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SOURCE IMPACT ANALYSIS

TAMPA ELECTRIC COMPANY
POLK POWER STATION
UNIT 1

TECO TAMPA ELECTRIC
Tampa, Florida

April 2016
ECT No. 160170-0100

Complex Challenges . . . PRACTICAL SOLUTIONS

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List of Acronyms and Abbreviations

°	degree
°F	degree Fahrenheit
µg/m^3	microgram per cubic meter
AERMAP	AERMOD terrain preprocessing program
AERMET	AERMOD meteorological preprocessing program
AERMIC	AMS/EPA Regulatory Model Improvement Committee
AERMOD	AMS/EPA regulatory model
AMS	American Meteorological Society
AQRV	air quality-related value
ARM	ambient ratio method
BPIP	Building Profile Input Program
BPIPPRM	BPIP for PRIME
CAA	Clean Air Act
CBL	convectively generated boundary layer
CFR	Code of Federal Regulations
DAT	deposition analysis threshold
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
EU	Emissions Unit
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
ft	foot
ft-msl	foot above mean sea level
GAQM	Guideline on Air Quality Models
GEP	good engineering practice
GHG	greenhouse gas
GIF	Winter Haven Municipal Airport Gilbert Field
H_2SO_4	sulfuric acid
HCEPC	Hillsborough County Environmental Protection Commission
hr/yr	hour per year
HRSG	heat recovery steam generator
IGCC	integrated gasification combined-cycle
kg/ha/yr	kilogram per hectare per year
km	kilometer
lb/hr	pound per hour
MW	megawatt

List of Acronyms and Abbreviations (cont.)

NAAQS	national ambient air quality standards
NED	National Elevation Dataset
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NP	National Park
NSR	new source review
NWA	National Wilderness Area
PM_{10}	particulate matter less than or equal to 10 micrometers
PPS	Polk Power Station
PRIME	Plume Rise Model Enhancements
PSD	prevention of significant deterioration
SBL	stable boundary layer
SER	significant emissions rate
SIL	significant impact level
SO_2	sulfur dioxide
Tampa Electric	Tampa Electric Company
TPA	Tampa International Airport
tpy	ton per year
USGS	U.S. Geological Survey

1.0 Introduction and Summary

1.1 Introduction

The Tampa Electric Company (Tampa Electric) Polk Power Station (PPS) located in southwest Polk County approximately 13 miles southwest of the city of Bartow currently operates under Title V Air Operation Permit No. 1050233-039-AV with an effective date of January 1, 2015, and an expiration date of December 31, 2019. This Title V air operation permit authorizes the operation of one nominal 260-megawatt (MW), combined-cycle gas turbine (Emissions Unit [EU] 001) and four simple-cycle combustion turbines (CTs).

PPS Unit 1 (EU 001) is an integrated gasification combined cycle (IGCC) unit authorized to combust syngas only, syngas with natural gas augmentation, and pipeline-quality natural gas only. The current Title V air operation permit authorizes EU 001 to operated continuously, i.e. 8,760 hours per year (hr/yr) while combusting syngas or while combusting syngas with natural gas augmentation. EU 001 is also authorized to operate up to 10 percent annual capacity factor (876 hr/yr) while combusting natural gas only.

Tampa Electric wishes to increase the maximum annual hours of operation for EU 001 while combusting natural gas only from 876 to 3,000 hr/yr. This will provide PPS with greater operational flexibility. This increase in maximum hours of natural gas-fired operation will result in an increase in annual nitrogen oxides (NO_x) emissions, since the hourly NO_x emissions rate is slightly higher when combusting natural gas as opposed to combusting syngas. There will be no increase in the annual emissions of any other pollutant. The increase in annual NO_x emissions will be greater than the NO_x prevention of significant deterioration (PSD) significant emissions rate (SER) and thus will be considered a major modification under PSD regulations.

An air construction permit incorporating a major modification, per Rule 62-212.300(1)(a), Florida Administrative Code (F.A.C.) is being submitted in accordance with the Florida Department of Environmental Protection (FDEP) permitting rules contained in Chapter 62-212, *et. seq.*, F.A.C. Since the proposed modification will not require physical construction of any new emissions unit or equipment or physical modification of any existing emissions unit, this permit application is being submitted as a concurrent air construction permit application/Title V air operation permit revision application. This modeling report supports the permit application by documenting the air quality analyses required under the PSD regulations. Since PSD is applicable because of the increase in annual NO_x emissions, the modification's impact on nitrogen dioxide (NO_2) air quality was assessed.

This report is organized as follows:

- Section 2.0 describes the air dispersion modeling methodology.
- Section 3.0 contains the Class II area air quality impact analyses.
- Section 4.0 provides an assessment of impacts on Class I areas located within 300 kilometers (km) of the project site.

The dispersion modeling input and output files for the ambient impact analyses are provided on a separate CD.

1.2 Summary

The air quality analyses required for the preparation of this permit application have resulted in the following conclusions:

- An ambient air impact analysis was conducted to determine the impacts of the increased annual NO_x emissions from PPS Unit 1 only. Air dispersion modeling using the American Meteorological Society (AMS)/U.S. Environmental Protection Agency (EPA) Regulatory Model Improvement Committee (AERMIC) model (AERMOD) was performed, and the results of the annual averaging period demonstrated that all impacts due to the increase in hours of operation while combusting natural gas only were below the NO_x annual significant impact level (SIL).
- Class I areas located within 300 km of PPS include the Chassahowitzka National Wilderness Area (NWA) and Everglades National Park (NP) in Florida. Application of the Federal Land Manager (FLM) initial screening criteria for air quality-related

value (AQRV) review indicated the total emissions associated with PPS Unit 1 would slightly exceed the screening criteria threshold for the Chassahowitzka NWA Class I area. Therefore, assessment of PSD Class I AQRVs was performed for this area.

- The ambient impact analysis demonstrates that project impacts will be below EPA's proposed PSD Class I SILs for the Chassahowitzka NWA and Everglades NP. Accordingly, a multisource cumulative assessment of PSD Class I increment consumption or compliance with NO_2 national ambient air quality standards (NAAQS) was not required.
- Based on refined dispersion modeling, the project will not cause nor contribute to an exceedance of any NAAQS or PSD increment for Class I or Class II areas.

2.0 Air Quality Impact Analysis Methodology

2.1 General Approach

The project is located in an area designated attainment or unclassifiable for criteria pollutants. All areas of Florida, with the exception of four PSD Class I areas, are designated as PSD Class II areas. The Florida PSD Class I areas include Everglades NP and Chassahowitzka, St. Marks, and Bradwell Bay NWAs. Accordingly, PPS and vicinity are classified as a PSD Class II area. This section focuses on the methodology used to determine project air quality impacts with respect to the PSD Class II increments and NAAQS. Section 3.0 addresses project air quality impacts with respect to the PSD Class I areas.

The approach to assessing air quality impacts for a new or modified emissions source generally begins by determining the impacts of only the proposed project. If project impacts are below PSD SILs, no further analysis is required. If the impacts of a proposed project are found to exceed a particular PSD SIL, further analysis considering other existing sources and background pollutant concentrations is required for that SIL.

The approach used to analyze potential impacts of the project, as described in detail in the following subsections, was developed in accordance with current FDEP and EPA modeling guidance. Guidance contained in EPA dispersion model manuals and user's guides was sought and followed.

