Solid Waste Authority of Palm Beach County
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BUREAU OF AIR REGULATION

Air Quality Modeling Protocol

Palm Beach Renewable Energy Facility No. 2

April 2009

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1. Introduction

The Solid Waste Authority of Palm Beach County (the Authority) is planning to expand its waste processing capacity by constructing a mass burn waste-to-energy facility in West Palm Beach, Florida (see Figure 1-1), adjacent to its existing renewable energy facility. The new facility, the Palm Beach Renewable Energy Facility No. 2 (PBREF2), will have a total facility throughput of 3,000 tpd of municipal solid waste (MSW). State-of-the-art emissions control systems will be included in the PBREF2 to minimize air pollutant emissions. In addition, continuous emissions monitoring equipment will be used to ensure on-going compliance with state and federal air regulations.

The Authority's 1,320 acre campus (Palm Beach Renewable Energy Park, PBREP) includes the existing renewable energy facility (the North County Resource Recovery Facility (NCRRF)), a refuse-derived fuel (RDF) facility which has two identical MWC units, and a total nominal design capacity of 2,000 tons per day of MSW. The construction of the PBREF2 will complement services that are being provided by the existing facilities at the PBREP, and will also serve to enhance the Authority's 2006 Integrated Solid Waste Management Plan (ISWM Plan) to develop a system of programs and facilities to effectively and economically manage solid waste through source reduction, recycling, composting, combustion, and landfilling. The ISWM Plan also calls for the expanded combustion capacity in order to extend the life of the existing landfill beyond its currently anticipated lifespan. The existing renewable energy facility is a major source of air emissions, and it is anticipated that emissions from the PBREF2 would be considered significant under the federal New Source Review (NSR) Program.

As part of the regulatory permitting process for the project, air dispersion modeling will be performed to demonstrate that the air quality impacts of the proposed project will comply with all applicable standards and criteria, including National Ambient Air Quality Standards (NAAQS), Florida Ambient Air Quality Standards (FAAQS), and Prevention of Significant Deterioration (PSD) increments (40 CFR Part 51.166). This protocol describes the methodology that will be used in the air quality modeling analysis.

This protocol is organized into the following sections:

- **Section 2 – Project and Site Descriptions** briefly describes the proposed project.
- **Section 3 – Applicable Regulations** discusses the air quality standards and criteria to be used for the modeling.
- **Section 4 – Climatology** describes the general climate and meteorological conditions in the vicinity of the project site.

- **Section 5 – Existing Air Quality** discusses the attainment status and background air quality representative of the area in the vicinity of the project site.

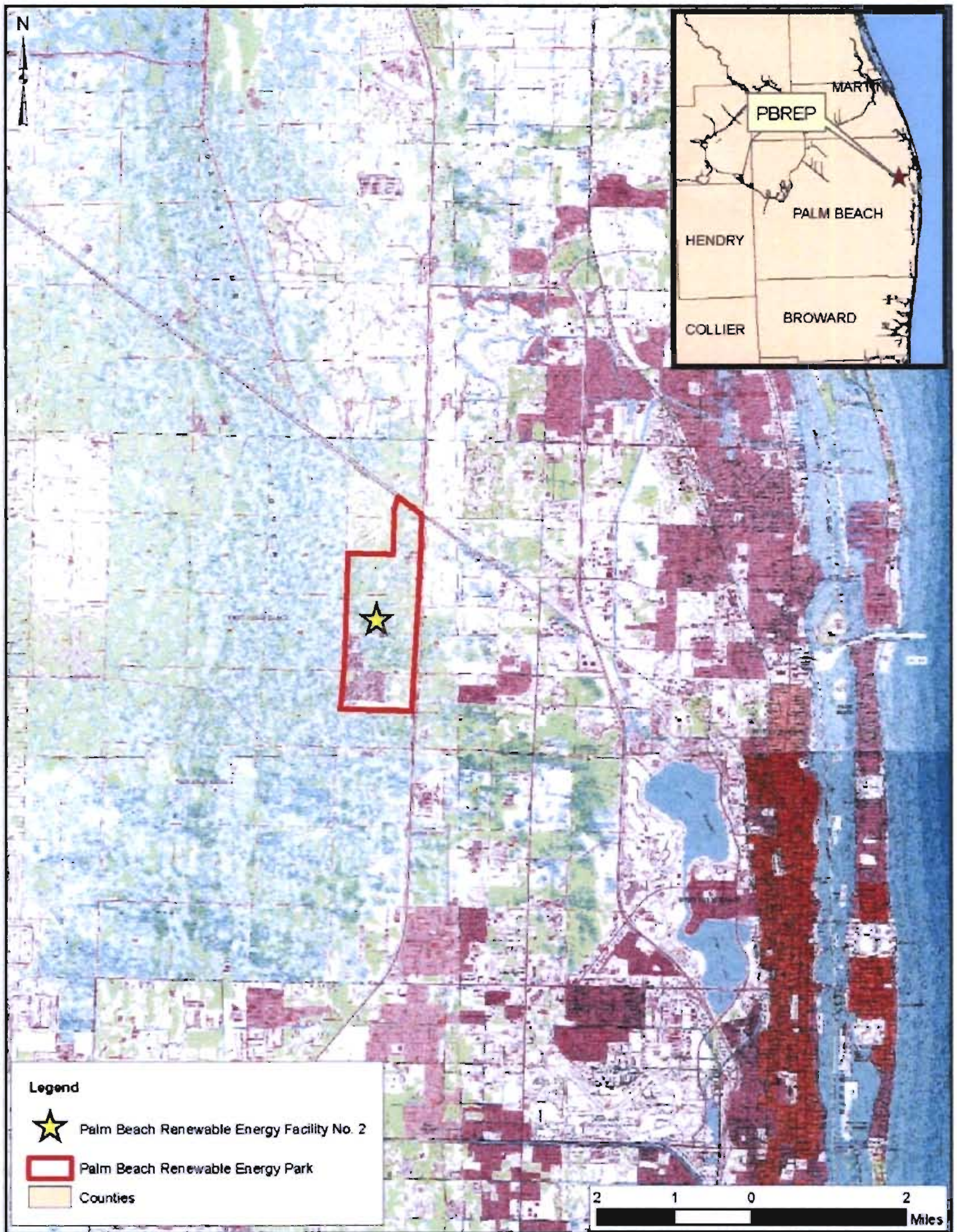
- **Section 6 – Methodology** discusses the methodology to be used for the modeling analysis, including:

  - selection of the appropriate dispersion model,
  - discussion of the required model input data,
  - procedures to be used to select applicable model options, and
  - analyses to be conducted as part of the modeling effort.

- **Section 7 – Class I Analysis** discusses the components of a Class I analysis and the potential need for this analysis for the proposed project.

- **Section 8 – Deliverables** describes the information that will be documented in the dispersion modeling report and the electronic modeling files which will be submitted for regulatory review.

- **Section 9 – References** lists the published regulatory material to be used as guidance in the performance of the modeling analysis.



