Walker, Elizabeth (AIR)

From: Koerner, Jeff
Sent: Wednesday, September 09, 2009 10:55 AM
To: Storey, Brian
Cc: Walker, Elizabeth (AIR); Holladay, Cleve
Subject: RE: Pratt & Whitney PSD Application

Yes, since we have the original signature pages, copies of these are fine.

Syed Arid is the permit engineer assigned to this project.

Cleve Holladay is the meteorologist assigned to this project.

Thanks!

Jeff Koerner, New Source Review Section
850/921-9536

From: Storey, Brian [mailto:Brian_Storey@golder.com]
Sent: Wednesday, September 09, 2009 10:46 AM
To: Koerner, Jeff
Subject: Pratt & Whitney PSD Application

Mr. Koerner:

As you may now be aware, we discovered yesterday that the PSD application we prepared on behalf of Pratt & Whitney (Facility ID No. 0990021) which was submitted by Pratt & Whitney to FDEP per instruction from Laxmana Tallam at the Palm Beach County Health Department, was missing pages from page 4-9 through page 7-8 of the PSD analysis. Somehow these pages were not bound with the report at the time of final production. I am preparing four new copies to provide you, but wanted to find out about the RO and PE signature pages. Can we simply make copies of the signature pages, since the signature pages were already provided? Or how would you like us to handle this. I only ask because if I need to get a new RO signature page, it is going to take a few days to get it to you.

Please let me know how we should handle this. I appreciate you working with me on this, and apologize for the inconvenience it may have caused.

Thanks again,

Brian A. Storey, P.E. | Staff Engineer | Golder Associates Inc.
6026 NW 1st Place, Gainesville, Florida, USA 32607
T: +1 (352) 336-5600 | F: +1 (352) 336-6603 | C: +1 (352) 284-1910 | E: Brian_Storey@golder.com |
www.golder.com

This email transmission is confidential and may contain proprietary information for the exclusive use of the intended recipient. Any use, distribution or copying of this transmission, other than by the intended recipient, is strictly prohibited. If you are not the intended recipient, please notify the sender and delete all copies. Electronic media is susceptible to unauthorized modification, deterioration, and incompatibility. Accordingly, the electronic media version of any work product may not be relied upon.

Please consider the environment before printing this email.

RECEIVED
SEP 08 2009
BUREAU OF AIR REGULATION

AIR PERMIT APPLICATION AND PREVENTION OF SIGNIFICANT DETERIORATION ANALYSIS FOR RAM TEST FACILITY PRATT & WHITNEY ROCKETDYNE PALM BEACH COUNTY, FLORIDA

Prepared For:
Pratt & Whitney Rocketdyne
P.O. Box 109600, MS 717-03
West Palm Beach, Florida 33410-9600

Prepared By:
Golder Associates Inc.
6026 NW 1st Place
Gainesville, Florida 32607

August 2009

0938-7550

DISTRIBUTION:
4 Copies –PBCHD
2 Copies – Pratt & Whitney Rocketdyne
1 Copy – Golder Associates Inc.

TABLE OF CONTENTS

SECTION			PAGE
1.0	INTRODUCTION		1-1
2.0	PROJECT DESCRIPTION		2-1
	2.1	Site Description	2-1
	2.2	RAM Test Facility	2-1
	2.3	Proposed Source Emissions and Stack Parameters	2-2
	2.4	Site Layout and Structures	2-3
	2.5	Excess Emissions	2-3
3.0	AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY		3-1
	3.1	National, State, and Local AAQS	3-1
	3.2	PSD Requirements	3-1
		3.2.1 General Requirements	3-1
		3.2.2 Control Technology Review	3-2
		3.2.3 Source Impact Analysis	3-4
		3.2.4 Air Quality Monitoring Requirements	3-7
		3.2.5 Source Information/GEP Stack Height	3-7
		3.2.6 Additional Impact Analyses	3-8
		3.2.7 Air Quality Related Values	3-8
	3.3	Nonattainment Rules	3-9
	3.4	Emission Standards	3-9
		3.4.1 New Source Performance Standards	3-9
		3.4.2 National Emission Standards for Hazardous Air Pollutants	3-10
		3.4.3 Florida Rules	3-10
		3.4.4 Florida Air Permitting Requirements	3-10
		3.4.5 Local Air Regulations	3-11
	3.5	Source Applicability	3-11
		3.5.1 New Source Performance Standards	3-11
		3.5.2 National Emissions Standards for Hazardous Air Pollutants	3-11
		3.5.3 Area Classification	3-11
		3.5.4 PSD Review	3-11
4.0	CONTROL TECHNOLOGY REVIEW		4-1
	4.1	Applicability	4-1
	4.2	Overview of Proposed BACT	4-1
	4.3	BACT Analysis	4-2
		4.3.1 Summary of Top-Down Process	4-2
	4.4	BACT Analysis for the GG4-9A Turbine Engines	4-5
		4.4.1 Carbon Monoxide	4-5
		4.4.2 Nitrogen Oxides	4-8
		4.4.3 Sulfur Dioxide	4-13

TABLE OF CONTENTS
(continued)