2.2 Pollutants Evaluated

The increased natural gas firing in PPS Unit 1 will only trigger PSD applicability for NO_x. All other pollutants will have either the same or decreased emissions. Although carbon dioxide does not trigger PSD, it is above the past actual annual emissions rate. Annual emissions are below applicable PSD SER levels for all PSD regulated pollutants other than NO_x. Accordingly, the project is subject to the PSD new source review (NSR) air quality impact analysis requirements of Rule 62 212.400(5)(a), F.A.C., for NO_x only.

2.3 Model Selection and Use

Air quality models are applied at two levels: screening and refined. At the screening level, models provide conservative estimates of impacts to determine whether more detailed modeling is required. Screening modeling can also be used to identify worst-case operating scenarios for subsequent refined modeling analysis. The refined level consists of techniques that provide more advanced technical treatment of atmospheric processes. Refined modeling requires more detailed and precise input data but also provides improved estimates of source impacts.

Regulatory agency-recommended procedures for conducting air quality impact assessments are contained in EPA’s Guideline on Air Quality Models (GAQM). In the November 9, 2005, Federal Register, EPA approved use of AERMOD as a GAQM Appendix A-preferred model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD system consists of meteorological and terrain preprocessing programs (AERMET and AERMAP, respectively) and AERMOD itself. For the project air quality analyses, the current version of the refined AERMOD system (Version 15181, June 30, 2015), together with five years of hour-by-hour National Weather Service meteorology, was used to obtain predictions of both short-term periods (i.e., periods equal to or less than 24 hours) and annual average air quality impacts.

EPA has issued modeling guidance memoranda that address the 1-hour NO_2 NAAQS. The most recent EPA memoranda providing guidance concerning 1-hour sulfur dioxide (SO_2) and NO_2 NAAQS modeling procedures is dated March 1, 2011. Modeling conducted for the project adhered to the guidance contained in this EPA document.

2.4 Model Options

Procedures applicable to the AERMOD system specified in the latest version of its User’s Guide (September 2004), Implementation Guide (revised March 19, 2009), and February 2012 Addendum to the User’s Guide and the current GAQM were followed. In particular, the

AERMOD control pathway MODELOPT keyword parameters DFAULT and CONC were selected. Selection of the parameter DFAULT, which specifies use of the regulatory default options, is recommended by the GAQM. The CONC option specifies the calculation of concentrations. The project will be located in rural Polk County. Accordingly, AERMOD options pertinent to urban areas including increased surface heating (URBANOPT keyword) and pollutant exponential decay (HALFLIFE and DCAYCOEF keywords) were not employed. In addition, the option to use flagpole receptors (FLAGPOLE keyword) was not selected.

2.5 NO_2 Ambient Impact Analysis

Emissions of NO_x from combustion sources consist of nitric oxide and NO_2. At stack exit conditions, the primary species is nitric oxide, which typically comprises 90 percent or more of total NO_x.

AERMOD includes three options for estimating NO_2 impacts:

- Tier 1—Assumes complete (i.e., 100 percent) conversion of nitric oxide to NO_2.
- Tier 2—Ambient ratio method (ARM), which represents the average ambient NO_2/NO_x ratio. Current EPA guidance recommends using ratios of 0.75 (for annual averages) and 0.80 (for 1-hour averages).
- Tier 3—Uses the ozone-limiting method and plume volume molar ratio method.

The Tier 1 option is an AERMOD regulatory default option that may be used without additional regulatory agency approval. The Tier 2 option has been historically accepted for regulatory modeling applications using an average ambient NO_2/NO_x ratio of 0.75. In accordance with EPA's March 1, 2011, guidance, Tier 2 will be accepted for regulatory modeling applications if the EPA-recommended average ambient NO_2/NO_x ratio of 0.80 is used for 1-hour NO_2 assessments. For annual and 1-hour NO_2 impacts, the Tier 2 ARM option was used with average ambient NO_2/NO_x ratios of 0.75 and 0.80, respectively, as recommended by EPA. As noted previously, the approach is acceptable without additional regulatory agency approval.

2.6 Terrain Consideration

The GAQM defines flat terrain as terrain equal to the elevation of the stack base, simple terrain as terrain lower than the height of the stack top, and complex terrain as terrain exceeding the height of the stack being modeled.

Site elevation for PPS is approximately 143 feet above mean sea level (ft-msl). The PPS Unit 1 combined-cycle CT/heat recovery steam generator (HRSG) stack has a height of 150 ft above grade elevation. Accordingly, terrain elevations above approximately 293 ft-msl (for the combined-cycle CT/HRSG unit), are classified as complex terrain. Terrain elevations within approximately 30 km of PPS range from 8 to 369 ft-msl. Accordingly, terrain in the vicinity of PPS is classified as ranging from flat to complex.

In accordance with the GAQM recommendations for AERMOD, each modeled receptor was assigned a terrain elevation based on U.S. Geological Survey (USGS) National Elevation Dataset (NED) terrain data and the AERMAP (Version 11103, April 13, 2011) terrain preprocessing program. AERMAP was used in accordance with the latest version of the User's Guide for the AERMOD Terrain Preprocessor (AERMAP), addenda to the User's Guide, and EPA's GAQM.

2.7 Building Wake Effects

The Clean Air Act (CAA) Amendments require the degree of emissions limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (Title 40, Part 51, Code of Federal Regulations [CFR]). GEP stack heights for the project emissions sources will comply with EPA-promulgated final stack height regulations (40 CFR 51). GEP stack height is defined as the highest of 65 meters, or a height established by applying the formula:

$$Hg = H + 1.5\,L$$

where: Hg = GEP stack height.
H = height of the structure or nearby structure.
L = lesser dimension (height or projected width) of the nearby structure.

Nearby is defined as a distance up to five times the lesser of the height or width dimension of a structure or terrain feature, but not greater than 800 meters. While GEP stack height regulations require that stack height used in modeling for determining compliance with NAAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater. Guidelines for determining GEP stack height have been issued by EPA (1985).

The PPS Unit 1 stack height is less than the regulatory GEP stack height of 213 feet (ft). The dominant structure influencing downwash is the HRSG, which has a height of 89.9 ft. Since the stack height of PPS Unit 1 complies with EPA-promulgated final stack height regulations, the actual stack height was used in the modeling analyses.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion model analysis, stacks having heights lower than the calculated GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the Plume Rise Model Enhancements (PRIME) building downwash algorithms. For the project ambient impact analysis, the complex downwash analysis implemented by AERMOD was performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM) (Version 04274, September 30, 2004). EPA's BPIP program was used to determine the area of influence for each building, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and finally to generate the specific building dimension data required by the model. BPIP output consists of an array of 36 direction-specific (10 degrees [°] to 360°) building heights (BUILDHGT keyword), lengths (BUILDLEN keyword), widths (BUILDWID keyword), and along-flow (XBADJ keyword) and across-flow (YBADJ keyword) distances for each stack suitable for use as input to AERMOD. Table 2-1 provides dimensions of the PPS buildings/structures evaluated for wake effects. The building/structure dimensions were determined from engineering layouts and specifications.