Topographical Map of Palm Beach Renewable Energy Facility No. 2 — FIGURE 1-1

Solid Waste Authority of Palm Beach County

2. Project and Site Descriptions

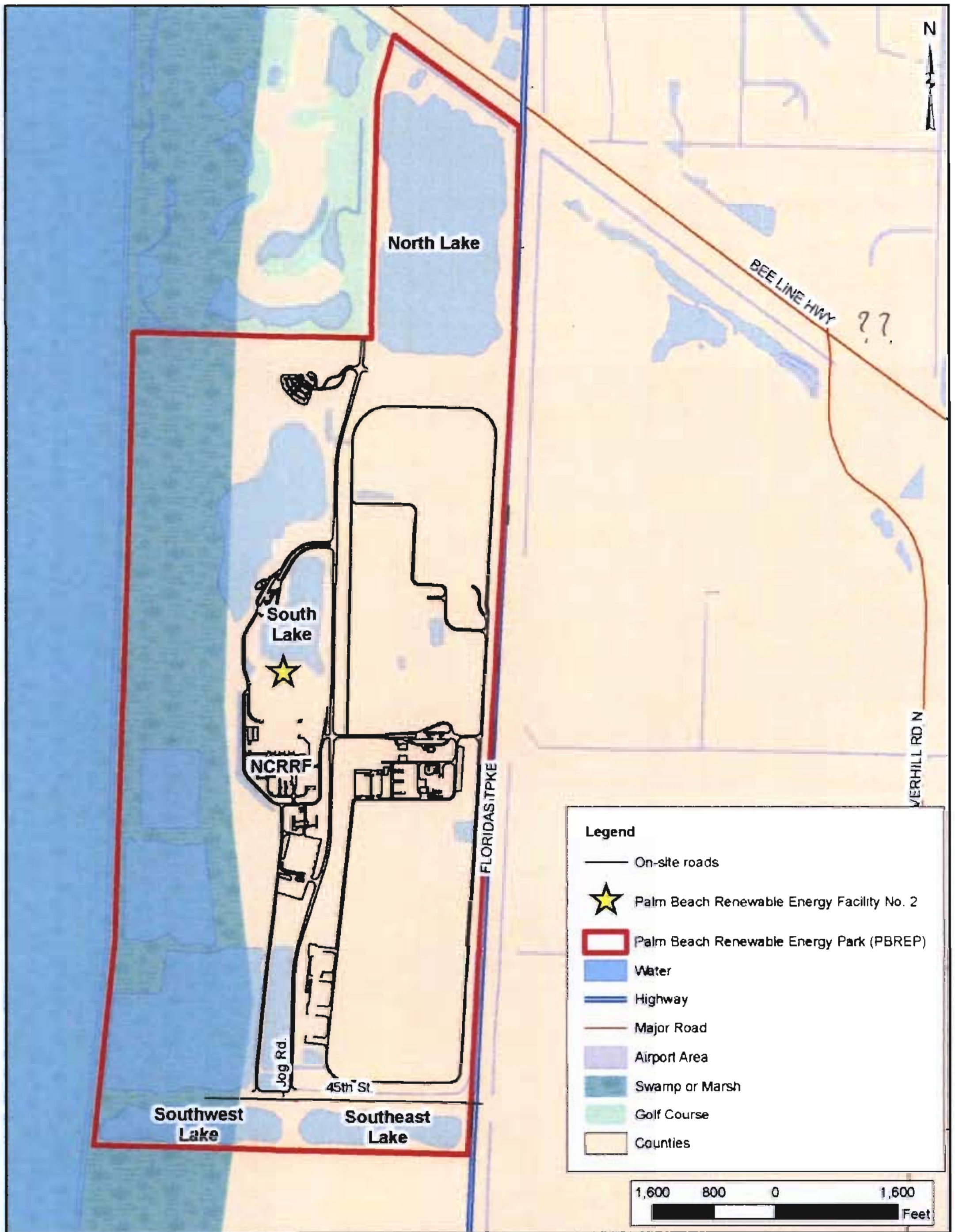
Palm Beach Renewable Energy Facility No. 2 will be located near 6501 Jog Road, West Palm Beach, within the Palm Beach Renewable Energy Park. Access to the project site is along Jog Road via 45[th] Street, State Road 705, a two-lane road at the southern border of the existing renewable energy facility site, or via Bee Line Highway (see Figure 2-1). The project site is buffered by developed and undeveloped land owned by the Authority to the north, east, and west. The new facility is adjacent to the northern border of the existing renewable energy facility as shown in Figure 2-2. The Palm Beach Renewable Energy Park and its existing facilities are subject to conditions of certification that were issued in accordance with the Florida Electrical Power Plant Siting Act (PPSA) (Sections 403.501 to .518, Florida Statutes). The construction and operation of the new facility also will be reviewed pursuant to the PPSA because, among other things, the new facility will increase the steam electrical generating capacity of the Authority's campus.

The proposed facility will have multiple identical MWC units, with a total facility throughput of 3,000 tpd. Each of the identical MWC units will exhaust through a single flue, and the identical flues will be enclosed in an outer concrete stack. Nitrogen oxides (NO_X) emissions will be controlled with a selective non-catalytic reduction (SNCR) system, combined with flue gas recirculation, enhanced overfire air systems, or other advanced methods of NO_X reduction. Emissions of acid gases, including sulfur dioxide (SO_2) and hydrogen chloride (HCl), will be controlled with a spray dryer absorber (SDA) with limestone injection in combination with a fabric filter (FF) baghouse. Metals and other particulate matter (PM) emissions will also be controlled by the FF baghouse. Good combustion practices will be utilized to minimize products of incomplete combustion, such as carbon monoxide (CO), volatile organic compounds (VOCs), and trace organics. The MWC units will use an activated carbon injection (ACI) system for control of mercury emissions. These state-of-the-art air pollution control systems have consistently proven to be effective in controlling the various pollutants present in MWC flue gases.

The proposed project will also include the addition of ancillary equipment, including a new cooling tower with four cells, new lime and carbon silos (one of each) with baghouse controls, an ash handling facility with baghouse control, and an emergency fire water pump (diesel-fired).