5.0 AMBIENT MONITORING ANALYSIS 5-1
5.1 O_3 Ambient Monitoring Analyses 5-1
6.0 AIR QUALITY IMPACT ANALYSIS 6-1
6.1 Significant Impact Analysis Approach 6-1
6.1.1 PSD Class II Areas (Near-Field) 6-1
6.1.2 PSD Class I Areas (Far-Field) 6-1
6.2 Pre-Construction Monitoring Analysis Approach 6-2
6.3 AAQS and PSD Increment Analysis Approach 6-2
6.3.1 PSD Class II Areas (Near-Field) 6-2
6.3.2 PSD Class I Areas (Far-Field) 6-3
6.4 Model Selection 6-4
6.5 Meteorological Data 6-5
6.5.1 Site Vicinity 6-5
6.5.2 PSD Class I Area of the Everglades NP 6-7
6.6 Emission Inventory 6-7
6.7 Building Downwash Effects 6-8
6.8 Receptor Locations 6-9
6.8.1 Site Vicinity 6-9
6.8.2 PSD Class I area at the Everglades NP 6-9
6.9 Model Results 6-9
6.9.1 PSD Class II Significant Impact Analysis 6-9
6.9.2 PSD Class I Significant Impact Analysis 6-10
6.9.3 *De Minimis* Monitoring Analysis Results 6-10
6.10 Conclusions 6-10
7.0 ADDITIONAL IMPACT ANALYSIS 7-1
7.1 Historical Growth and Impacts Due to Associated Growth in the Project Vicinity 7-1
7.1.1 Introduction 7-1
7.1.2 Air Quality Discussion 7-2
7.2 General Discussion of Potential Air Quality Effect Levels on Soils, Vegetation and Wildlife 7-4
7.2.1 Soils 7-4
7.2.2 Vegetation 7-4
7.2.3 Wildlife 7-8
7.2.4 Impact Analysis Methodology 7-8
7.3 Impacts on Soils, Vegetation, Wildlife, and Visibility in the Project's Vicinity 7-8
7.3.1 Impacts on Vegetation and Soils 7-8
7.3.2 Impacts on Wildlife 7-9

TABLE OF CONTENTS
(continued)

7.4 Impacts to AQRVs in the Everglades NP PSD Class I Area 7-10
7.4.1 Identification of AQRVs and Methodology 7-10
7.4.2 Impacts to Soils 7-11
7.4.3 Impacts to Vegetation 7-11
7.4.4 Impacts to Wildlife 7-13
7.4.5 Impacts upon Visibility 7-13
7.4.6 Sulfur and Nitrogen Deposition 7-15
8.0 REFERENCES 8-1

APPENDICES

Appendix A Application for Air Permit

TABLE OF CONTENTS
(continued)

LIST OF TABLES

Table 2-1 Estimated Hourly Emissions for the GG4-9A JP8-Fired Turbine Engines at Various Load Conditions

Table 2-2 Estimated Annual Emissions for the GG4-9A JP8-Fired Turbine Engines at Various Load Conditions

Table 2-3 Estimated Hourly and Annual Hazardous Air Pollutant (HAP) Emissions Summary

Table 2-4 Hourly and Annual Criteria Pollutant Emissions Summary, Maximum Load Conditions

Table 2-5 Summary of Stack and Fuel Information

Table 3-1 National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

Table 3-2 PSD Significant Emission Rates and *De Minimis* Monitoring Concentrations

Table 3-3 Maximum Estimated Proposed Emissions Compared to the PSD Significant Emission Rates

Table 3-4 Predicted Net Increase in Impacts Due to the Proposed Project Compared to PSD *De Minimis* Monitoring Concentrations

Table 4-1 Summary of CO BACT Determinations for Jet Fuel-Fired CTs (1999-2009)

Table 4-2 Summary of NO_x BACT Determinations for Jet Fuel-Fired CTs (1999-2009)

Table 4-3 Summary of SO_2 BACT Determinations for Jet Fuel-Fired CTs (1999-2009)

Table 5-1 Summary of Maximum Measured O_3 Concentrations for Palm Beach County, 2006 to 2008

Table 6-1 Major Features of the AERMOD Model, Version 07026

Table 6-2 Major Features of the CALPUFF Model, Version 5.8

Table 6-3 Model Parameters Used for the Significant Impact Analysis

Table 6-4 Modeled Emission Rates Used for the Significant Impact Analysis

Table 6-5 Building Dimensions Used for the Modeling Analysis

Table 6-6 Maximum CO, NO_2, and SO_2 Concentrations Predicted for the Significant Impact Analysis, Site Land Use

Table 6-7 Maximum CO, NO_2, and SO_2 Concentrations Predicted for the Significant Impact Analysis, Palm Beach International Airport and Florida International University Land Use

Table 6-8 Maximum Predicted NO_2 and SO_2 Impacts Compared to the EPA Class I Significant Impact Levels

Table 7-1 SO_2 Effects Levels for Various Plant Species

Table 7-2 Sensitivity Groupings of Vegetation Based on Visible Injury at Different SO_2 Exposures

Table 7-3 Examples of Reported Effects of Air Pollutants at Concentrations Below National Secondary Ambient Air Quality Standards

Table 7-4 Maximum Pollutant Concentrations Predicted at the Everglades National Park

Table 7-5 Maximum 24-Hour Visibility Impairment Predicted for the Proposed Project at the Everglades NP PSD Class I Area

Table 7-6 Annual Total Nitrogen and Sulfur Deposition Predicted for the Proposed Project at the Everglades NP PSD Class I Area

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

Figure 1-1 Site Location Map

Figure 1-2 Project Layout

Figure 2-1 Process Flow Diagram

Figure 7-1 Mobile Source Emissions of CO, VOCs, and NO_x in Palm Beach County

Figure 7-2 1-Hour Carbon Monoxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Figure 7-3 8-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Figure 7-4 Measured Annual Average Nitrogen Dioxide Concentrations Measured from 1977 to 2007 – Palm Beach County

Figure 7-5 1-Hour Average Ozone Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Figure 7-6 8-Hour Average Ozone Concentrations (3-year Average of the 4th Highest Values) Measured from 1995 to 2007 – Palm Beach County

Figure 7-7 24-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Figure 7-8 3-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Figure 7-9 Annual Average Sulfur Dioxide Concentrations Measured from 1977 to 2007 – Palm Beach County

1.0 INTRODUCTION

United Technologies Corporation - Pratt & Whitney Rocketdyne (PWR) is located in rural northwest Palm Beach County on a site that is approximately 7,000 acres. The site resembles a triangle and is approximately centered at latitude 26°55"8.43"North, longitude 80°20"54.64"West. The front gate is located at street address 17900 Beeline Highway (State Road 71), Jupiter, Florida 33478. Refer to Figure 1-1 for map location.

Pratt & Whitney performs various aerospace related activities at this location. These activities mainly include rocket engine manufacturing, jet and rocket engine testing, and research and development for both engine types. The facility includes over 50 test stands specifically designed to evaluate rocket engines and jet engines, as well as individual components for each engine type. PWR also performs various support and ancillary operations associated with the large infrastructure of shops and offices.