Table 2-1. Dimensions of Project and PPS Major Buildings and Structures

Building/Structure	Height (ft)	X Length (ft)	Y Length (ft)
Solid fuel truck unloading Area A	60.0	24.1	22.0
Solid fuel truck unloading Area B	40.0	24.1	21.1
Solid fuel truck unloading Area C	10.0	Polygon shape	
Solid fuel truck unloading Area D	20.1	Polygon shape	
Solid fuel truck unloading Area E	30.0	Polygon shape	
Solid fuel truck unloading Area F	6.0	Polygon shape	
Solid fuel truck unloading Area G	12.0	Polygon shape	
Solid fuel truck unloading Area H	18.0	Polygon shape	
Solid fuel truck unloading Area I	24.0	Polygon shape	
Solid fuel truck unloading Area J	30.0	Polygon shape	
Solid fuel Silos 1 and 2 (each)*	40.0	55.0	
Gasifier structure	252.0	60.9	65.1
Syngas cooling Wing 1	89.9	151.9	25.3
Syngas cooling Wing 2	89.9	151.9	25.3
IGCC cold box*	165.0	21.0	
IGCC hot gas cleanup unit	278.9	72.3	79.4
Fuel oil storage Tanks 1 through 3 (each)*	57.0	100.0	
Unit 1 HRSG	89.9	131.2	42.7
SC Units 2 through 4 air inlets (each)	56.4	13.6	45.6
CC Unit 2A through 5A HRSGs (each)	110.0	135.0	55.0
CC Unit 2 STG	80.0	150.0	50.0
Unit 2 cooling tower	51.0	145.0	97.0

*Length represents structure diameter.

Source: Environmental Consulting & Technology, Inc. (ECT), 2016.

2.8 Receptor Grids

Receptors were placed at locations considered to be ambient air, which is defined as "that portion of the atmosphere, external to buildings, to which the general public has access." The entire perimeter of the PPS plant site is fenced. Therefore, the nearest locations of general public access are at the facility fence lines. Consistent with GAQM and FDEP recommendations, the project ambient impact analysis used the following receptor grids:

- Fence Line Receptors—Receptors placed on the site fence line spaced 25 meters apart.
- Near-field Cartesian Receptors—Receptors at 100-meter spacing starting at 100 meters from the fence line receptors and extending to 3,000 meters from the center of the PPS site.
- Mid-field Cartesian Receptors—Receptors at 250-meter spacing starting at 3,250 meters and extending to 6,000 meters from the center of the PPS site.
- Far-field Cartesian Receptors—Receptors at 500-meter spacing starting at 6,500 meters and extending to 15,000 meters from the center of the PPS site, and receptors at 1,000-meter spacing starting at 16,000 meters and extending to 30,000 meters from the center of the PPS site.

As necessary, the receptor grids used for the ambient impact analysis were refined following initial modeling to ensure the highest ambient impacts for each pollutant and averaging period have been identified using a receptor spacing of no more than 100 meters.

For the cumulative modeling analysis, the receptor grids consisted of only those receptors that exceeded a PSD Class II SIL for a specific pollutant and averaging period. These receptors included any location for which an SIL was exceeded for any averaging period and any year of meteorological data.

2.9 Meteorological Data

The AERMET meteorological preprocessing program creates two files used by AERMOD: surface and profile files. The surface file contains boundary layer parameters, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convectively generated boundary layer (CBL) height, stable boundary layer (SBL) height, and surface heat flux. The profile file contains multilevel data of windspeed, wind direction, and temperature.

AERMET calculates the hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, CBL and SBL heights, and surface heat flux. In addition, AERMET passes all observed meteorological parameters to AERMOD including wind direction and speed (at multiple heights, if available), temperature, and if available, measured turbulence. AERMOD uses this information to calculate concentrations in a manner that accounts for a dispersion rate that is a continuous function of meteorology.

FDEP supplied five years (2010 to 2014) of representative hourly meteorological data for use in the modeling. The surface data is from Winter Haven Municipal Airport Gilbert Field (GIF) located approximately 27 miles northeast of PPS. The upper air data is from the Tampa International Airport (TPA) located approximately 38 miles to the west-northwest of PPS. The GIF/TPA meteorological dataset was prepared by FDEP using Version 14134 of AERMET.

2.10 Modeled Emissions Inventory

2.10.1 On-property Sources

The IGCC PPS Unit 1 normally operates at full load, or near full load. It also operates as a base loaded unit and therefore has few startup/shutdown cycles in a year. Therefore, partial loads and startups and shutdowns were not modeled. The full load stack parameters listed in the permit were used in the modeling. For assessing annual NO_2 air quality, the difference in annual emissions between operation on natural gas alone and operation on syngas and syngas augmented with natural gas was assessed. NO_x emissions on natural gas is permitted at 185 pounds per hour (lb/hr), while NO_x emissions on syngas or syngas/natural gas is permitted at 132 lb/hr. The difference of 53 lb/hr was assumed to occur for 3,000 hours in the modeling. This is somewhat conservative, since natural gas is currently permitted for 876 hr/yr. To assess 1-hour NO_2 air quality, the permitted natural gas emissions rate of 185 lb/hr was used.

In addition to PPS Unit 1, the cumulative modeling for the NO_2 1-hour NAAQS included the four existing CT Units 2 through 5 and the auxiliary boiler. Emergency engines, which normally operate for less than 100 hr/yr, were not included in the modeling. PPS Units 2 through 5 were modeled assuming the operating condition that was previously found to result in the highest impact. This was combined-cycle operation on fuel oil at 75-percent load at 20 degrees Fahrenheit (°F) ambient temperature. These modeling results can be found in the PPS Air Construction/PSD Permit Application dated October 2012. The auxiliary boiler was modeled with the stack parameters and allowable emissions rate found in the current Title V permit. Table 2-2 provides the model stack parameters and emissions rates.

2.10.2 Off-property Sources

The modeling analysis determined that project impacts will exceed the PSD Class II SIL for the NO_2 1-hour averaging time. The emissions inventory for sources located within 50 km of the PPS site were obtained from FDEP for use in the cumulative modeling analyses. The information provided by FDEP for existing sources of NO_x included facility ID; emissions unit ID; facility and emissions unit descriptions, coordinates, source parameters (e.g., stack height and diameter, exhaust temperature and flow rate, etc.); and potential, allowable, and actual emissions. PSD increment-consuming sources were also indicated. This data was supplemented with permit information obtained from the Air Permit Document Search Website at http://appprod.dep.state.fl.us/air/emissions/apds/default.asp.

Only major sources (i.e., those sources having potential emissions of 100 tpy or greater) were included in the modeling. Inclusion of facilities was dependent on the maximum distance that a significant impact was predicted, and the averaging time being assessed. For assessment of the 1-hour NO_2 NAAQS, it is generally sufficient to include sources within 10 km, or to at least the maximum distance of significant impact, whichever is higher. Although significant NO_2 impacts were only predicted out to approximately 3 km, all major sources of NO_x within 35 km were included in the inventory, which is well beyond the furthest distance of significant impact.