NOx SNCR SO2 SDA FF PM FF

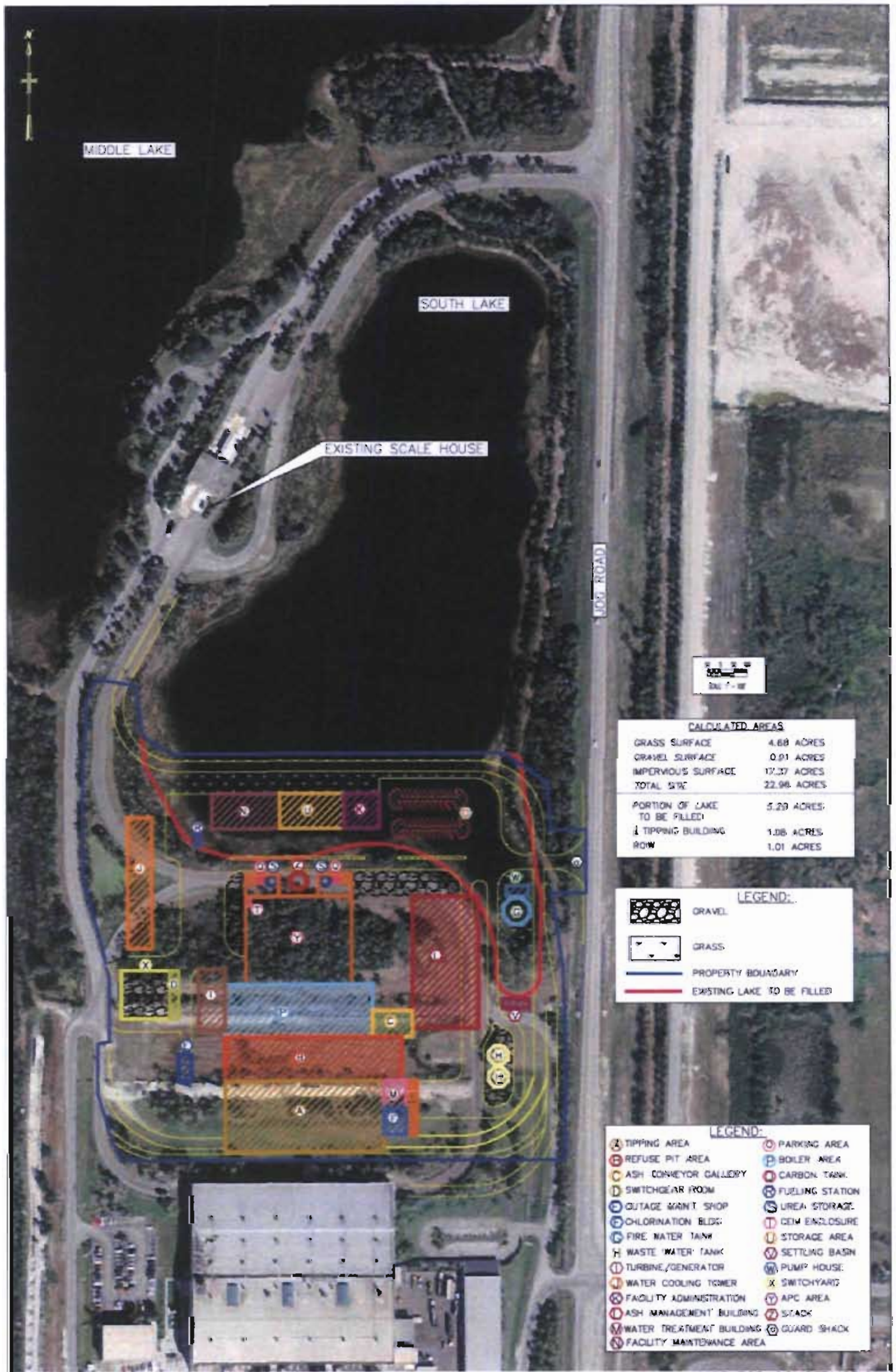
Cooling Tower



Location of Palm Beach Renewable Energy Facility No. 2

Solid Waste Authority Palm Beach County

FIGURE 2-1



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Preliminary Site Plan of Palm Beach Renewable Energy Facility No. 2

FIGURE 2--2

Preliminary emission estimates for the PBREF2 are shown in Table 2-1 compared to the PSD Significant Emission Rates (SERs). The preliminary emission estimates are based on the anticipated allowable concentration of each pollutant in the exhaust gas as estimated by using the concentration allowed under the applicable regulatory requirements or recently-approved air permits for MWC units (Hillsborough County WTE facility and Lee County Resource Recovery Facility). The estimated volume of exhaust gas was calculated based upon the conceptual design of the new MWC units.

118 km Min dist. Class I Call

Table 2-1.
Preliminary Emission Rates

Pollutant	Significant Emission Rate Threshold (tons/year)	Palm Beach Renewable Energy Facility No. 2 Estimated Emissions (tons/year)	Subject to PSD?
Carbon Monoxide (CO)	100	452.65	Yes
Nitrogen Oxides (NO_X)	40	836.6	Yes
Sulfur Dioxide (SO_2)	40	336.8	Yes
Particulate Matter (PM)	25	97.3	Yes
Particulate Matter (PM_{10})	15	58.4	Yes
Particulate Matter ($PM_{2.5}$)	10	58.4	Yes
Ozone (VOCs or NO_X)	40	62.2	Yes
Lead (Pb)	0.6	0.68	Yes
Fluorides	3	14.2	Yes
Hydrogen Sulfide (H_2S)	10	Negligible	No
Total Reduced Sulfur	10	Negligible	No
Reduced Sulfur Compounds	10	Negligible	No
Sulfuric Acid Mist (H_2SO_4)	7	79.2	Yes
MWC Organics (as TCDD/TCDF)	3.5E-06	6.32E-05	Yes
MWC Metals (as PM)	15	58.4	Yes
MWC Acid Gases (as SO_2 & HCl)	40	484.3	Yes

Source: 40 CFR 52.21(b)(23).

Although mercury is not a federal PSD pollutant, the State of Florida has listed mercury as a PSD pollutant in the past. However, according to a recent ruling on Florida's PSD State Implementation Plan (SIP) by the United States Environmental Protection Agency (USEPA) (Federal Register, June 27, 2008), one condition of final approval of the SIP is that the mercury SER be removed from the Florida PSD regulations by June 2009. The estimated mercury emission rate for PBREF2 is 0.14 tons/year.

→ 200 lbs/year

3. Applicable Regulations

Based upon the initial estimated emissions from the new facility shown in Table 2-1, it is anticipated that NSR requirements under the Clean Air Act Amendments (CAAA), including PSD regulations will apply. Under PSD (40 CFR 52.21(k) and F.A.C. 62-212.400), it must be demonstrated that the proposed project will not cause or contribute to a violation of an ambient air quality standard, or applicable PSD increment for those pollutants emitted in significant amounts. The proposed project will also be subject to applicable state air quality standards and regulations.

3.1. National and Florida Ambient Air Quality Standards

The CAAA requires the USEPA to set national ambient air quality standards (NAAQS) for wide-spread pollutants from numerous and diverse sources considered harmful to public health and the environment. There are currently NAAQS designated for six pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter (PM_{10} and $PM_{2.5}$). The CAAA also established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings. Florida has incorporated the NAAQS by reference into state regulations (F.A.C. 62-204.800) and in addition, has established state ambient air quality standards (FAAQS, F.A.C. 62-204.240). Table 3-1 lists the current Florida state and national AAQS.

Table 3-1.
Florida State and National Ambient Air Quality Standards

Pollutant	Averaging Time	FAAQS	NAAQS	
			Primary	Secondary
Carbon Monoxide (CO)	8-hour[1]	9 ppm	9 ppm	---
	1-hour[1]	35 ppm	35 ppm	---
Nitrogen Dioxide (NO_2)	Annual	100 μg/m^3 (0.5 ppm)	100 μg/m^3 (0.053 ppm)	Same as primary
Sulfur Dioxide (SO_2)	Annual	60 μg/m^3	0.03 ppm (80 μg/m^3)	Same as primary
	24-hour[1]	260 μg/m^3	0.14 ppm (365 μg/m^3)	Same as primary
	3-hour[1]	1300 μg/m^3	---	0.5 ppm (1300 μg/m^3)
PM_{10}	Annual[2]	50 μg/m^3	---	Same as primary
	24-hour[3]	150 μg/m^3	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual[4]	---	15 μg/m^3	Same as primary
	24-hour[5]	---	35 μg/m^3	Same as primary
Lead (Pb)	3-mo. rolling[6]	---	0.15 μg/m^3	Same as primary
	Quarterly	1.5 μg/m^3	1.5 μg/m^3	Same as primary
Ozone	8-hour[7] (2008)	---	0.075 ppm	Same as primary
	8-hour[8] (1997)	---	0.08 ppm	Same as primary
	1-hour[9]	0.12 ppm	0.12 ppm	Same as primary

Sources: F.A.C. Chapter 62-204.240 and 40 CFR Part 50.

[1] Not to be exceeded more than once per calendar year.
[2] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the USEPA revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).
[3] The 24-hour PM_{10} standard is not to be exceeded more than once per year on average over 3 years.
[4] To attain the annual $PM_{2.5}$ standard, the 3-year average of the weighted annual mean concentrations must be less than or equal to the standard.
[5] The Federal 24-hour $PM_{2.5}$ standard was changed from 65μg/m^3 to 35 μg/m^3 on December 17, 2006. The 24-hour $PM_{2.5}$ standard is met when the 3-year average of the 98th percentile is less than or equal to the standard.
[6] Final rule signed October 15, 2008.
[7] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[8] The standard is attained when the 3-year average of the fourth-highest daily maximum is less than or equal to the standard.
[9] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1. As of June 15, 2005, the USEPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone non-attainment Early Action Compact (EAC) areas.

The USEPA recently revised particulate matter ambient air quality standards, rescinding the annual PM_{10} NAAQS, and lowering the 24-hour $PM_{2.5}$ NAAQS; however, most states, including Florida, have not yet promulgated regulations for the control of $PM_{2.5}$ emissions. Therefore, following USEPA guidance, the air quality analysis will use PM_{10} as a surrogate for $PM_{2.5}$.