The Palm Beach County Health Department (PBCHD) Air Pollution Control Section has been delegated authority by the Florida Department of Environmental Protection (FDEP) to review, process, and take appropriate action on most FDEP District-level permits in Palm Beach County. PWR was authorized by FDEP air construction permit to construct the RAM Test Facility to support jet engine testing at the West Palm Beach facility. The RAM Test Facility is so named because it is used to "ram" or force compressed air into the intakes of jet engines during testing. The "ram" effect simulates the high velocity of atmospheric air entering an engine when installed on an aircraft operating at high speed. The RAM Test Facility consists of two gas turbines fueled by JP-8 jet fuel, two air compressors, assorted air transfer ducting and valves, water-cooled heat exchangers, and a forced draft cooling tower. The ducting and valves direct the compressed air to the jet engine test stands and the coolers reduce the hot air temperatures back to ambient levels. The two GG4-9A turbine engines are the only air emission sources regulated by the air construction permit.

PWR received authorization from the PBCHD to relocate two existing GG4-9A JP-8 fired industrial turbine engines from the Pratt & Whitney facility in Hartford, Connecticut, to the West Palm Beach, Florida facility. The GG4-9A turbine engines were originally manufactured in 1966. The authorization to relocate the engines was issued May 1, 2006 by FDEP Air Construction Permit No. 0990021-008-AC. The air construction permit limited the hours of operation of each GG4-9A engine to 398 hours per 12 consecutive month period (796 hours per 12 consecutive month period for both engines) to avoid triggering a major modification under the Prevention of Significant Deterioration (PSD) regulations.

Nitrogen oxide (NO_x) and carbon monoxide (CO) emissions estimates were made based on emission factors previously developed during testing of similar Pratt & Whitney engines. Specifically, potential emissions were estimated based on emission factors of 0.563 pound per million British thermal units (lb/MMBtu) for NO_x and 0.083 lb/MMBtu for CO. The construction permit expiration date was extended by FDEP Permit No. 0990021-009-AC, issued April 22, 2008, and again by FDEP Permit No. 0990021-011-AC, issued October 8, 2008. Compliance testing was performed on July 31, 2008 by Air Consulting and Engineering, Inc. to quantify the NO_x and CO emissions generated during various phases of operation at the test stands. Specifically, stack testing of the units indicated a maximum emission factor of 0.646 lb/MMBtu for NO_x and 0.327 lb/MMBtu for CO (under normal operating conditions). In addition, the stack testing results indicated that the CO emission factor during idle load conditions was 7.463 lb/MMBtu. Using these unit-specific emission factors, the original air construction permit was revised to limit the hours of operation at the test stands to 347 hours per 12 consecutive month period (694 hours per 12 consecutive month period for both engines) to again avoid triggering a major modification under the PSD regulations.

The GG4-9A turbine engines are located adjacent to test stands A-8 and A-9, which are part of the eight sea level test stands used in the development testing of commercial and military jet engines. PWR has determined that additional hours of operation are needed in a 12-month period to effectively utilize the test stands. This increase in operating hours will require PSD approval, which in turn requires the submission of air quality assessments for determining the facility's compliance with state and federal new source review (NSR) regulations, including addressing applicable PSD requirements. The critical aspects of these assessments include the air quality impact analyses performed using appropriate air dispersion models and the Best Available Control Technology (BACT) analyses performed to evaluate the selected emission control technology. The locations of the test stands are presented in Figure 1-2.

The U.S. Environmental Protection Agency (EPA) has implemented regulations requiring a PSD review for new and modified sources with air emissions above certain threshold amounts. EPA's PSD regulations are promulgated under Title 40, Part 51, Section 166 of the Code of Federal Regulations (40 CFR 51.166). Florida's PSD regulations are codified in Rule 62-212.400 of the Florida Administrative Code (F.A.C.). The Florida PSD regulations incorporate the requirements of EPA's PSD regulations. The request to increase operating hours at the test stands will be considered a "major modification" of a major source under PSD rules.

Based on the potential emissions from the two GG4-9A turbine engines, emission increases above the PSD significant emission rates are estimated to occur for the following criteria pollutants:

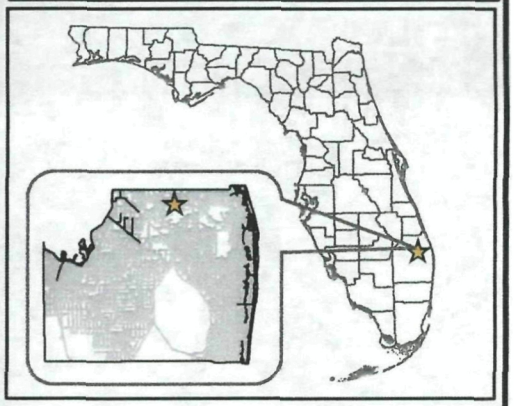
- CO;
- NO_x; and
- Sulfur dioxide (SO_2).

Palm Beach County has been designated as an attainment area for all criteria pollutants and is a PSD Class II area for nitrogen dioxide (NO_2). Therefore, the PSD review will follow regulations pertaining to this designation.

The remainder of this PSD Report is divided into six major sections:

- Section 2.0 presents a description of the GG4-9A turbine engines, including air emissions and stack parameters.
- Section 3.0 provides a review of the PSD and nonattainment requirements applicable to the GG4-9A turbine engines.
- Section 4.0 includes the control technology review with discussions on BACT.
- Section 5.0 discusses the ambient air monitoring analysis (pre-construction monitoring) required by PSD regulations.
- Section 6.0 presents a summary of the air modeling approach and results used in assessing compliance of the proposed facility with ambient air quality standards (AAQS) and PSD increments.
- Section 7.0 provides the additional impact analyses for soils, vegetation, and visibility.