Table 2-3 provides the list of facilities included in the modeling. The emissions rates used in the modeling were based on the allowable rates contained in the information received from FDEP

Table 2-2. PPS Modeled NO_x Sources

Model ID	UTM (meters) East	UTM (meters) North	Elevation (meters)	Emissions Unit Description	Emissions Rate lb/hr	Emissions Rate g/s	Stack Height (meters)	Stack Diameter (meters)	Exit Temperature (K)	Velocity (m/s)
UNIT1	402542.220	3067463.720	43.7	IGCC CT	185.00	23.31	45.72	5.79	444.30	15.54
CC2A20	402519.015	3067300.601	43.7	CT	55.87	7.04	39.60	5.80	363.60	15.50
CC2B20	402518.448	30672251.401	43.7	CT	55.87	7.04	39.60	5.80	363.60	15.50
CC2C20	402517.537	3067149.561	43.7	CT	55.87	7.04	39.60	5.80	363.60	15.50
CC2D20	402517.058	3067099.930	43.7	CT	55.87	7.04	39.60	5.80	363.60	15.50
AUXB	402471.620	3067462.480	43.7	Auxiliary boile	11.90	1.50	22.90	1.10	463.70	15.20

Note: lb/hr = pound per hour.
g/s = gram per second.
K = Kelvin.
m/s = meter per second.

Source: ECT, 2016.

Table 2-3. Existing Facilities Included in the Cumulative Modeling Analysis

Model ID	Facility Name	Distance from PPS (km)
F055	Mosaic Fertilizer South Pierce Facility	6.5
H340	Seminole Electric Midulla Generating Station	9.8
H015	Hardee Power Station	10.2
F349	CPV Pierce Power	12.6
F034	Mosaic Fertilizer Central Florida Mineral	12.7
F059	Mosaic Fertilizer New Wales Facility	13.1
F051	U.S. Agri-Chemical Fort Meade Facility	13.4
F234	Duke Energy – Hines Energy Complex	13.5
F053	Mosaic Fertilizer Green Bay	13.5
F223	Duke Energy – Tiger Bay Cogeneration	13.7
F336	Peace River Station	17.1
F217	PPS Mulberry Cogeneration	17.3
F057	IMC Phosphates Nichols Plant	17.4
F047	Agrifos Mining Nichols Plant	18.6
F046	Mosaic Fertilizer Bartow Facility	20.8
F231	Orange Cogeneration Facility	22.6
H043	Vandolah Power Project	23.5
F352	Lakeland Electric Winston Peaking Station	33.6
F015	US Beverage Lakeland Plant	34.8

Note: Model ID consists of county designation (F = Polk; H = Hardee), and the last three digits of the Title V permit.

Source: ECT, 2016.

and the Title V permits. Sources expected to operate infrequently, such as emergency engines for electrical generation or firewater pumps, were not included in the modeling.

In several cases one or more stack parameters were missing. To be able to include the emissions, missing stack parameters were substituted with value(s) considered to be representative of a similar source or based on engineering judgment. In all cases, the values were also chosen to be conservative, i.e., the substituted values were selected in a manner that would result in higher predicted air quality impacts than would actually be expected to occur. In some cases, emissions rates for combustion sources (e.g., boilers, dryers, and furnaces) were missing. In these instances, emissions were estimated based on heat input, fuel(s), and emissions factors from AP-42. If more than one fuel was listed, the higher resulting emissions rate was chosen. Table 2-4 contains the locations, emissions rates, stack parameters, and other information on the modeled off-property sources.

Table 2-4. Modeling Inventory of NO_x Sources

Site Name	Model ID	UTM (meters) East	UTM (meters) North	Elevation (meters)	EU ID	Emissions Unit Description	Emissions Rate lb/hr	Emissions Rate g/s	Stack Height (meters)	Stack Diameter (meters)	Exit Temperature (K)	Velocity (m/s)
Mosaic Fertilizer South Pierce Facility	F055U001	407900.0	3071900.0	40.2	1	Auxiliary boiler	17.64	2.22	10.67	1.46	494	15.54
	F055U004	407240.0	3073280.0	40.2	4	Sulfuric acid plant No. 10	15.00	1.89	43.89	2.74	350	12.53
	F055U005	407250.0	3073280.0	40.2	5	Sulfuric acid plant No. 11	15.00	1.89	43.89	2.74	350	12.53
	F055U052	407240.0	3073310.0	40.2	52	Phosphate rock dryer (supplies rock to No. 2 ball mill)	5.52	0.70	27.43	2.44	344	3.84
	F055U053	407240.0	3073310.0	40.2	53	Auxiliary boiler	14.30	1.80	7.62	0.61	494	15.24
Central Florida Mineral Operations	F034U008	392960.0	3058550.0	39.6	8	Boiler at Four Corners Mine	0.55	0.07	7.92	0.29	478	7.16
	F034U011	392960.0	3058550.0	39.6	11	Phosphate rock dryer No. 1 at Noralyn Mine (011)	46.69	5.88	23.16	1.98	394	17.31
	F034U012	392960.0	3058550.0	39.6	12	Phosphate rock dryer No. 2 east at Noralyn Mine (012)	44.18	5.57	16.76	2.83	341	8.84
Hines Energy Complex	F234U001	414170.0	3074100.0	49.7	1	Power Block 1, CT 1A	349.00	43.97	38.10	5.79	361	18.07
	F234U002	414340.0	3073900.0	49.7	2	Power Block 1, CT 1B	349.00	43.97	38.10	5.79	361	18.07
	F234U003	414170.0	3074100.0	49.7	3	Auxiliary boiler firing natural gas and low-sulfur fuel oil	9.90	1.25	6.71	0.61	422	15.24
	F234U014	414400.0	3073900.0	49.7	14	Power Block 2, CT 2A	99.70	12.56	38.10	5.79	361	18.07
	F234U015	414400.0	3073900.0	49.7	15	Power Block 2, CT 2B	99.70	12.56	38.10	5.79	361	18.07
	F234U016	414400.0	3073900.0	49.7	16	Power Block 3, CT 3A	82.00	10.33	38.10	5.79	361	18.11
	F234U017	414400.0	3073900.0	49.7	17	Power Block 3, CT 3B	82.00	10.33	38.10	5.79	361	18.11
	F234U018	414170.0	3074100.0	49.7	18	Power Block 4, CT 4A	100.08	12.61	38.10	5.49	368	20.70
	F234U019	414170.0	3074100.0	49.7	19	Power Block 4, CT 4B	100.08	12.61	38.10	5.49	368	20.70
Mosaic Fertilizer New Wales Facility	F059U002	396670.0	3079300.0	47.9	2	Sulfuric acid plant No. 1	17.00	2.14	60.96	2.59	350	15.24
	F059U003	396670.0	3079300.0	47.9	3	Sulfuric acid plant No. 2	17.00	2.14	60.96	2.59	350	15.24
	F059U004	396670.0	3079300.0	47.9	4	Sulfuric acid plant No. 3	17.00	2.14	60.96	2.59	350	15.24
	F059U009	396670.0	3079300.0	47.9	9	DAP Plant No. 1	13.97	1.76	40.54	2.13	314	14.94
	F059U042	396670.0	3079300.0	47.9	42	Sulfuric acid plant No. 4	14.50	1.83	60.66	2.59	350	15.24
	F059U044	396670.0	3079300.0	47.9	44	Sulfuric acid plant No. 5	14.50	1.83	60.66	2.59	350	15.24
	F059U045	396670.0	3079300.0	47.9	45	DAP Plant No 2 - East Train	12.60	1.59	52.12	1.83	316	17.68
	F059U046	396450.0	3079290.0	47.9	46	DAP Plant No 2 - West Train	12.60	1.59	52.12	1.83	316	17.68
	F059U074	396670.0	3079300.0	47.9	74	Multifos C kiln scrubber	9.11	1.15	52.43	1.37	314	21.40