3.2. PSD Class II Increments

In order to maintain air quality in areas that meet the NAAQS, the CAAA also established maximum allowable increases over baseline concentrations, called PSD increments. The PSD increments were established for three land use classifications (Class I, Class II, and Class III). The Palm Beach County area is designated as a Class II area for increment consumption. Table 3-2 lists the applicable Class II PSD increments for the Palm Beach County area.

Table 3-2.
Class II PSD Increments

Pollutant	Class II PSD Increments (μg/m³)		
	Annual	24-hour	3-hour
Nitrogen Dioxide (NO_2)	25	-	-
Sulfur Dioxide (SO_2)	20	91	512
Particulate matter < 10 μm (PM_{10})	17	30	-

Source: 40 CFR 52.21

Notes: Long-term (annual) increments are not to be exceeded. Short-term (3-hour and 24-hour) increments are not to be exceeded more than once per year.

3.3. Ambient Reference Concentrations

The Florida Air Toxics Working Group, composed of Florida Department of Environmental Protection (FDEP) and county air toxics staff developed a working list of Ambient Reference Concentrations (ARCs) for a number of hazardous air pollutants (HAPs) listed in Title III of the CAAA of 1990 and other air toxics that might be of concern (FDEP, 1995). These ARCs were designed to serve as guidance levels below which there would be no significant risk to human health. Although FDEP eventually determined that the ARCs were not rules, do not implement any statutory authority, nor are they to be used in the evaluation of air permits (FDEP, 2000), they are, nonetheless, useful for evaluating the magnitude of non-criteria pollutant impacts. Impacts due to the emissions of air toxics from the PBREF2 will be compared to relevant ARCs.

4. Climatology

Palm Beach County, along with the rest of southern Florida has a tropical climate. Based upon a 30-year database from the National Climatic Data Center (NCDC), the annual average temperature is 75.3°F. The annual average relative humidity is 71.5 percent. Annual average precipitation is 61.4 inches, most of it occurring during the summer and wet period from May through October. Hurricane season is officially from June 1st through November 30th.

Between May and October, the weather is hot, humid, and wet with average temperatures ranging between 78.1°F and 82.8°F. This season is characterized by occasional afternoon thunderstorms and sea breezes that result in cooler temperatures in the afternoons.

The weather from November through April tends to be warm and generally dry with a range of average temperatures from 66.2°F to 73.8 °F. On occasion, short-term cold fronts can result in temperatures in the 40s and 50s.

5. Existing Air Quality

The PBREF2 will be located in Palm Beach County, which is part of the Southeast Florida Intrastate Air Quality Control Region (40 CFR 81.49). The proposed site of the PBREF2 is located in an area that is in attainment of the NAAQS for all criteria pollutants, and classified as attainment/maintenance for ozone by FDEP. Background air quality is established by ambient air monitoring stations maintained by FDEP and local agencies with stations located throughout the state to monitor ambient levels of criteria pollutants (CO, NO_2, SO_2, Pb, ozone, and particulates, PM_{10} and $PM_{2.5}$). Example background air quality data for the project site from 2005 through 2007 is presented in Table 5-1.

Table 5-1.
Background Air Quality

Pollutant	Averaging Period	Monitoring Location	Monitored Concentration ($\mu g/m^3$) [1]		
			2005	2006	2007
NO_2	Annual	West Palm Beach (Belvedere Road)	17	17	17
	1-hour		109	98	105
SO_2	Annual	Riviera Beach	3	3	3
	24-hour		8	5	5
	3-hour		8	5	10
CO	8-hour	West Palm Beach (Belvedere Road)	2,519	2,061	1,489
	1-hour		3,893	3,206	2,405
PM_{10}	Annual	Delray Beach	24	26	24
	24-hour		60	49	43
$PM_{2.5}$	Annual	Delray Beach	7.8	7.8	8.2
	24-hour		18.9	18.7	25.2
Pb	3-month	Pinellas Park	0.01	0.01	0.01
O_3 (ppm)	8-hour	Royal Palm Beach	0.062	0.071	0.066
	1-hour		0.068	0.086	0.069

Source: USEPA AirData - Monitor Values Report - Criteria Air Pollutants.

[1] Annual concentrations are based upon maximum calendar year monitored concentrations. Short-term concentrations are based upon highest, second highest monitored concentrations (except for ozone which is highest fourth-highest monitored concentration).

If background data are required to demonstrate compliance with ambient air quality standards, the background concentrations for the criteria pollutants will be determined from the routinely monitored ambient air quality data.

6. Methodology

The dispersion modeling for the PSD Class II analysis will be performed in accordance with the *Guideline on Air Quality Models* (USEPA, 2008a), the *New Source Review Workshop Manual* (USEPA, 1990), and guidance provided by FDEP.

The modeling analysis for the PBREF2 will determine potential ambient air quality impacts for each pollutant that has the potential to be emitted in significant amounts. Based upon a preliminary estimate of the emissions from the PBREF2, modeling will be required for CO, NO_2, SO_2, Pb, and particulate matter (PM_{10} and $PM_{2.5}$).

6.1. Model Selection

Emissions from the PBREF2 will be modeled using the latest version of AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model, USEPA, 2004a). The AERMOD system has multi-layer meteorology (important for taller stacks), includes handling of convective (unstable) conditions, terrain depiction, and refined characterization of surface conditions. The analysis will use the latest version of AERMOD (currently version 07026), and follow the latest USEPA guidance for using AERMOD (USEPA, 2009a).

07026

The AERMOD modeling system includes the following options:

- USEPA regulatory default option, including the use of stack-tip downwash, calm wind/missing data processing;
- Concentration estimates from 1 hour to annual average;
- Point, area, and volume sources. Line sources may also be modeled as a string of volume sources or as elongated area sources;
- Building downwash algorithms to account for the effects of aerodynamic downwash due to nearby buildings on point source emissions;
- Source emission rates can be treated as constant throughout the modeling period, or varied by month, season, hour-of-day, or other optional periods;
- Ability to include multiple receptor grids and grid types in a single run;
- Ability to model in both simple terrain and complex terrain (terrain above stack release height).
- In elevated terrain, a hill height scale along with the receptor elevation is input to the model.

The terrain data used by AERMOD is processed using the AERMAP pre-processing program (USEPA, 2004b, 2009b). AERMAP processes commercially available Digital Elevation Model (DEM) data and creates a file suitable for use by AERMOD. The AERMAP file contains elevation and hill height scaling factors for each receptor in the air dispersion study. The latest version of AERMAP (currently version 09040) will be used for the analysis.

06341

The meteorological data used by AERMOD is developed using the meteorological data preprocessor AERMET (USEPA, 2004c). AERMET incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts. AERMET processes commercially available or custom meteorological data to create two files: a surface data file and an upper air data file used by AERMOD. When applying the AERMET meteorological processor (currently version 06341) to process meteorological data for the AERMOD model, appropriate values for three surface characteristics, surface roughness length, albedo, and Bowen ratio, must be determined. USEPA recently developed the AERSURFACE tool (USEPA, 2008b) to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. AERSURFACE uses publicly available national land cover datasets and look-up tables of surface characteristics that vary by land cover type and season.

A commercial version of the AERMOD model, *BREEZE* AERMOD (*BREEZE* Software, Trinity Consultants, Inc.), will be used for the analysis. This commercial version of the AERMOD program combines the regulatory executable files of the AERMOD system with Windows-based pre- and post-processing programs to allow easier data input entry and advanced data processing and graphing capabilities.

6.2. Model Inputs

The AERMOD model requires four types of input:

- Source parameters (type, dimensions, location, flow and emission rates);
- Meteorological data (surface and profile data files);
- Receptor location (ground level and/or flagpole), fence line, simple, intermediate, and complex terrain grid receptors; and
- Model control options (land use/land cover, building wake information, regulatory control options, averaging time, etc.).

