index of computational domain	User Defined	25
4		JECOMP	15	Northeast Y-index of computational domain	User Defined	28
4		LSAMP	16	Use gridded receptors? (T = Yes)	F	F
4		IBSAMP	17	Southwest X-index of receptor grid	User Defined	0
4		JBSAMP	18	Southwest Y-index of receptor grid	User Defined	0
4		IESAMP	19	Northeast X-index of receptor grid	User Defined	0
4		JESAMP	20	Northeast Y-index of receptor grid	User Defined	0
4		MESH DN	21	Gridded receptor spacing = DGRIDKM/MESH DN	1	1
5	Output Options	ICON	1	Output concentrations? (1 = Yes)	1	1
5		IDRY	2	Output dry deposition flux? (1 = Yes)	1	0
5		IWET	3	Output wet deposition flux? (1 = Yes)	1	0
5		IVIS	4	Output RH for visibility calculations (1 = Yes)	1	0
5		LCOMPRS	5	Use compression option in output? (T = Yes)	T	T
5		ICPRT	6	Print concentrations? (0 = No)	0	0
5		IDPRT	7	Print dry deposition fluxes (0 = No)	0	0
5		IWPRT	8	Print wet deposition fluxes (0 = No)	0	0
5		ICFRQ	9	Concentration print interval (1 = hourly)	1	24
5		IDFRQ	10	Dry deposition flux print interval (1 = hourly)	1	1
5		IWFRQ	11	Wet deposition flux print interval (1 = hourly)	1	1
5		IPRTU	12	Print output units (1 = g/m**3; g/m**2/s; 3 = ug/m3, ug/m2/s)	1	3
5		IMESG	13	Status messages to screen? (1 = Yes)	1	1
5		LDEBUG	14	Turn on debug tracking? (F = No)	F	F
5		NPFDEB	15	(Number of puffs to track)	(1)	1
5		NN1	16	(Met. Period to start output)	(1)	1
5		NN2	17	(Met. Period to end output)	(10)	10
7	Dry Dep Chem	Dry Gas Dep		Chemical parameters of gaseous deposition species	User Defined	NOX,HNO3 SO2
8	Dry Dep Size	Dry Part. Dep		Chemical parameters of particulate deposition species	User Defined	SO4,NO3 PM10
9	Dry Dep Misc	RCUTR	1	Reference cuticle resistance (s/cm)	30	30

Table A-2. IWAQM Phase II Calpuff Parameter Settings Used in the Refined Regional Haze Analysis						
IPS-Vandolah Site, Hardee County, Florida						
Input Group						Modeled
Number	Description	Variable	Seq	Description	Default Value	Value
9		RGR	2	Reference ground resistance (s/cm)	10	10
9		REACTR	3	Reference reactivity	8	8
9		NINT	4	Number of particle-size intervals	9	9
9		IVEG	5	Vegetative state (1 = active and unstressed)	1	1
10	Wet Dep	Wet Dep		Wet deposition parameters	User Defined	Var
11	Chemistry	MOZ	1	Ozone background? (0 = constant background value; 1 = read from ozone.dat)	1	0
11		BCKO3	2	Ozone default (ppb) (Use only for missing data)	80	60
11		BCKNH3	3	Ammonia background (ppb)	10	3
11		RNITE1	4	Nighttime SO2 loss rate (%/hr)	0.2	0.2
11		RNITE2	5	Nighttime NOx loss rate (%/hr)	2	2
11		RNITE3	6	Nighttime HNO3 loss rate (%/hr)	2	2
12	Dispersion	SYTDEP	1	Horizontal size (m) to switch to time dependence	550	550
12		MHFTSZ	2	Use Heffter for vertical dispersion? (0 = No)	0	0
12		JSUP	3	PG Stability class above mixed layer	5	5
12		CONK1	4	Stable dispersion constant (Eq 2.7-3)	0.01	0.01
12		CONK2	5	Neutral dispersion constant (Eq 2.7-4)	0.1	0.1
12		TBD	6	Transition for downwash algorithms (0.5 = ISC)	0.5	0.5
12		IURB1	7	Beginning urban landuse type	10	10
12		IURB2	8	Ending urban landuse type	19	19
12		ILANDUIN	9	Land use type (20 = Unirrigated agricultural land)	(20)	20
12		ZOIN	10	Roughness length (m)	(0.25)	0.25
12		XLAIIN	11	Leaf area index	(3)	3
12		ELEVIN	12	Met. Station elevation (m above MSL)	(0)	0
12		XLATIN	13	Met. Station North latitude (degrees)	(-999)	-999
12		XLONIN	14	Met. Station West longitude (degrees)	(-999)	-999
12		ANEMHT	15	Anemometer height of ISC meteorological data (m)	(10)	NA
12		ISIGMAV	16	Lateral turbulence (Not used with ISC meteorology)	(1)	NA
12		IMIXCTDM	17	Mixing heights (Not used with ISC meteorology)	(1)	NA
12		MXMLEN	18	Maximum slug length in units of DGRIDKM	1	1
12		XSAMLEN	19	Maximum puff travel distance per sampling step (units of DGRIDKM)	1	1
12		MXNEW	20	Maximum number of puffs per hour	99	99
12		MXSAM	21	Maximum sampling steps per hour	99	99
12		NCOUNT	22	Iterations when computing Transport Wind (Calmet & Profile Winds)	(2)	2
12		SYMIN	23	Minimum lateral dispersion of new puff (m)	1	1
12		SZMIN	24	Minimum vertical dispersion of new puff (m)	1	1
12		SVMIN	25	Array of minimum lateral turbulence (m/s)	6 * 0.50	6*0.50
12		SWMIN	26	Array of minimum vertical turbulence (m/s)	0.20,0.12,0.08,0.06,0.03,0.016	SAME
12		CDIV (1), (2)	27	Divergence criterion for dw/dz (1/s)	0.01 (0.0,0.0)	0.0,0.0
12		WSCALM	28	Minimum non-calm wind speed (m/s)	0.5	0.5