Table 2-4. Modeling Inventory of NO_x Sources

Site Name	Model ID	UTM (meters) East	UTM (meters) North	Elevation (meters)	EU ID	Emissions Unit Description	Emissions Rate lb/hr	Emissions Rate g/s	Stack Height (meters)	Stack Diameter (meters)	Exit Temperature (K)	Velocity (m/s)
Mosaic Fertilizer New Wales	F059U078	396670.0	3079300.0	47.9	78	Granular monoammonium phosphate (GMAP) plant	19.96	2.51	40.54	1.83	336	33.41
Facility (cont.)	F059U081	396670.0	3079300.0	47.9	81	89.5 MMBtu/hr boiler (non-NSPS) - rental boiler	12.80	1.61	5.49	1.10	478	10.64
Tiger Bay	F223U001	416250.0	3069370.0	48.2	1	CT/HRSG	97.22	12.25	54.86	5.79	369	19.20
Cogeneration Facility	F223U003	416200.0	3069220.0	48.2	3	100 MMBtu/hr package steam boiler	10.00	1.26	12.19	1.22	433	11.80
Mulberry Cogen	F217U001	413600.0	3080600.0	44.8	1	CT/HRSG (Phase II, acid rain unit)	164.00	20.66	38.10	4.57	378	19.54
Facility	F217U002	413600.0	3080600.0	44.8	2	Secondary boiler	23.40	2.95	38.10	0.91	378	20.27
Mosaic Fertilizer	F053U007	409500.0	3080100.0	52.4	7	South AP fertilizer plant	8.57	1.08	39.01	2.29	322	12.65
Green Bay	F053U029	409050.0	3079050.0	52.4	29	North MAP/DAP fertilizer plant	7.14	0.90	39.32	2.29	315	13.11
Facility	F053U038	409500.0	3080100.0	52.4	38	2750 TPD No. 6 sulfuric acid plant	13.80	1.74	45.72	2.74	355	9.27
Peace River Station, LLC	F336U001	419500.0	3069700.0	36.3	1	GT-1, 170 MW simple-cycle gas turbine peaking unit	330.60	41.66	18.29	6.40	865	34.85
	F336U002	419500.0	3069700.0	36.3	2	GT-2, 170 MW simple-cycle gas turbine peaking unit	330.60	41.66	18.29	6.40	865	34.85
	F336U003	419500.0	3069700.0	36.3	3	GT-3, 170 MW simple cycle gas turbine peaking unit	330.60	41.66	18.29	6.40	865	34.85
IMC Phosphates	F057U003	398400.0	3084200.0	36.6	3	DAP plant dryer	2.29	0.29	24.38	1.07	328	23.77
Company (Nichols)	F057U005	398400.0	3084200.0	36.6	5	Sulfuric acid plant No. 1 double absorption (2000 TPD) (PSD)	12.50	1.58	45.72	2.29	350	10.06
	F057U012	398400.0	3084200.0	36.6	12	Phosphate rock dryer	22.00	2.77	24.69	2.29	328	3.66
	F057U015	398400.0	3084200.0	36.6	15	North auxiliary boiler	3.50	0.44	8.23	0.61	533	13.72
	F057U016	398040.0	3084020.0	36.6	16	South auxiliary boiler	7.00	0.88	11.89	0.98	533	8.84
U.S. Agri-	F051U006	416950.0	3069280.0	47.9	6	Auxiliary boiler	30.00	3.78	21.34	1.13	478	14.94
Chemicals	F051U016	416950.0	3069280.0	47.9	16	Sulfuric acid plant No. 1	17.35	2.19	53.34	2.59	355	9.75
Fort Meade	F051U017	416950.0	3069280.0	47.9	17	Sulfuric acid plant No. 2	17.35	2.19	53.34	2.59	355	9.75

Table 2-4. Modeling Inventory of NO_x Sources

Site Name	Model ID	UTM (meters) East	UTM (meters) North	Elevation (meters)	EU ID	Emissions Unit Description	Emissions Rate lb/hr	Emissions Rate g/s	Stack Height (meters)	Stack Diameter (meters)	Exit Temperature (K)	Velocity (m/s)
CPV Pierce Power Generating Facility	F349U001	406700.0	3079300.0	45.4	1	245-MW CT/HRSG	80.00	10.08	53.34	5.64	361	18.29
Mosaic Fertilizer, LLC Bartow Facility	F046U001	409770.0	3087260.0	64.0	1	No. 3 fertilizer (DAP/MAP) plant	14.67	1.85	30.18	2.29	330.4	16.15
	F046U012	409080.0	3087000.0	64.0	12	No. 4 sulfuric acid plant	13.00	1.64	60.96	2.07	355.4	18.59
	F046U021	409770.0	3087260.0	64.0	21	No. 4 fertilizer plant	14.67	1.85	42.67	3.32	328.7	16.15
	F046U032	409080.0	3087000.0	64.0	32	No. 6 sulfuric acid plant	13.00	1.64	60.96	2.07	355.4	18.59
	F046U033	409080.0	3087000.0	64.0	33	No. 5 sulfuric acid plant	13.00	1.64	60.96	2.07	355.4	18.59
	F046U051	409800.0	3087000.0	64.0	51	Cleaver Brooks package watertube boiler	23.47	2.96	9.45	1.07	483.2	6.10
	F046U055	409770.0	3087260.0	64.0	55	Auxiliary process steam boiler	23.93	3.02	7.62	1.45	449.3	8.60
Orange Cogeneration Facility	F231U001	418700.0	3083000.0	38.7	1	CT/HRSG, Unit 1 (Phase II acid rain unit)	37.00	4.66	30.48	3.35	383.2	15.97
	F231U002	418700.0	3083000.0	38.7	2	CT/ HRSG, Unit 2 (Phase II acid rain unit)	37.00	4.66	30.48	3.35	383.2	15.97
	F231U003	418700.0	3083000.0	38.7	3	Auxiliary boiler	13.00	1.64	19.81	1.13	424.8	14.02
Agrifos Mining, L.L.C., Nichols	F047U001	398300.0	3085250.0	35.4	1	Phosphate rock dryer No. 1, dry cyclones, venturi cyclonic	35.82	4.51	21.34	2.29	344.3	12.50
	F047U002	398300.0	3085250.0	35.4	2	Phosphate rock dryer No. 2, dry cyclones, venturi cyclonic SEPA	35.20	4.44	21.34	2.29	344.3	12.50
Winston Peaking Station	F352U001	400080.0	3100690.0	54.9	1	2.5-MW GM EMD 20/645/E4B diesel engine	13.90	1.75	9.14	0.56	666.5	41.24
	F352U002	400080.0	3100690.0	54.9	2		13.90	1.75	9.14	0.56	666.5	41.24
	F352U003	400080.0	3100690.0	54.9	3		13.90	1.75	9.14	0.56	666.5	41.24
	F352U004	400080.0	3100690.0	54.9	4		13.90	1.75	9.14	0.56	666.5	41.24
	F352U005	400080.0	3100690.0	54.9	5		13.90	1.75	9.14	0.56	666.5	41.24
	F352U006	400080.0	3100690.0	54.9	6		13.90	1.75	9.14	0.56	666.5	41.24
	F352U007	400080.0	3100690.0	54.9	7		13.90	1.75	9.14	0.56	666.5	41.24
	F352U008	400080.0	3100690.0	54.9	8		13.90	1.75	9.14	0.56	666.5	41.24
	F352U009	400080.0	3100690.0	54.9	9		13.90	1.75	9.14	0.56	666.5	41.24