6.2.1. Source Parameters

The primary source of emissions at the new facility will be from the MWC units. The MWC emissions will be exhausted from a tall stack which contains identical flues (one for each identical MWC unit). The analysis will also consider the particulate emissions from the new cooling tower cells. Emissions from the other project-related ancillary equipment (i.e., the lime and carbon silo baghouse vents, the baghouse vent for the ash handling facility, and the emergency fire pump) are considered negligible. The following information will be included in the air quality report in support of the air permit application:

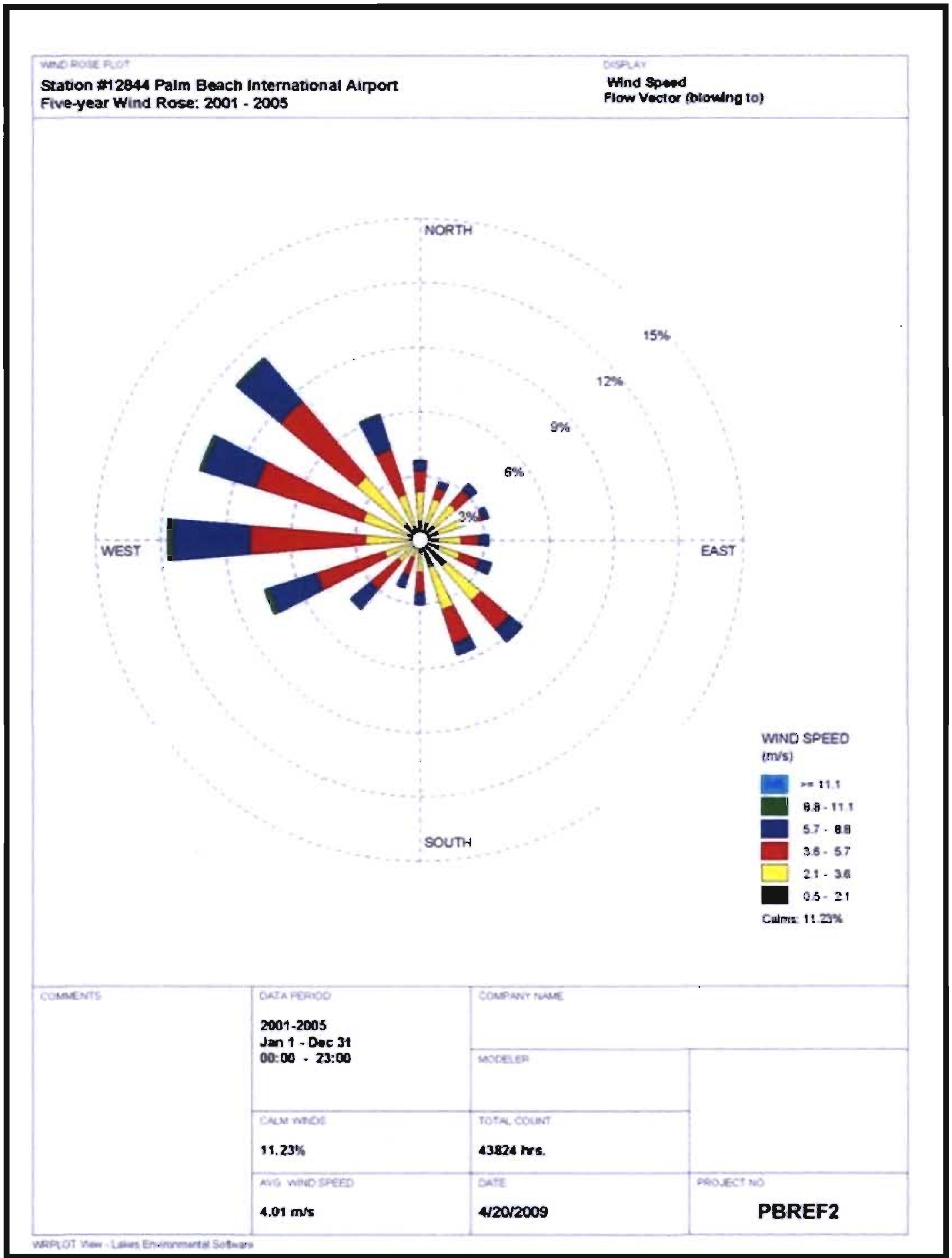
Electronic?

- A scaled site plan showing the existing and proposed structures and source locations, including fence line and onsite roadways.
- Proposed emissions source(s) for the PBREF2.
- A table with emission exhaust parameters for proposed source(s) showing the following:
  - Location in UTM coordinates;
  - Base elevation;
  - Release height(s) above base elevation;
  - Exhaust temperature;
  - Exhaust velocity;
  - Stack internal diameter; and
  - Emission rate calculations (short-term and long-term as applicable).
- Building dimensions relevant to the project.
- If applicable, the parameters for alternative operating loads will be provided for use in an alternative load analysis to determine worst-case load.
- Evaluation of emissions under start-up and shut-down conditions.

6.2.2. Meteorology

Five years of AERMOD-ready data provided by FDEP will be used for the analysis. The data from 2001 through 2005 is based on hourly surface data from Palm Beach International Airport and upper air data from Florida International University, Miami. Palm Beach International Airport, the nearest National Weather Service (NWS) station is approximately 6.9 miles southeast of the site. A five-year average wind rose (wind blowing to) is presented in Figure 6-1. In developing the data, the FDEP data used single values of albedo, Bowen ratio, and surface roughness for all seasons over the twelve (12) default AERMET sectors. These sector-averaged values were included in the AERMET data file provided by FDEP.

Comparison w/ , and use at site



Five-Year Average Wind Rose Solid Waste Authority of Palm Beach County	FIGURE 6-1

6.2.3. Receptor Locations

Receptors will be developed using a Cartesian grid network. A tiered grid network is proposed. Initially, a fine 100 meter (m)-spaced grid will be placed out to 3 kilometers (km). A coarser grid with 500-m spacing will be placed from 3-km to 10-km, followed by a coarser 1,000-m spaced grid from 10 km out to 30 km. The receptor grid spacing and extent will be adjusted as necessary to insure that the maximum impact locations are captured in the modeling within the 100-meter spaced receptors. Receptors will be placed around the PBREF2 fence line at a spacing of 50 meters. Receptors located within the fence line of the PBREF2 will be excluded from the analysis because public access is restricted in this area. Following regulatory guidance (USEPA, 1990), maximum impacts will be determined to the nearest 100 meters. All receptors will be placed at ground level.