AREA MAP



LEGEND

- Site Location
- Property Boundary

REFERENCES

Golder, 2009; Microsoft Virtual Earth, 2009

6,000 3,000 0 6,000 Feet

REV.	DATE	DES.	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT

PRATT & WHITNEY
RAM TEST FACILITY

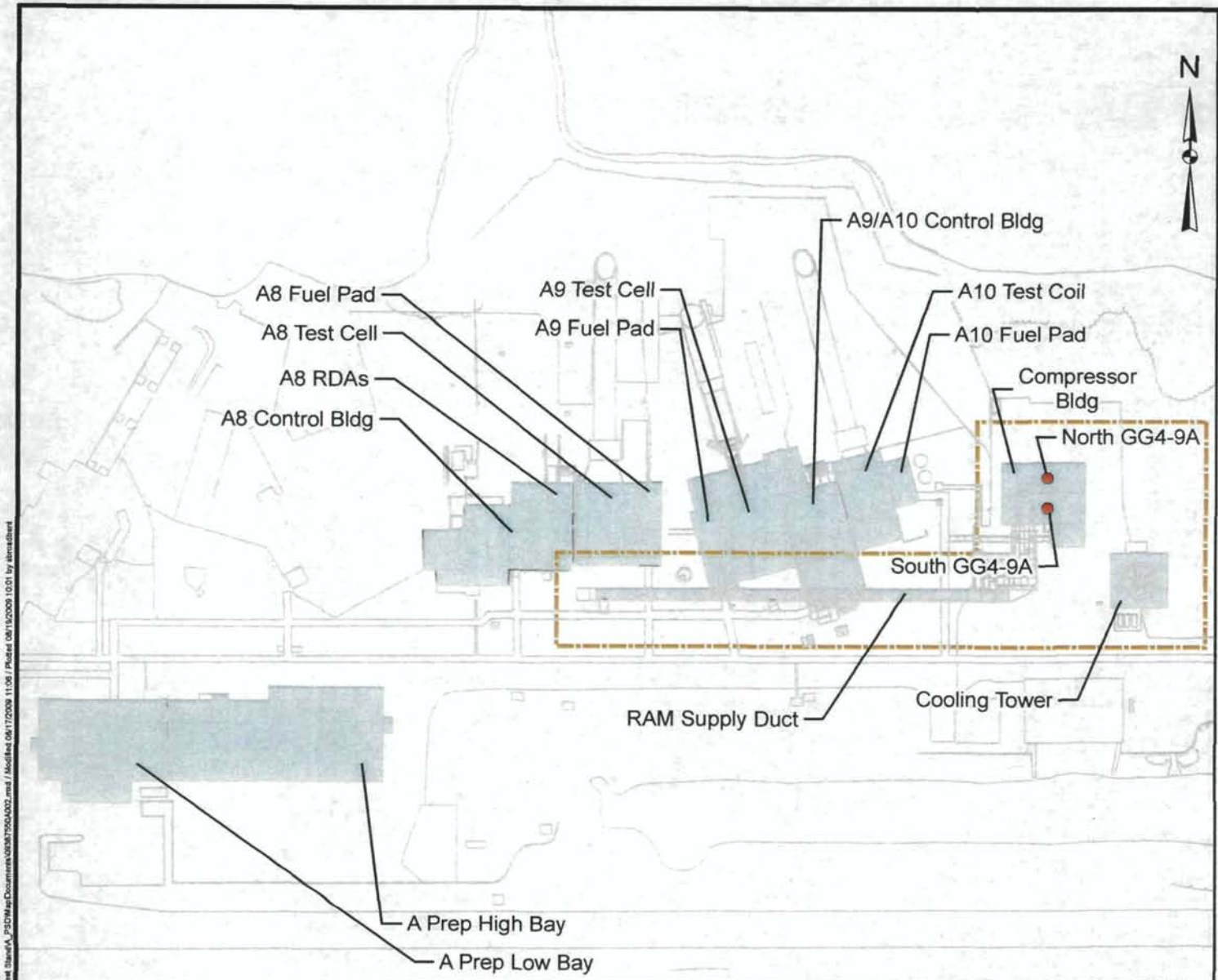
TITLE

SITE LOCATION MAP

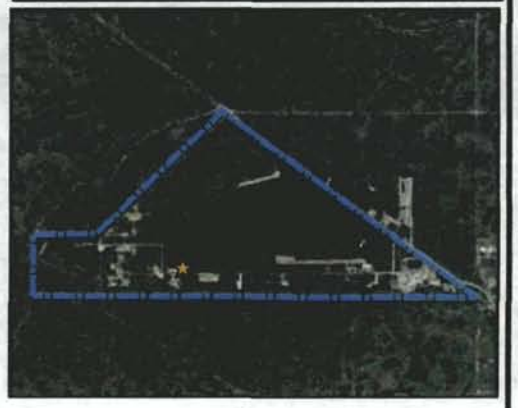
Golder Associates
Gainesville, Florida

PROJECT No.		08987550	FILE No.	08987550A001
DESIGN	AB	06/08/2009	SCALE: AS SHOWN	REV. 0
GIS	AB	06/08/2009		
CHECK	PG	06/08/2009	FIGURE 1-1	
REVIEW	BS	06/08/2009		

Map Document: E:\Projects\2009\08987550 Pratt and Whitney RAM Test Stand\A_PSD\MapDocuments\08987550A001.mxd / Modified 06/09/2009 10:25 / Plotted 06/19/2009 10:04 by abroadbent



PROPERTY BOUNDARY



LEGEND

- GG4-9A Engine Stacks
- Project Location
- A Area Buildings
- RAM Test Facility

REFERENCES

Golder, 2009

100 50 0 100 Feet

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT

PRATT & WHITNEY
RAM TEST FACILITY

TITLE

PROJECT LAYOUT

Golder Associates
Gainesville, Florida

PROJECT No.	08087550	FILE No.	08087550A002		
DESIGN	AB	05/19/2009	SCALE: AS SHOWN	REV.	0
GIS	AB	05/19/2009			
CHECK	PG	05/19/2009			
REVIEW	BS	05/19/2009			

FIGURE 1-2

Map Document: E:\Projects\2009\08-87550\Gis\Maps\Documents\08087550A002.mxd / Modified: 06/17/2009 11:06 / Plotted: 06/19/2009 10:01 by ahmadbert

2.0 PROJECT DESCRIPTION

2.1 Site Description

The PWR facility encompasses 7,000 acres. The properties to the north, south, and west of the facility are owned by the Florida State Game and Fish Commission. The properties to the east of the facility are predominantly owned by Palm Beach County. The elevation at the facility is nominally 20 to 22 feet (ft) with respect to the national geodetic vertical datum (NGVD) of 1929. The terrain surrounding the facility is relatively flat.