Table 2-4. Modeling Inventory of NO_x Sources

Site Name	Model ID	UTM (meters) East	UTM (meters) North	Elevation (meters)	EU ID	Emissions Unit Description	Emissions Rate lb/hr	Emissions Rate g/s	Stack Height (meters)	Stack Diameter (meters)	Exit Temperature (K)	Velocity (m/s)
Winston Peaking Station (cont.)	F352U010	400080.0	3100690.0	54.9	10		13.90	1.75	9.14	0.56	666.5	41.24
	F352U011	400080.0	3100690.0	54.9	11		13.90	1.75	9.14	0.56	666.5	41.24
	F352U012	400080.0	3100690.0	54.9	12		13.90	1.75	9.14	0.56	666.5	41.24
	F352U013	400080.0	3100690.0	54.9	13		13.90	1.75	9.14	0.56	666.5	41.24
	F352U014	400080.0	3100690.0	54.9	14		13.90	1.75	9.14	0.56	666.5	41.24
	F352U015	400080.0	3100690.0	54.9	15		13.90	1.75	9.14	0.56	666.5	41.24
	F352U016	400080.0	3100690.0	54.9	16		13.90	1.75	9.14	0.56	666.5	41.24
	F352U017	400080.0	3100690.0	54.9	17		13.90	1.75	9.14	0.56	666.5	41.24
	F352U018	400080.0	3100690.0	54.9	18		13.90	1.75	9.14	0.56	666.5	41.24
	F352U019	400080.0	3100690.0	54.9	19		13.90	1.75	9.14	0.56	666.5	41.24
	F352U020	400080.0	3100690.0	54.9	20		13.90	1.75	9.14	0.56	666.5	41.24
US Beverage Lakeland Plant	F015U001	399070.0	3102070.0	38.1	1	Citrus peel dryer with two waste heat evaporators	11.66	1.47	27.43	0.91	333.2	7.32
	F015U002	399070.0	3102070.0	38.1	2	Erie City Model 14-200 process steam boiler No. 1	23.32	2.94	10.06	0.61	447.0	5.18
	F015U003	399070.0	3102070.0	38.1	3	Erie City Size 50 proces setam boiler No. 2	8.09	1.02	10.36	0.91	447.0	9.14
Midulla Generating Station	H340UCTG1	405095.0	3057723.9	39.0	1	CT/HRSG Unit 1	336.03	42.34	53.34	5.49	365.4	23.0
	H340UCTG2	405095.0	3057723.1	39.0	2	CT/HRSG Unit 2	336.03	42.34	53.34	5.49	365.4	23.0
	H340UCT4A	405384.5	3057553.6	39.0	4A	PW Twin Pac CT	102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT4B	405384.5	3057545.8	39.0	4B		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT5A	405384.5	3057510.3	39.0	5A		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT5B	405384.5	3057502.5	39.0	5B		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT6A	405384.5	3057467.0	39.0	6A		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT6B	405384.5	3057459.3	39.0	6B		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT7A	405384.5	3057423.7	39.0	7A		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT7B	405384.5	3057416.0	39.0	7B		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT8A	405384.5	3057480.4	39.0	8A		102.38	12.90	18.29	2.90	750.4	30.75
	H340UCT8B	405384.5	3057372.7	39.0	8B		102.38	12.90	18.29	2.90	750.4	30.75

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Table 2-4. Modeling Inventory of NO_x Sources

Site Name	Model ID	UTM (meters) East	UTM (meters) North	Elevation (meters)	EU ID	Emissions Unit Description	Emissions Rate lb/hr	Emissions Rate g/s	Stack Height (meters)	Stack Diameter (meters)	Exit Temperature (K)	Velocity (m/s)
Hardee Power Station	H015UCT1A	409903.0	3057390.0	36.0	1A	CT 1A with HRSG	383.81	48.36	27.43	4.42	394.3	23.10
	H015UCT1B	404903.0	3057378.0	35.0	1B	CT 1B with HRSG	383.81	48.36	27.43	4.42	394.3	23.10
	H015UCT2A	404939.0	3057260.0	35.0	2A	CT 2A with HRSG	383.81	48.36	22.86	5.46	394.3	28.70
	H015UCT2B	404941.0	3057245.0	35.0	2B	CT 2B with HRSG	166.98	21.04	25.91	4.50	810.9	43.54
Vandolah Power Project	H043U004A	408788.9	3044913.8	30.2	4A	170-MW gas simple-cycle CT	351.03	44.23	22.86	7.01	873.7	32.34
	H043U004B	408788.9	3044863.8	30.2	4B		351.03	44.23	22.86	7.01	873.7	32.34
	H043U004C	408788.9	3044813.8	30.2	4C		351.03	44.23	22.86	7.01	873.7	32.34
	H043U004D	408788.9	3044763.1	30.2	4D		351.03	44.23	22.86	7.01	873.7	32.34

Source: ECT, 2016.

3.0 Class II Area Impact Analysis Results

3.1 Overview

Air dispersion modeling was conducted to assess the air quality impacts resulting from the proposed modification in accordance with the methodology described in Section 2.0. This section provides the results of the Class II air quality assessment for NO_2 project air quality impacts. The potential impacts at distant PSD Class I areas are addressed in Section 4.0.

The AERMOD dispersion model was used to assess project NO_2 impacts in the surrounding Class II areas. First the proposed modification was modeled and the results compared to the annual and 1-hour PSD SILs. Since 1-hour impacts were predicted to exceed the SIL at a limited number of locations, cumulative modeling was performed to demonstrate that the NO_2 NAAQS would not be exceeded.

3.2 PSD Class II SIL Analysis Results

The dispersion modeling results indicate that proposed modification will result in ambient air quality impacts that are well below the PSD Class II SIL for the NO_2 annual average. Table 3-1 provides details of the maximum annual average NO_2 impacts, including locations of the maximum impacts and comparisons to the PSD Class II SIL. As shown, the increased annual emissions from the proposed modification will result in maximum impacts that range from 1.4 to 2.3 percent of the SIL. Accordingly, additional cumulative modeling with respect to the PSD Class II increments and annual NAAQS was not required.

Table 3-2 presents the NO_2 1-hour modeling results. The highest Tier 2 predicted impact is slightly above the 1-hour SIL. Exceedances of the SIL were predicted at a 31 receptor locations. Therefore, cumulative source modeling was required to demonstrate compliance with NAAQS. A PSD increment analysis will not be required, since a 1-hour NO_2 increment has not been required.