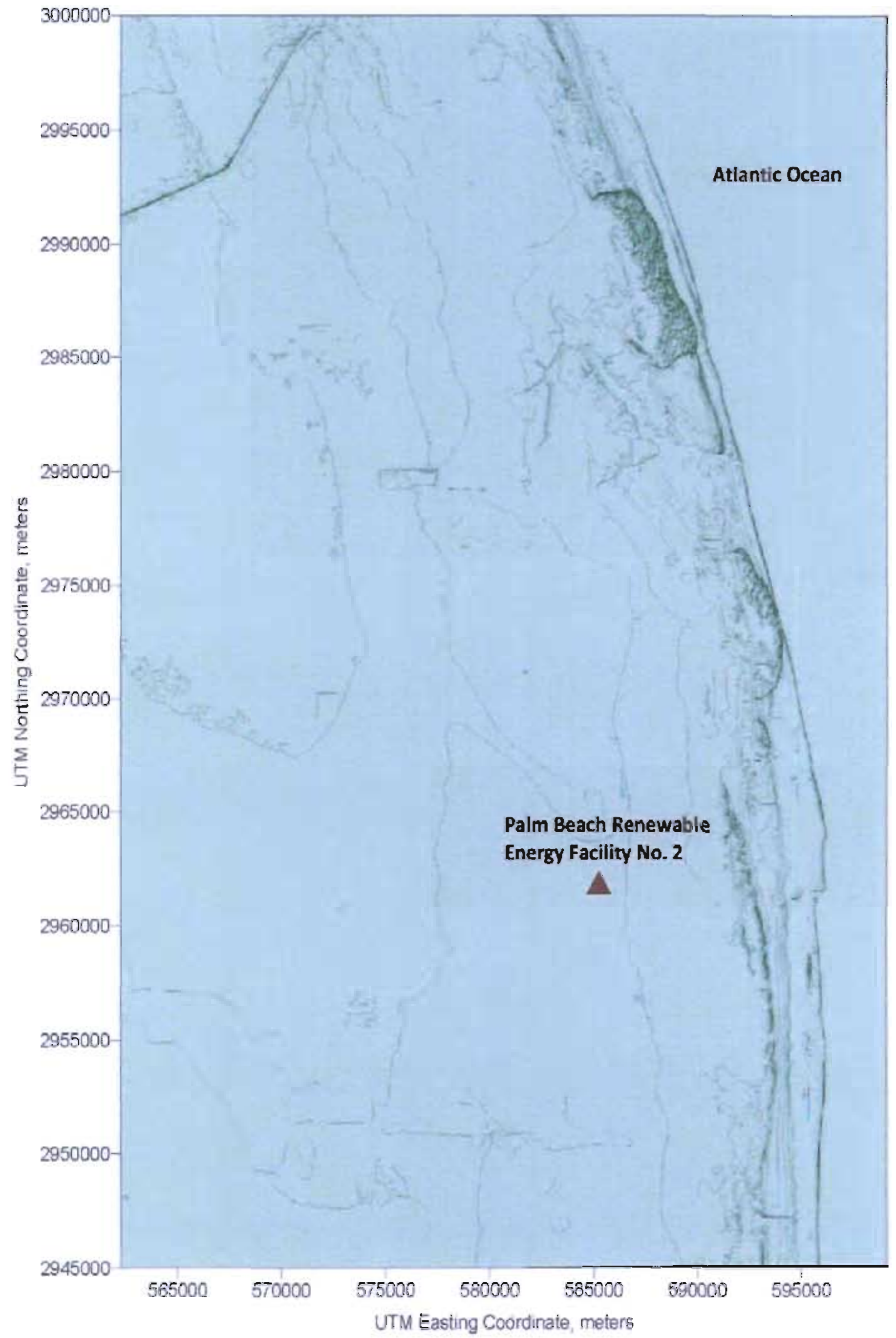
6.2.4. Terrain Elevation

Terrain in the vicinity of the project site is relatively flat. Figure 6-2 shows the topography in the vicinity of the project. Terrain elevations at each receptor location in the vicinity of the PBREF2 will be evaluated based on electronic terrain data from FDEP Land Boundary Information System (LABINS). The terrain files are in NAD27 datum Zone 17, and all have 10-meter resolution with the exception of files 2103, 2104, and 2204, which are 30-meter resolution. The terrain data used by AERMOD is processed using the AERMAP pre-processing program. A list of the DEM data within 30 km of the PBREF2 is presented in Table 6-1.

Have to create a new file

Table 6-1.
Digital Elevation Quads

FDEP Quad Number	USGS Quad Number	Quad Name	County
2101	26080-E1	Lake Worth	Palm Beach
2102	26080-E2	Greenacres City	Palm Beach
2103	26080-E3	Loxahatchee SE	Palm Beach
2104	26080-E4	Loxahatchee SW	Palm Beach
2201	26080-F1	Palm Beach	Palm Beach
2202	26080-F2	Palm Beach Farms	Palm Beach
2203	26080-F3	Loxahatchee	Palm Beach
2204	26080-F4	Loxahatchee NW	Palm Beach
2301	26080-G1	Riviera Beach	Palm Beach
2302	26080-G2	Delta	Palm Beach
2303	26080-G3	West Palm Beach 2 SE (West of Delta)	Palm Beach
2304	26080-G4	West Palm Beach 2 SW (Big Mound South)	Palm Beach
2401	26080-H1	Jupiter	Martin and Palm Beach
2402	26080-H2	Rood	Martin and Palm Beach
2403	26080-H3	West Palm Beach 2 NE (West of Rood)	Martin and Palm Beach
2404	26080-H4	West Palm Beach 2 NW (Big Mound North)	Martin and Palm Beach
2501	27080-A1	Hobe Sound	Martin
2502	27080-A2	Gomez	Martin
2503	27080-A3	Indiantown SE	Martin
2504	27080-A4	Indiantown	Martin



Topography

Solid Waste Authority of Palm Beach County

FIGURE 6-2

6.2.5. Model Options and Defaults

Model options include land use, building wake information, regulatory control options, and averaging time.

6.2.5.1. GEP Stack Height Analysis and Building Downwash

A GEP stack height analysis will be performed for each stack in accordance with USEPA's *Guideline for Determination of Good Engineering Practice Stack Height* (USEPA, 1985). Per guidelines in this document, GEP stack height is the higher of 65 meters, or a height, H_G, determined from the dimensions of all building tiers within the region of influence using the following equation:

$$H_G = H + 1.5L$$

where:

H = height of the structure within 5L of the stack

L = lesser dimension of the height or projected width of the structure.

For a squat structure where the height is less than the projected width, the following equation is used:

$$H_G = 2.5H$$

USEPA's *Building Profile Input Program* with the PRIME algorithm (BPIPPRM) (USEPA, 2004d) will be used to determine the potential effects of on-site and nearby structures on the dispersion from the source, and GEP stack height. The program requires the input of the horizontal, lateral, and vertical extent of each building, as well as the source-specific parameters of facility stacks. The program includes an algorithm for calculating downwash values for input into the PRIME algorithm contained in AERMOD.

The building and source parameter data will be used to calculate the predominant building dimensions associated with each emission source at wind directions of every 10 degrees. This output will be used by the model in determining downwash effects on the dispersion of plumes. If the actual stack height exceeds the GEP stack height, the stack will be modeled at its calculated GEP stack height. If a stack is less than GEP stack height, the stack will be modeled at its actual stack height. Due to its proximity to nearby airports, this stack height must also have approval by the Federal Aviation Administration (FAA) as not interfering with air traffic. Detailed building dimensions used in the GEP analysis will be presented in the final air permit application.

6.2.5.2. Land Use Analysis

The land use classification procedure recommended by USEPA as outlined in the *Guideline on Air Quality Models* (USEPA, 2008) was used to identify whether rural or urban dispersion coefficients are applicable for this modeling analysis. The procedure involves classifying the land use within a 3-km radius circle centered on the PBREF2 site using Auer's land use typing scheme (Auer, 1978). If more than fifty percent of the area within this 3-km radius circle consists of Auer's industrial, commercial or compact residential land types, then urban dispersion coefficients are used in modeling; otherwise, rural dispersion coefficients will be used. Figure 6-3 shows the land uses within 3-km of the project and a breakdown of the classifications. Based upon the analysis, rural dispersion coefficients will be used for the analysis.

6.2.5.3. Regulatory default option

Following USEPA guidance, the modeling will use the AERMOD regulatory default option. This option includes buoyancy-induced dispersion, final plume rise, the effects of stack-tip downwash, and calm wind processing.

6.2.5.4. Chemical transformation

Following USEPA guidance (40 CFR 51 Appendix W, Section 5.2.4), the initial screen to determine nitrogen dioxide (NO_2) impacts from emissions of nitrogen oxides (NO_x) will assume total conversion of NO to NO_2, i.e., all NO_x is in the form of NO_2. If the modeling indicates that a SIL, an NAAQS or PSD increment is exceeded using this conservative approach, then the default conversion factor of 0.75 will be used to provide more realistic values. Either the ozone-limiting method or a site-specific conversion factor will then be used if further refinement is needed.