2.2 RAM Test Facility

The GG4-9A turbine engines (emission sources of RAM Test Facility) are located adjacent to test stands A-8 and A-9, which are part of the eight sea level test stands used in the development testing of commercial and military jet engines. The two industrial turbine engines are utilized to drive two large air compressors and operate at a steady state temperature and pressure point throughout a given inlet condition. Airflow and temperature control are provided to the test engine through ductwork, controlled downstream of the compressor through a series of control valves. The GG4-9A turbine engines were originally manufactured by Pratt & Whitney in 1966. The engines, compressors, ducting, and coolers are collectively known as the RAM Test Facility.

During normal operations, various engine load conditions are established. The load conditions are expressed in terms of the compressor discharge pressure readings. Thus, as the compressor discharge pressure is varied, the load on the GG4-9A turbine engines will vary. During emissions testing, the GG4-9A turbine engines were operated at specific load conditions, based on estimated conditions expected during normal testing operations. Specifically, the facility estimates that the following load conditions will be required as part of the normal test stand operations with the estimated annual hours of operation for each load, expressed as a percentage of the total annual operating hours:

- Idle – 24 percent [720 hours per year (hr/yr)];
- 16 pounds per square inch, absolute (psia) – 3 percent (90 hr/yr);
- 18 psia – 6 percent (180 hr/yr);
- 20 psia – 16 percent (480 hr/yr);
- 23 psia – 30 percent (900 hr/yr);

- 26 psia – 16 percent (480 hr/yr), and
- 31 psia – 5 percent (150 hr/yr).

The total hours of operation at the test stands will be limited to 3,000 hr/yr.

The GG4-9A turbine engines are fueled by JP-8 fuel only. During idle load conditions, the fuel usage rate is approximately 5.0 gallons per minute (gpm). During all other load conditions the fuel usage rate is approximately 29.0 gpm. The total annual fuel usage is estimated to be 4,183,200 gallons per year (gal/yr), calculated as follows:

Annual fuel usage = (24% × 5.0 gpm + 76% × 29.0 gpm) × 60 minutes/hour × 3,000 hr/yr = 4,183,200 gal/yr

Based on a fuel analysis performed on JP-8 fuel by Hazen Research on June 13, 2008, the high heating value of the GG4-9A turbine engine fuel is 19,910 British thermal units per pound (Btu/lb). Assuming a fuel density of 6.7 pounds per gallon (lb/gal), the maximum heat input for the two GG4-9A turbine engines combined is estimated to be 558,026 million Btu per year (MMBtu/yr). Each unit is rated at 19.5 megawatts (MW), but the maximum power output is limited to 12.3 MW.

Emissions testing results indicate that the maximum CO emissions occur during idle load conditions, and maximum NO_x emissions occur during 31 psia load conditions. Refer to Section 2.3 for potential emissions estimates.

A process flow diagram is included as Figure 2-1.

2.3 Proposed Source Emissions and Stack Parameters

Hourly and annual emissions calculations for NO_x, CO, total particulate matter (PM), particulate matter smaller than 10 micrometers in size (PM_{10}), SO_2, and volatile organic compounds (VOCs) are provided in Tables 2-1 and 2-2. Hourly and annual emissions calculations of hazardous air pollutants (HAPs) are provided in Table 2-3. NO_x and CO emission factors were developed as a result of the July 31, 2008 stack testing data. PM, PM_{10}, SO_2, VOC, and HAP emission factors are based on published emission factors in EPA's *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42 Fifth Edition, Chapter 3.1, Stationary Gas Turbines.*

Table 2-4 includes the potential criteria pollutant emissions resulting from the worst-case load conditions for CO and NO_x emissions. As previously mentioned, stack testing results indicate that the maximum (i.e., "worst-case") CO emissions occur during idle load conditions, and maximum NO_x emissions occur during 31 psia load conditions. The idle and 31 psia load conditions were used to estimate potential criteria pollutant emissions.

Stack and fuel information for the GG4-9A turbine engines is provided in Table 2-5.

2.4 Site Layout and Structures

The RAM Test Facility layout is included in Figure 1-2. The dimensions of the buildings and structures are presented in Section 6.0.

2.5 Excess Emissions

Using the emission factors developed during stack testing, NO_x and CO emissions can be quantified while at idle load conditions, which include start-up and shut-down operations; therefore, operating the GG4-9A turbine engines does not result in excess emissions.

TABLE 2-1
ESTIMATED HOURLY EMISSIONS FOR THE GG4-9A JP8 FIRED TURBINE ENGINES AT VARIOUS LOAD CONDITIONS
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Test Condition	Fuel Usage[a]			Emission Factor[b] (lb/MMBtu)						Hourly Emissions (lb/hr)					
(psia)	(GPM)	(lb/hr)	(MMBtu/hr)	CO	NO_x	PM	PM_{10}	SO_2	VOC	CO	NO_x	PM	PM_{10}	SO_2	VOC
Idle	5.0	2,010	40.02	7.463	0.062	7.20E-03	4.30E-03	0.114	4.10E-04	298.66	2.48	0.29	0.17	4.57	0.016
16	25.4	10,211	203.3	0.327	0.546	7.20E-03	4.30E-03	0.114	4.10E-04	66.48	111.0	1.46	0.87	23.20	0.083
18[c]	25.5	10,251	204.1	0.293	0.576	7.20E-03	4.30E-03	0.114	4.10E-04	59.80	117.6	1.47	0.88	23.29	0.084
20[c]	25.9	10,412	207.3	0.291	0.580	7.20E-03	4.30E-03	0.114	4.10E-04	60.32	120.2	1.49	0.89	23.66	0.085
23	26.6	10,693	212.9	0.261	0.596	7.20E-03	4.30E-03	0.114	4.10E-04	55.57	126.9	1.53	0.92	24.30	0.087
26[c]	27.7	11,135	221.7	0.215	0.625	7.20E-03	4.30E-03	0.114	4.10E-04	47.67	138.6	1.60	0.95	25.30	0.091
31	29.0	11,658	232.1	0.190	0.646	7.20E-03	4.30E-03	0.114	4.10E-04	44.10	149.9	1.67	1.00	26.49	0.095
					Maximum Hourly Emissions, One Engine (lb/hr)					**298.7**	**149.9**	**1.67**	**1.00**	**26.5**	**0.095**
					Maximum Hourly Emissions, Two Engines (lb/hr)					**597.3**	**299.9**	**3.34**	**2.00**	**53.0**	**0.190**