Table 3-1. NO_2 Annual Class II SIL Analysis Results

	2010	2011	2012	2013	2014
Maximum predicted Tier 1 NO_2 impact ($\mu g/m^3$)	0.030	0.024	0.022	0.028	0.019
Maximum predicted Tier 2 NO_2 impact ($\mu g/m^3$)*	0.023	0.018	0.017	0.021	0.014
Receptor UTM Easting (meter)	400,995	400,913	401,022	401,049	401,008
Receptor UTM Northing (meter)	3,067,529	3,067,405	3,067,570	3,067,611	3,067,549
Distance from grid origin (meter)‡	1,549	1,630	1,524	1,501	1,536
Direction from grid origin (Vector degrees)‡	272	268	274	276	273
Receptor elevation (meter, amsl)	43.5	43.1	43.6	43.6	43.6
PSD modeling SIL ($\mu g/m^3$)	1	1	1	1	1
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	2.3	1.8	1.7	2.1	1.4

*Tier 1 impact times EPA default NO_2/NO_x ration of 0.75.

‡Distance and direction measured from location of Unit 1 stack, i.e., Grid Origin = UTM Easting (meter) 402,542.22, and UTM Northing 3,067,463.72.

Source: ECT, 2016.

Table 3-2. NO_2 1-Hour Class II SIL Analysis Results

	1-Hour Class II SIL
Highest Tier 1 daily maximum 1-hour NO_2 impact ($\mu g/m^3$)	9.60
Highest Tier 2 daily maximum 1-hour NO_2 impact ($\mu g/m^3$)*	7.68
Receptor UTM Easting (meter)	400,128
Receptor UTM Northing (meter)	3,068,714
Distance from grid origin (meter)‡	2,719
Direction from grid origin (Vector degrees)‡	297
Receptor elevation (meter, amsl)	45.2
NO_2 modeling SIL ($\mu g/m^3$)	7.5
Exceed PSD modeling SIL? (Yes/No)	Yes
Percent of PSD modeling SIL (%)	102.4

*Tier 1 impact times EPA default NO_2/NO_x ration of 0.8.

‡Distance and direction measured from location of Unit 1 stack, i.e., Grid Origin = UTM Easting 402,542.22, and UTM Northing 3,067,463.72.

Source: ECT, 2016.

3.3 Cumulative Impact Analysis Results

Since project 1-hour NO_2 impacts are predicted to exceed the PSD Class II SILs, multisource cumulative analyses of air quality impacts were conducted. Only those receptors that were predicted to have an impact above the PSD Class II SIL were assessed in the cumulative analysis.

In accordance with agency modeling guidance, background concentrations were determined by reviewing available ambient air data collected for the latest three years (2013 through 2015). Data from the Hillsborough County Environmental Protection Commission (HCEPC) monitoring station located at 5121 Gandy Boulevard in Tampa (ID 12 057 1065) was used to establish a representative background value. This site is located approximately 57 km northwest of the PPS site. Although surrounded by more urban land use, this site is somewhat similar to the rural setting of the PPS site. It also had the requisite 3 years of data. The three-year average of the eights-highest daily maximum ambient air values for this monitoring station is 57.0 micrograms per cubic meter ($\mu g/m^3$). Data from this urban monitoring station should provide conservative estimates (i.e., overestimates) of background NO_2 concentrations at the rural PPS site.

The cumulative NO_2 1-hour NAAQS modeling included PPS emissions sources and the offsite emissions inventory. The model results were then added to the representative background concentration to obtain the total impact for comparison to the NAAQS. For modeling purposes, the 1-hour NO_2 NAAQS is evaluated based on the fiver-year average of the 98^{th} percentile (i.e., highest, eighth-highest) of the 1-hour daily maximum NO_2 impacts. Table 3-3 provides the results of the 1-hour NO_2 NAAQS analysis. The highest total predicted Tier 2 impact was 67 percent of NAAQS. Therefore, the model results indicate that no potential exceedances of the 1-hour NO_2 NAAQS are predicted at the locations where PPS Unit 1 would have a significant impact.

Table 3-3. Cumulative NO_2 1-Hour NAAQS Analysis Results

Parameter	2010 through 2014 5-Year Average All Sources
Highest Tier 1 98th percentile of 1-hour daily maximum NO_2 impact ($\mu g/m^3$)	86.23
Highest Tier 2 98th percentile of 1-hour daily maximum NO_2 impact ($\mu g/m^3$)*	68.98
Receptor UTM Easting (meter)	403,627.84
Receptor UTM Northing (meter)	3,064,813.75
Receptor elevation (meter, amsl)	45.37
Distance from CT stack (km)†	2.86
Direction from CT stack (degrees)†	158
Background 1-hour NO_2 concentration ($\mu g/m^3$)‡	57.0
Total 1-hour NO_2 concentration ($\mu g/m^3$)	125.98
Polk Power Station contribution ($\mu g/m^3$) Tier 1	0.15
Polk Power Station contribution ($\mu g/m^3$) Tier 2	0.12
Polk Power Station Unit 1 contribution (%)	0.0944
1-hour NO_2 NAAQS ($\mu g/m^3$)	188
Exceed NAAQS (Yes/No)	No
Percent of NAAQS (%)	67.0

*Tier 1 impact times EPA default NO_2/NO_x ration of 0.8.

†Distance and direction measured from location of CT stack, i.e., Grid Origin = UTM Easting (m) 402,542.22, and UTM Northing 3,067,463.72.

‡Three-year average of 1-hour 98th percentile NO_2 values for 2013, 2014, and 2015 from Station ID: 120571065 (1621 Gandy Blvd, Tampa, Hillsborough County).

Source: ECT, 2016.

3.4 Preconstruction Ambient Air Quality Monitoring Exemption Applicability

PSD review may require continuous ambient air monitoring data to be collected in the area of the proposed source for pollutants emitted in significant amounts. As a result of the proposed modification, NO_2 will be emitted in excess of the respective SER, which indicates preconstruction monitoring may be required. However, Rule 62-212.400(2)(e), F.A.C., provides for an exemption from the preconstruction monitoring requirement for sources with de minimis air quality impacts. In cases where the predicted ambient impacts exceed the de minimis levels, regulatory agencies have the authority to allow data from existing monitoring stations to substitute for preconstruction monitoring. The maximum predicted annual NO_2 impact of 0.03 $\mu g/m^3$ is below the annual average NO_2 de minimis ambient impact level of 14 $\mu g/m^3$. Therefore, the project qualifies for a preconstruction monitoring exemption for NO_2 in accordance with FDEP PSD regulations.

3.5 Summary of Model Results

Conclusions regarding the modeling analyses are as follows:

- Project impacts are predicted to exceed the PSD Class II SILs for the NO_2 1-hour average.
- Project impacts were below PSD Class II SILs for the NO_2 annual averaging period.
- Cumulative modeling showed no potential exceedances of the 1-hour NO_2 NAAQS.
- Preconstruction ambient monitoring will not be required for this project.

4.0 Class I Impact Results

4.1 Overview

This section describes the evaluation that was conducted to assess project Class I area air quality impacts in accordance with EPA, FLMs, and FDEP modeling guidance. This section provides the results of the project air quality assessment with respect to long-range transport impacts at Chassahowitzka NWA and Everglades NP Class I areas. The nearest PSD Class I area is Chassahowitzka NWA situated approximately 117 km (73 miles) northwest of the project. Everglades NP is situated approximately 211 km (131 miles) southeast of the project.