Table A-2. IWAQM Phase II Calpuff Parameter Settings Used in the Refined Regional Haze Analysis						
IPS-Vandolah Site, Hardee County, Florida						
Input Group						Modeled
Number	Description	Variable	Seq	Description	Default Value	Value
12		XMAXZI	29	Maximum mixing height (m)	3000	3000
12		XMINZI	30	Minimum mixing height (m)	50	50
12		WSCAT	31	Upper bounds 1st 5 wind speed classes (m/s)	1.54,3.09,5.14,8.23,10.8	SAME
12		PLX0	32	Wind speed power-law exponents	0.07,0.07,0.10,0.15,0.35,0.55	SAME
12		PTGO	33	Potential temperature gradients PG E and F (deg/km)	0.020,0.035	SAME
12		PPC	34	Plume path coefficients (only if MCTADJ = 3)	0.5,0.5,0.5,0.5,0.35,0.35	SAME
12		SL2PF	35	Maximum Sy/puff length	10	10
12		NSPLIT	36	Number of puffs when puffs split	3	3
12		IRESPLIT	37	Hours when puff are eligible to split	User Defined	HR 17=1
12		ZISPLIT	38	Previous hour's mixing height(minimum)(m)	100	100
12		ROLDMAX	39	Previous Max mix ht/current mix ht ratio must be less then this value for puff to split	0.25	0.25
12		EPSSLUG	40	Convergence criterion for slug sampling integration	1.00E-04	1.0E-04
12		EPSAREA	41	Convergence criterion for area source integration	1.00E-06	1.0E-06
13	Point Source	NPT1	1	Number of point sources	User Defined	1
13		IPTU	2	Units of emission rates (1 = g/s)	1	1
13		NSPT1	3	Number of point source-species combinations	0	0
13		NPT2	4	Number of point sources with fully variable emission rates	0	0
13		Point Sources		Point sources characteristics	User Defined	VAR
14	Area Source	Area Sources		Area sources characteristics	User Defined	NA
15	Volume Source	Volume		Volume sources characteristics	User Defined Sources	NA
16	Line Source	Line Sources		Buoyant lines source characteristics	User Defined	NA
17	Receptors	NREC		Number of user defined receptors	User Defined	13
17		Receptor Data		Location and elevation (MSL) of receptors	User Defined	VAR
Legend						
	DEPOS.	With Deposition				
	DEFAULT	Uses defaults				
	VAR	Variable Input				
	NA	Not Applicable				
	SAME	Same as recommended				



Jeb Bush
Governor

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
September 3, 1999

David B. Struhs
Secretary

Mr. Gregg Worley, Chief
Air, Radiation Technology Branch
Preconstruction/HAP Section
U.S. EPA – Region IV
61 Forsyth Street
Atlanta, Georgia 30303

Re: IPS 680 MW Simple Cycle Project
DEP File No. 0490043-001-AC (PSD-FL-275)

Dear Mr. Worley:

Enclosed for your review and comment is an application for the IPS Vandolah Power Project in Hardee County. This facility will be comprised of four nominal 170 MW GE PG7241FA combustion turbines operating in simple cycle mode, two fuel oil storage tanks, and ancillary equipment. IPS proposes 3,390 hours of operation per unit. IPS requests up to 1000 hours of 0.05 percent sulfur No. 2 distillate fuel oil use per unit within the requested 3,390 hours.

The site is approximately 139 kilometers South of the Chassahowitzka National Wildlife Area. The applicant proposes NO_x emissions at 9 ppmvd on natural gas and 42 ppmvd on fuel oil with annual emissions as per the table below:

Pollutant	Proposed Facility Emissions (tons per year)
NO _x	1008
SO ₂	221
CO	346
PM/PM ₁₀	82
VOC	46

The project is essentially the same as the Oleander Project except that it consists of four units instead of three. Your comments can be forwarded to my attention at the letterhead address or faxed to me at (850) 922-6979. If you have any questions, please contact me at (850) 921-9523.

Sincerely,

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/al
Enclosures



Jeb Bush
Governor

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
September 3, 1999

David B. Struhs
Secretary

Mr. John Bunyak, Chief
Policy, Planning & Permit Review Branch
NPS-Air Quality Division
Post Office Box 25287
Denver, CO 80225

Re: IPS 680 MW Simple Cycle Project
DEP File No. 0490043-001-AC (PSD-FL-275)

Dear Mr. Bunyak:

Enclosed for your review and comment is an application for the IPS Vandolah Power Project in Hardee County. This facility will be comprised of four nominal 170 MW GE PG7241FA combustion turbines operating in simple cycle mode, two fuel oil storage tanks, and ancillary equipment. IPS proposes 3,390 hours of operation per unit. IPS requests up to 1000 hours of 0.05 percent sulfur No. 2 distillate fuel oil use per unit within the requested 3,390 hours.

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The project is essentially the same as the Oleander Project that you previously reviewed except that it consists of four units instead of three. Your comments can be forwarded to my attention at the letterhead address or faxed to me at (850) 922-6979. If you have any questions, please contact me at (850) 921-9523.

Sincerely,

 9/3

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/al

Enclosures