[a] Fuel usage based on reported fuel usage during source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008.
High Heating Value (HHV) = 19,910 Btu/lb and fuel density = 6.70 lb/gal, based on fuel analysis performed on JP-8 fuel by Hazen Research on June 13, 2008.

[b] NO_x and CO emission factors are based on source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008. SO_2, PM, PM_{10}, and VOC emission factors are based on AP-42, Chapter 3.1, Table 3.1-2a. SO_2 emission factor is based on a JP8 sulfur content of 0.113%.

[c] Abbreviated load points (for informational purposes only).

TABLE 2-2
ESTIMATED ANNUAL EMISSIONS FOR THE GG4-9A JP8 FIRED TURBINE ENGINES AT VARIOUS LOAD CONDITIONS
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Test Condition (psia)	Percentage of Total Operating Hours[a] (%)	Annual Operating Hours[b] (hr/yr)	Fuel Usage[c]			Emission Factor[d] (lb/MMBtu)						Annual Emissions (TPY)					
			(GPM)	(lb/hr)	(MMBtu/hr)	CO	NO_x	PM	PM_{10}	SO_2	VOC	CO	NO_x	PM	PM_{10}	SO_2	VOC
Idle	24	720	5.0	2,010	40.02	7.463	0.062	7.20E-03	4.30E-03	0.114	4.10E-04	107.52	0.89	1.04E-01	6.19E-02	1.64	5.91E-03
16	3	90	25.4	10,211	203.3	0.327	0.546	7.20E-03	4.30E-03	0.114	4.10E-04	2.99	5.00	6.59E-02	3.93E-02	1.04	3.75E-03
18[e]	6	180	25.5	10,251	204.1	0.293	0.576	7.20E-03	4.30E-03	0.114	4.10E-04	5.38	10.58	1.32E-01	7.90E-02	2.10	7.53E-03
20[e]	16	480	25.9	10,412	207.3	0.291	0.580	7.20E-03	4.30E-03	0.114	4.10E-04	14.48	28.86	3.58E-01	2.14E-01	5.68	2.04E-02
23	30	900	26.6	10,693	212.9	0.261	0.596	7.20E-03	4.30E-03	0.114	4.10E-04	25.01	57.10	6.90E-01	4.12E-01	10.93	3.93E-02
26[e]	16	480	27.7	11,135	221.7	0.215	0.625	7.20E-03	4.30E-03	0.114	4.10E-04	11.44	33.26	3.83E-01	2.29E-01	6.07	2.18E-02
31	5	150	29.0	11,658	232.1	0.190	0.646	7.20E-03	4.30E-03	0.114	4.10E-04	3.31	11.25	1.25E-01	7.49E-02	1.99	7.14E-03
	Total Hours	**3,000**									**Total Annual Emission, One Engine (TPY)**	**170.1**	**146.9**	**1.86**	**1.11**	**29.5**	**0.106**
											Total Annual Emissions, Two Engines (TPY)	**340.2**	**293.9**	**3.72**	**2.22**	**58.9**	**0.212**

[a] Represents the percentage of the testing hours and on an estimation of the planned testing cycle.

[b] Annual operating hours are based on 8,760 hours per year (continuous operations).

[c] Fuel usage based on reported fuel usage during source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008.
High Heating Value (HHV) = 19,910 Btu/lb and fuel density = 6.70 lb/gal, based on fuel analysis performed on JP-8 fuel by Hazen Research on June 13, 2008.

[d] NO_x and CO emission factors are based on source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008. SO_2, PM, PM_{10}, and VOC emission factors are based on AP-42, Chapter 3.1, Table 3.1-2a. SO_2 emission factor is based on a JP-8 sulfur content of 0.113%.

[e] Abbreviated load points (for informational purposes only).

TABLE 2-3
ESTIMATED HOURLY AND ANNUAL HAZARDOUS AIR POLLUTANT (HAP) EMISSIONS SUMMARY[a]
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Pollutant Abbreviation	Emission Factors (lb/MMBtu)		Emissions Estimates			
				Hourly Emissions (lb/hr)		Annual Emissions (TPY)	
		Idle	All Other	1 Engine	2 Engines	1 Engine	2 Engines
Arsenic	H015	1.10E-05	1.10E-05	2.55E-03	5.11E-03	3.07E-03	6.14E-03
Beryllium	H021	3.10E-07	3.10E-07	7.20E-05	1.44E-04	8.65E-05	1.73E-04
Cadmium	H027	4.80E-06	4.80E-06	1.11E-03	2.23E-03	1.34E-03	2.68E-03
Chromium	H046	1.10E-05	1.10E-05	2.55E-03	5.11E-03	3.07E-03	6.14E-03
Lead	H110	1.40E-05	1.40E-05	3.25E-03	6.50E-03	3.91E-03	7.81E-03
Manganese	H113	7.90E-04	7.90E-04	1.83E-01	3.67E-01	2.20E-01	4.41E-01
Mercury	H114	1.20E-06	1.20E-06	2.79E-04	5.57E-04	3.35E-04	6.70E-04
Nickel	H133	4.60E-06	4.60E-06	1.07E-03	2.14E-03	1.28E-03	2.57E-03
Selenium	H162	2.50E-05	2.50E-05	5.80E-03	1.16E-02	6.98E-03	1.40E-02
1,3-Butadiene	H026	1.60E-05	1.60E-05	3.71E-03	7.43E-03	4.46E-03	8.93E-03
Benzene	H017	5.50E-05	5.50E-05	1.28E-02	2.55E-02	1.53E-02	3.07E-02
Formaldehyde	H095	2.80E-04	2.80E-04	6.50E-02	1.30E-01	7.81E-02	1.56E-01
Naphthalene	H132	3.50E-05	3.50E-05	8.12E-03	1.62E-02	9.77E-03	1.95E-02
PAH	H151	4.00E-05	4.00E-05	9.28E-03	1.86E-02	1.12E-02	2.23E-02
Total HAP	Total HAP	NA	NA	2.99E-01	5.98E-01	3.59E-01	7.19E-01

[a] The following operating conditions were used to estimate the hourly and annual emissions "worst-case" scenarios described in Section 2.3.