4.2 PSD Increment and NAAQS

Since the Class I areas are beyond 50 km, the CALMET/CALPUFF/CALPOST modeling suite for long-range transport would be required to accurately evaluate impacts. However, a screening approach was used to determine if the emissions from the modification would have a significant impact at the Class I areas. AERMOD was run using a ring of receptors located 50 km from the PPS site and spaced at 1° intervals. The maximum potential annual increase in NO_x emissions of 79.5 tpy was modeled from the Unit 1 stack. Table 4-1 shows the comparison of the maximum impacts to the Class I annual NO_2 SIL of 0.1 µg/m^3. The maximum impact for any year was less than 2 percent of the SIL. Therefore, increased emissions resulting from the modification could not contribute to an exceedance of the annual PSD increment or NO_2 annual NAAQS.

There is no 1-hour NO_2 Class I SIL or 1-hour NO_2 PSD increment. Since the maximum distance that PPS Unit 1 had a predicted significant 1-hour impact at the permitted hourly NO_x rate on natural gas was approximately 3 km, Unit 1 could not contribute significantly to a violation of the NO_2 1-hour NAAQS at the location of the Class I areas.

Table 4-1. NO_2 Annual Class I SIL Analysis Results

	2010	2011	2012	2013	2014
Maximum predicted Tier 1 NO_2 impact ($\mu g/m^3$)	0.0023	0.0019	0.0021	0.0023	0.0022
Maximum predicted Tier 2 NO_2 impact ($\mu g/m^3$)*	0.0017	0.0014	0.0016	0.0017	0.0016
Receptor UTM Easting (meter)	353,461	353,461	355,558	353,461	400,797
Receptor UTM Northing (meter)	3,057,923	3,058,781	3,050,363	3,057,068	3,017,494
Distance from grid origin (meter)‡	50,000	49,843	50,000	50,170	50,000
Direction from grid origin (Vector degrees)‡	259	260	250	258	182
Receptor elevation (meter, amsl)	8	8	8	8	17
PSD Class 1 SIL ($\mu g/m^3$)	0.1	0.1	0.1	0.1	0.1
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	1.7	1.4	1.6	1.7	1.6

*Tier 1 impact times EPA default NO_2/NO_x ration of 0.75.

‡Distance and direction measured from location of Unit 1 stack, i.e., Grid Origin = UTM Easting (meter) 402,542.22, and UTM Northing 3,067,463.72.

Source: ECT, 2016.

4.3 AQRVs

For new sources that will be located at a distance of 50 km or greater from a Class I area, the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report, Revised (2010), guidance on initial screening criteria recommends using the ratio of potential project emissions rates divided by the project's distance from a Class I area (i.e., Q/D or 10D Rule) to determine whether an assessment of Class I area AQRVs is necessary. Potential project emissions (i.e., Q) include SO_2, NO_2, particulate matter less than or equal to 10 micrometers (PM_{10}), and sulfuric acid (H_2SO_4) mist annual emissions in tpy, based on 24-hour maximum allowable emissions. The distance (i.e., D) is the distance in kilometers to the Class I area. For cases in which the source is located more than 50 km and has a calculated Q/D ratio of 10 or less, the FLM will consider the source to have negligible impacts with respect to Class I AQRVs and would not request any further Class I AQRV impact analyses for such sources.

The Q/D ratios were calculated for the project using annual emissions based on 24-hour maximum allowable emissions as required by the FLM screening guidance and the nearest distance to each of the two Class I areas located within 300 km of the project. The annual emissions were comprised a combination of operation on syngas and syngas with natural gas augmentation for 5,760 hr/yr, and natural gas alone for 3,000 hr/yr. The natural gas permit limit of 2.0 grains per 100 standard cubic feet was used in the calculation for sulfur dioxide and H_2SO_4 mist.

Table 4-2 summarizes Unit 1's potential annual emissions of NO_2, SO_2, H_2SO_4 mist, and PM_{10} in tpy, the distance to each Class I area (km), and the calculated Q/D ratio for each Class I area. The calculated Q/D ratio for Everglades NP is well below the FLM threshold of 10. Accordingly, Class I AQRV analyses would only be required for Chassahowitzka NWA in accordance with the FLAG guidance.

The AQRVs were previously assessed using refined modeling techniques, and are described in the October, 2012 PSD application for Units 2 through 5 (ECT, 2013). Although different sources were involved, the overall emissions and stack parameters of Unit 1 and Units 2 through 5 are similar. Table 4-3 below shows the stack parameters and emissions rates used in the Class I

Table 4-2. PSD Class I Initial Screening Analysis

	NO_x	SO_2	H_2SO_4 Mist	PM_{10} (total)*	Totals
Potential emissions (Q) (tpy)	657.7	549.6	83.6	74.5	1,365.4

	Chassahowitzka NWA	Everglades NP
Distance from the Project (D) (km)	116.9	211.8
FLAG screening ratio (Q/D) (tpy/km)	11.7	6.4

Note: tpy/km = ton per year per kilometer.

*Filterable and condensable PM.

Source: ECT, 2012.

Table 4-3. Comparison of Emissions and Stack Parameters

Parameter	Units	Units 2 through 5	Unit 1
Stack height	ft	130	150
Stack diameter	ft	19.0	19.0
Stack velocity	ft/sec	60.0	78.5
Stack temperature	oF	194	340
SO_2 emissions	lb/hr	49.2	9.38
H_2SO_4 emissions	lb/hr	14.0	0.72
NO_x emissions	lb/hr	141.2	185.0
$PM_{2.5}$ emissions	lb/hr	76.0	17.01
Total emissions for all pollutants	lb/hr	280.4	212.1

Note: Emissions rates for Units 2 through 5 are the total for four units.
Emissions rates for Unit 1 are the maximum potential emissions firing natural gas.

Source: ECT, 2016.

analysis to model Units 2 through 5. The table also shows the emissions rates and stack parameters that would be appropriate for assessing the proposed modification. As can be seen, the Unit 1 stack is higher, has a greater exhaust velocity, and higher temperature, modeling it for an equivalent emissions rate should result in lower impacts than the Unit 2 through 5 stacks. Also, the emissions are significantly lower for all pollutants except NO_x, which is approximately 30 percent higher than the total emissions of Units 2 through 5 as input to the long-range transport model, i.e., CALPUFF. However, the total emissions of all pollutants modeled from Units 2 through 5 are 30 percent higher than would be modeled to assess the short-term visibility impacts from the PPS Unit 1 modification.

The added NO_x emissions from the modification would not adversely affect the conclusions of that previous study, which found the AQRVs to not be threatened.

For instance, the maximum predicted nitrogen deposition at the Chassahowitzka NWA was 0.0024 kilogram per hectare per year (kg/ha/yr), or 24.4 percent of the FLM deposition analysis threshold (DAT) of 0.01 kg/ha/yr. The increase in NO_x emissions from the PPS Unit 1 modification is 79.5 tpy, which is approximately 13 percent of the total PPS NO_x emissions used in the deposition modeling.

For visibility, i.e., regional haze, the significant impact level for Class I areas is a change in the light-extinction coefficient (bext) of 5.0. The coefficient bext is the attenuation of light per unit distance and is expressed as inverse megameters (Mm-1). The highest bext predicted in any of the three model years was 1.30 Mm-1, or 26.0 percent of the significance level. Again, the increased emissions from the modification would not cause the conclusion of acceptable impact to change.