6.2.5.5. Averaging times

The AERMOD output will include 1-hour, 3-hour, 8-hour, and 24-hour averages (short-term) and long-term (annual) averages as appropriate. For comparison with the Class II significant impact levels (SILs), and *de minimis* monitoring concentrations, maximum short-term and annual averages will be used for comparison to the criteria. For NAAQS and PSD Class II increments, maximum annual averages will be used for comparison to annual criteria, and the highest, second-highest (H2H) short-term averages (i.e., less than one year) will be used for comparison to the short-term criteria. For comparison to the short-term PM_{10} NAAQS, the highest, sixth highest (H6H) concentration over five (5) years will be used. For comparison to the short-term $PM_{2.5}$ NAAQS, the highest, eighth highest (H8H) concentration over five (5) years will be used. The maximum 24-hour concentration will be used as a conservative comparison to the 3-month rolling average lead standard. For comparison to the annual average PM_{10} and $PM_{2.5}$ NAAQS, the maximum annual average concentration over the five (5)-year meteorological database will be used.

FIGURE 6-3

Auer Land Use Classification Map

Solid Waste Authority of Palm Beach County

6.3. Worst-case Load Analysis

If the proposed MWC units will be operated at alternative loads, a load analysis will be performed using AERMOD to determine the load that will result in the highest impacts. Modeling for 100% load and the worst-case operating load will be included in the subsequent modeling analysis. Start-up and shut-down operations and emissions will be evaluated for potential inclusion in the modeling analysis.

6.4. Preliminary Analysis

Following USEPA guidance (USEPA, 1990), a PSD air quality analysis consists of two distinct phases:

- a preliminary analysis to determine if facility emissions will result in a significant impact on ambient air quality, and
- a full impact, or multisource analysis that includes modeling emissions from the proposed source, other existing sources, and the emissions due to planned growth that accompanies the new source. A full impact analysis is required for any pollutant where the estimated pollutant concentration exceeds the applicable significant impact level.

6.4.1. Significant Impact Analysis

The preliminary analysis will be performed using AERMOD to determine if predicted ambient air impacts from the PBREF2 are below the SILs shown in Table 6-2 for each criteria pollutant subject to PSD review.

Table 6-2.
Class II Significant Impact Levels

Pollutant	Averaging Time	Class II Significant Impact Levels ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	Annual	1
Sulfur dioxide (SO_2)	Annual 24-hour 3-hour	1 5 25
Particulate matter < 10 μm (PM_{10})	Annual 24-hour	1 5
Carbon monoxide (CO)	8-hour 1-hour	500 2,000

Source: 40 CFR 51.165.

If the maximum predicted short-term and annual average impacts are below the SILs for the PSD-applicable pollutants, then the Class II modeling analysis is considered complete for that particular pollutant. The additional impacts analysis and Class I analysis, along with state-required analyses may still need to be performed. If any of the predicted impacts exceed a SIL, then a full impact analysis will need to be performed for that pollutant(s).

6.4.2. *De Minimis* (Significant) Monitoring Concentrations

In general, PSD regulations require up to one year of continuous ambient air monitoring prior to construction of any new PSD source. However, the regulations allow an exemption from this requirement for those sources whose air quality impacts fall below certain *"de minimis"* levels shown in Table 6-3. AERMOD will be used to identify if potential emissions from the PBREF2 meet these *de minimis* monitoring concentrations. If the maximum predicted concentrations are below these levels, then the Authority will request a PSD pre-construction monitoring waiver from FDEP. It is then proposed to use the background concentrations from monitoring locations nearby and representative of the project site. If existing background data are not considered representative, then the Authority will work with FDEP to develop an appropriate approach to determining background air quality.

Table 6-3.
***De Minimis* Monitoring Concentrations (μg/m^3)**

Pollutant	*De Minimis* Monitoring Levels (μg/m^3)				
	Annual	3-month	24-Hour	8-Hour	1-Hour
Sulfur dioxide (SO_2)	-	-	13	-	-
Particulate matter < 10 μm (PM_{10})	-	-	10	-	-
Nitrogen dioxide (NO_2)	14	-	-	-	-
Carbon monoxide (CO)	-	-	-	575	-
Ozone[a]	-	-	-	-	-
Lead (Pb)	-	0.1	-	-	-

Source: 40 CFR 51.166.

PM2.5 ?

Notes: μg/m^3 = micrograms per cubic meter
[a] No significant air quality concentration for ozone has been established.

6.5. Full Impact Analysis

For any pollutant for which the predicted ambient concentration from the PBREF2 exceeds a SIL, a full impact analysis will be performed for that pollutant. The full impact analysis will include emissions from the PBREF2 and nearby existing sources (i.e., a multisource analysis). The NAAQS and PSD inventories will be developed in consultation with FDEP. A PSD increment is the maximum increase in ambient air concentrations that is allowed to occur above a baseline concentration for a given pollutant. Therefore, the PSD inventory will include those sources considered to be increment-affecting, accounting for facilities constructed or modified subsequent to the minor and major source baseline dates.

When comparing the impacts of the project to the NAAQS, ambient concentrations representative of background levels will be added to the model-predicted impacts from the facility and other inventory sources. Depending upon the size of the inventories, procedures to identify relevant sources and screen out insignificant sources in the initial NAAQS and PSD increment source inventories, (e.g., 20D, GRAD D^2, etc.) will be discussed with FDEP and then applied to the preliminary inventory.

The full impact analysis will also consider any residential, commercial, or industrial growth that may accompany the new source.

6.6. Additional Impacts Analysis

Under the PSD requirements, additional impact analyses are required to evaluate the impact of the emissions from the proposed new facility on growth, soils and vegetation, and visibility impairment. The following analyses will be conducted.

6.6.1. Growth Analysis

The purpose of the growth analysis is to determine how much growth is likely to occur to support the proposed project. A projection of potential growth in the area (industrial, commercial, and residential) due to the operation of the new facility will be evaluated. As needed, the air emissions associated with this growth will be estimated. Evaluation of minor source growth since August 7, 1977 in the impact area is also required under 40 CFR Part 51.166(n)(3)(ii) and F.A.C. 62-212.400(5).

6.6.2. Soils and Vegetation Analysis

An inventory of soils and vegetation in the impact area will be performed, and the model-predicted concentrations within this area will be compared to the NAAQS secondary standards to determine if the potential for harmful effects exists. In the event that there are sensitive vegetation species within the impact area that may be harmed by long-term exposure to low ambient concentrations of pollutants for which there are no NAAQS, additional analysis may be required.

6.6.3. Visibility Impairment Analysis

If requested by FDEP, a Class II visibility impairment analysis will be performed on scenic vistas, nearby airports, or other areas within the impact area of the PBREF2 that might be affected by minor reductions in visibility. This analysis will be performed following the procedures in the *Workbook for Plume Visual Impact Screening and Analysis* (USEPA, 1988).

7. Class I Analysis

Class I areas are areas of special national or regional value from a scenic, recreational, or historic perspective. Sources or modifications subject to PSD review may not adversely impact a Class I area. These adverse impacts are evaluated in terms of Class I area PSD increments (air quality degradation) and air quality related values (AQRVs). AQRVs include special attributes of a particular Class I area, such as visibility, special flora and fauna, water quality, etc.

The USEPA developed Class I area PSD increments for SO_2, NO_2, and particulate matter (PM_{10}), shown in Table 7-1.