Parameter	Operating Condition		
	Idle	All Other	Total
Percentage of Total Operating Hours	24	76	100
Operating Hours	720	2,280	3,000
Fuel Usage (GPM)	5.0	29.0	34.0
Fuel Usage (MMBtu/hr)	40.0	232.1	272.1
Fuel Usage (MMBtu/yr)	28,813.8	529,212.6	558,026.3

Fuel usage based on reported fuel usage during source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008.
High Heating Value (HHV) = 19,910 Btu/lb and fuel density = 6.70 lb/gal, based on fuel analysis performed on JP-8 fuel by Hazen Research on June 13, 2008.

TABLE 2-4

HOURLY AND ANNUAL CRITERIA POLLUTANT EMISSIONS SUMMARY, MAXIMUM LOAD CONDITIONS[a]
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Pollutant Abbreviation	Emission Factors[b] (lb/MMBtu)		Emissions Estimates			
				Hourly Emissions (lb/hr)		Annual Emissions (TPY)	
		Idle	All Other	1 Engine	2 Engines	1 Engine	2 Engines
Carbon Monoxide	CO	7.463	0.327	298.7	597.3	194.0	388.1
Nitrogen Oxides	NO_X	0.062	0.646	149.9	299.9	171.8	343.7
Particulate Matter	PM	7.20E-03	7.20E-03	1.67	3.34	2.01	4.02
Particulate Matter <10 microns	PM_{10}	4.30E-03	4.30E-03	1.00	2.00	1.20	2.40
Sulfur Dioxide	SO_2	0.114	0.114	26.5	53.0	31.8	63.7
Volatile Organic Compounds	VOC	4.10E-04	4.10E-04	0.0952	0.190	0.114	0.229

[a] The following operating conditions were used to estimate the hourly and annual emissions "worst-case" scenarios described in Section 2.3.

Parameter	Operating Condition		
	Idle	All Other	Total
Percentage of Total Operating Hours	24	76	100
Operating Hours	720	2,280	3,000
Fuel Usage (GPM)	5.0	29.0	34.0
Fuel Usage (gal/yr)	NA	NA	6,120,000
Fuel Usage (MMBtu/hr)	40.0	232.1	272.1
Fuel Usage (MMBtu/yr)	28,813.8	529,212.6	558,026.3

Fuel usage based on reported fuel usage during source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008.
High Heating Value (HHV) = 19,910 Btu/lb and fuel density = 6.70 lb/gal, based on fuel analysis performed on JP-8 fuel by Hazen Research on June 13, 2008.

[b] NO_x and CO emission factors are based on source testing conducted by Air Consulting and Engineering, Inc. on July 31, 2008. All other emission factors are based on AP-42, Chapter 3.1. SO_2 emission factor is based on a JP-8 sulfur content of 0.113%.

TABLE 2-5
SUMMARY OF STACK AND FUEL INFORMATION
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Fuel Parameter[a]	Value
Water (%)	0.02
Ash (%)	0.015
Sulfur (%)	0.113
Carbon (%)	87.49
Hydrogen (%)	12.2
Nitrogen (%)	0.06
Oxygen (%)	0.1
Volatile matter (%)	99.98
Fixed carbon (%)	<0.01
Calorific value (Btu/lb)	19,910
Stack Information	**Value**
Stack diameter (ft)	5.9
Stack height (ft)	26.0
Exhaust temperature (°F)	750
Exhaust flow rate (acfm)	328,000

[a] Based on fuel analysis performed on JP-8 fuel by Hazen Research on June 13, 2008.