Table 7-1.
Class I Area PSD Increments

Pollutant	Class I PSD Increments (µg/m^3)		
	Annual	24-hour	3-hour
Sulfur dioxide (SO_2)	2	5	25
Nitrogen dioxide (NO_2)	2.5	-	-
Particulate matter < 10 µm (PM_{10})	4	8	-

Source: 40 CFR 52.21

The *New Source Review Workshop Manual (Draft)* (USEPA, 1990) provided a Class I significant impact level of 1µg/m^3 for a 24-hour average for all criteria pollutants. As with the Class II SILs, if the impacts from the potential emissions from the PBREF2 are below these SILs, then the impacts are considered insignificant and no further air quality analysis is required. In 1996, the USEPA proposed pollutant-specific Class I SILs (see Table 7-2). While these revised SILs have not yet been promulgated, they have been applied by FDEP as part of the PSD review process.

Conf Call 8 Jul 09

Don Elias
Phyllis Diosey
Cleve
John Notar
Dee Morse
Lorraine Ferrell, MP
Russ Chalbert AQ Services
Joel Cone

JN PM (2.5) Speciate into organic ~~cmpds~~ carbon cmpds, elemental Carbon

DElias will poss. 1% residual C in ash

About $PM_{2.5}$ DE not too many tests

DE did

Lee 2001-03

Increment + AQRV analysis for Biscayne Bay NPS

Organic Act Impacts at Biscayne - dowant

JN says propose receptor network

JN can mail input file for $PM_{2.5}$ speciation

Revised IWAQM report

May 29

Follow that guidance -

Can not use VISTAS data

Pat Brewer

Table 7-2.
Proposed Class I Area Significant Impact Level

Pollutant	Averaging Time	Proposed Class I Significant Impact Levels ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	Annual	0.1
Sulfur dioxide (SO_2)	Annual 24-hour 3-hour	0.1 0.2 1.0
Particulate matter < 10 µm (PM_{10})	Annual 24-hour	0.2 0.3

Source: 40 CFR 51.166

According to published USEPA policy (USEPA, 1990), if a proposed major source or major modification is located within 100 km of a Class I area, the area's Federal Land Manager (FLM) must be notified. The FLMs have jurisdiction over the Class I areas and determine if a Class I air quality analysis is required. However, currently accepted Class I guidance recommends that the FLMs for all Class I areas within 300 km of a proposed major project be notified.

The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) recently drafted a revision to their Phase I Report (FLAG, 2008). While still in draft form, this document includes initial screening criteria for sources greater than 50 km from a Class I area. Namely, for a source greater than 50 km from a Class I area:

if **Q /d < 10**,

where:

Q is the combined annual emissions (in tons per year (tpy), based on 24-hour maximum allowable emissions) of sulfur dioxide (SO_2), oxides of nitrogen (NO_X), particulate matter less than 10 microns (PM_{10}), and sulfuric acid mist (H_2SO_4), and

d is the nearest distance to a Class I area in kilometers (km),

then the impacts will be considered negligible, and no AQRV analysis (including visibility) will be required for that Class I area.

The nearest Class I areas to the facility are shown in Figure 7-1. Table 7-3 indicates the distances from the site to these Class I areas.

George in NC office
Contact George U/A Sfc Precip MM5 data
Domain 2

JN e-mail a way to run CALMET

Class II SIA 200 m

JN is going to check

Just 1 hr approved use of new CALMET data

Include a file
CALMET, CALPOFF, CALPOST ^ VIS only

Write up a short
VIS Analysis Have to do Use Method 2
FLAG 2000
CALPOST
Method 8 Mode 5
new FLAG 2009

going thru USDA, DOI

Pb New NAAQS 1.5 on a qtrly basis
0.15 3 month rolling - Final Rule Oct 2008
.0.1

Table 7-3.
Class I Areas

Class I Area	Federal Land Manager	Distance (km)
Everglades National Park	National Park Service	118
Chassahowitzka National Wildlife Refuge	US Fish & Wildlife Service	320
St. Marks National Wildlife Refuge	US Fish & Wildlife Service	525

Based on the initial emissions estimates, the Q/d estimate for Everglades National Park, the closest Class I area to the project site, exceeds 10^1. Therefore, a Class I AQRV analysis may be requested by the National Park Service for Everglades National Park. If a Class I analysis is required, a Class I modeling protocol describing the methodology and the criteria will be developed in coordination with the FLM and FDEP.

Clearinghouse
May 15 Big Stone Memo
Regions may still
Stan Krivo - send out to him

[1] Assumes maximum allowable 24-hr emission rates of 1022 TPY of NOx, 336.8 TPY of SO_2, 58.4 TPY of PM_{10}, and 79.2 TPY of H_2SO_4, where Q/d = 1496.4÷ 118 = 12.7 for Everglades National Park. The values of Q/d for the two remaining Class I areas are below 10.

8 Jul 09 Background Ammonia
0.5 Forested areas
Is there Ammonia mon. JN will check

Put Amm.

JN says model just the stack

How is refuse fed into combustor
DE says Pretty std Mass Burn approach

Looking at VISTAS 2001, 2002, 2003
Stack is GEP so may be DW
~~Do same for~~ Whatever doing for AERMOD

Propose reasonable receptor NW
Total S/N dep oll
at Both ENP, BB Annual
.01 kg/hectare/yr

BB part of ~~AQRV~~ analyses Additional Impacts

Regional Haze
Use Background conc Meth 2 FLAG 2000
draft FLAG 2009 Meth 8

Rayleigh 11 for both

Class I Areas

Solid Waste Authority of Palm Beach County

FIGURE 7-1

Background sea salt - FLAG 2009
ENP, BB

Using CALPUFF 5.8
CALPOST 6.221
CALMET

Class II increments for BB
NAAQS
No cumulative analyses

July 23, 1996 Federal Reg.

E-mail protocol to Dee &
John

JN send out ex CALPUFF input file
Ex CALPOST 6.221

Final Rule Pb std November 09
eff Jan 12, 2009

MP? Use .50.

When Hg methylates, it is a problem

JN Won't ask for F^{-1}, but will
look at Class II F^{-1} analyses
AERMOD F^{-1} gas? particulate?

Turn around time for protocol - 2 wks

Lost NAA designations for $PM_{2.5}$

8. Deliverables

The modeling analysis input and output files will be provided to FDEP at the conclusion of the modeling analysis for their review. The files will be provided in electronic format. The results of the modeling will also be documented in a report containing the following information:

- Owner/Facility
- Project name
- Project location
- Project description
- Date of submittal (including protocol submittal, and any subsequent correspondence)
- Receptor information, including:
  - Scaled site plans showing the facility and any ambient air and/or property boundaries
  - Listing of DEM files
  - Receptor grid and discrete receptor locations
- Meteorological data, including:
  - Surface and upper air meteorological data (supplied by FDEP)
- Land use analysis
- Output data, including:
  - Preliminary analysis results
  - Maximum impacts compared with SILs
  - Locations of maximum impacts
  - Extent of significant impact area(s) (if impacts are greater than SILs)
- NAAQS Analysis Results (if required)
  - Model design value comparison with standards
  - Demonstration that the proposed project does not cause nor is significant contributor to any potential NAAQS exceedances.
- Class II Increment Analysis Results (if required)
  - Model design value comparison with PSD increments
  - Demonstration that the proposed project does not cause nor is a significant contributor to any potential PSD increment exceedances.

- Additional Analyses Results (e.g., visibility impairment, growth, soils, and vegetation).
- Class I Analysis (if required)

Data disks, with the following information, will also be provided to FDEP.

- AERMOD/AERMAP input and output files
- Raw surface and upper air meteorological data (supplied by FDEP)
- Source data, including:
  - Emission calculation spreadsheet files
  - Building Profile Input Program-PRIME (BPIPPRM) input and output files
  - Computer-assisted drawing (CAD) files
- Class I modeling input and output files (if required)
- File lists and descriptions of all files contained on each disk

9. References

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