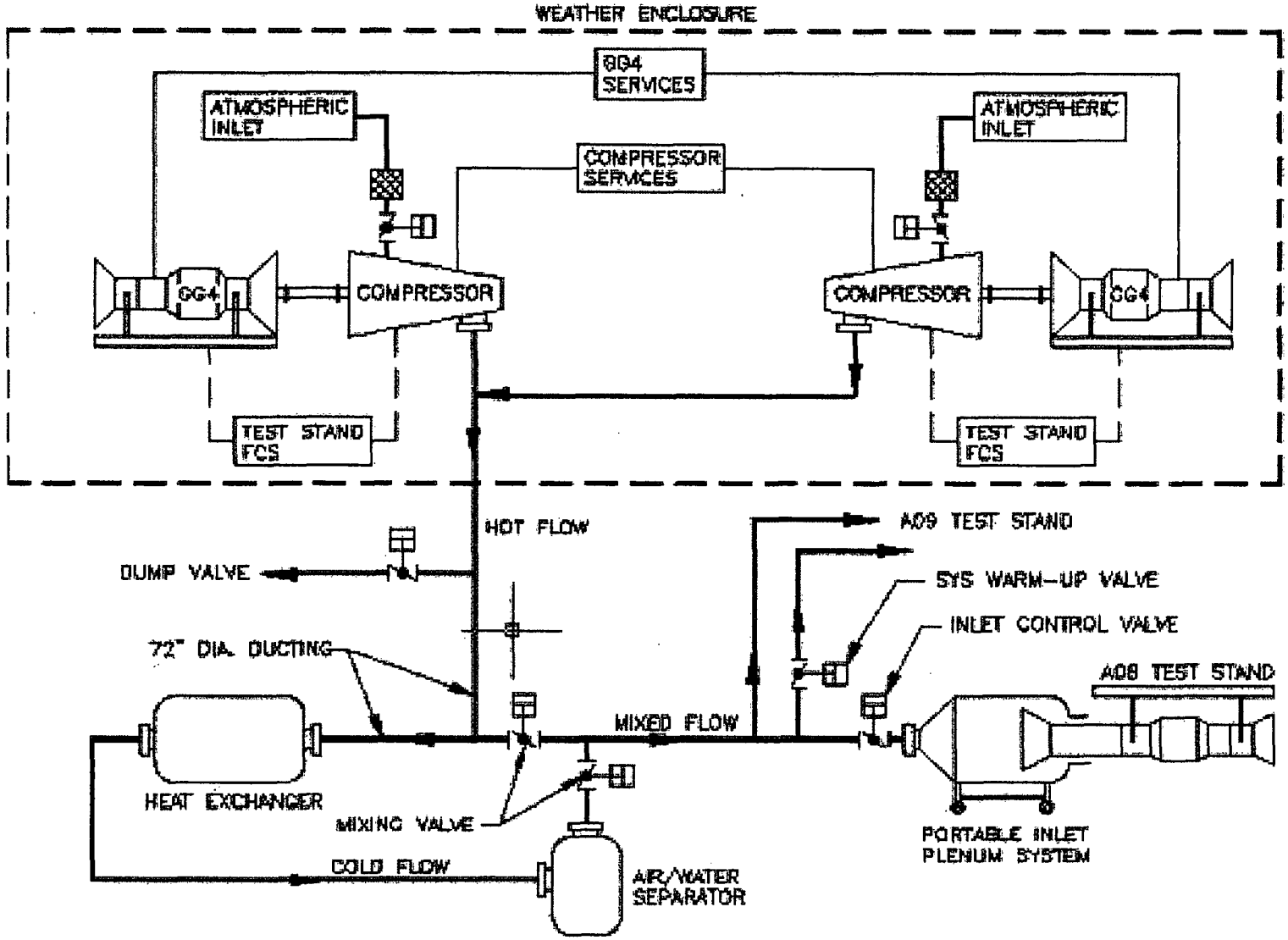


Figure 2-1
Process Flow Diagram
RAM Test Facility

Source: Golder, 2006.

Golder Associates

3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussion pertains to the federal, State, and local air regulatory requirements and their applicability to the GG4-9A turbine engines.

3.1 National, State, and Local AAQS

The national and State of Florida AAQS are presented in Table 3-1. Primary national AAQS were promulgated to protect the public health with an adequate margin of safety, and secondary national AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in compliance with AAQS are designated as attainment areas. New sources to be located in or near these areas may be subject to more stringent air permitting requirements.

3.2 PSD Requirements

3.2.1 General Requirements

Under federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed, and a pre-construction permit issued.

PSD review is applicable to a "major facility" and certain "modifications" that occur at a major facility. A "major facility" is defined as any 1 of 28 named source categories that have the potential to emit 100 tons per year (TPY) or more, or any other stationary facility that has the potential to emit 250 TPY or more, of any pollutant regulated under the CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. Net emission increases from a modification at a major facility that exceed the PSD significant emission rates are also subject to PSD review.

EPA has promulgated regulations providing that certain increases above an air quality baseline concentration level of SO_2, PM_{10}, and NO_2 concentrations would constitute significant deterioration. The EPA class designations and allowable PSD increments are presented in Table 3-1. The State of Florida has adopted the EPA class designations and allowable PSD increments for SO_2, PM_{10}, and NO_2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Federal PSD requirements are contained in 40 CFR 51.166, *Prevention of Significant Deterioration of Air Quality*. The State of Florida's PSD regulations are found in Rule 62-212.400, F.A.C. Major new facilities are required to undergo the following analysis related to PSD for each pollutant emitted in significant amounts (refer to Table 3-2):

- Control technology review;
- Source impact analysis;
- Air quality analysis (monitoring);
- Source information; and
- Additional impact analyses.

In addition to these analyses, a review with respect to Good Engineering Practice (GEP) stack height regulations must be conducted. Discussions concerning each of these requirements are presented in the following sections.

3.2.2 Control Technology Review

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that BACT be applied to control emissions from the source (Rule 62-212.400, F.A.C.). The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the facility or modification exceeds the significant emission rate (refer to Table 3-2).

BACT is defined in Rule 62-210.200(39), F.A.C., as:

> *(a) An emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account:*
>
> *1. Energy, environmental and economic impacts, and other costs;*
>
> *2. All scientific, engineering, and technical material and other information available to the Department; and*
>
> *3. The emission limiting standards or BACT determinations of Florida and any other state;*
>
> *determines is achievable through application of production processes and available methods, systems and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant.*
>
> *(b) If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of an emissions unit or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be*

prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice or operation.
(c) Each BACT determination shall include applicable test methods or shall provide for determining compliance with the standard(s) by means which achieve equivalent results.
(d) In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60, 61, and 63.

BACT requirements were promulgated within the framework of the PSD provisions in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increments and thereby enlarge the potential for future economic growth without significantly degrading air quality (EPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in *Guidelines for Determining Best Available Control Technology (BACT)* (EPA, 1978) and in the *New Source Review Workshop Manual* Prevention of Significant Deterioration and Nonattainment Areas (EPA, 1990a). These guidelines were issued by EPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. However, BACT in one area may not be identical to BACT in another area. According to EPA (1980), "BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis."

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with new source performance standards (NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts.

Historically, a "bottom-up" approach, consistent with the BACT Guidelines and the NSR Workshop Manual, was used. With this approach, an initial control level, which is usually NSPS, is evaluated against successively more stringent controls until a BACT level is selected. However, EPA developed a concern that the bottom-up approach was not providing the level of BACT decisions originally intended. As a result, in December 1987, the EPA Assistant Administrator for Air and Radiation mandated changes in the implementation of the PSD program, including the adoption of a new "top-down" approach to BACT decision making.

The top-down BACT approach essentially starts with the most stringent (or top) technology and emission limits that have been applied elsewhere to the same or a similar source category. The applicant must next provide a basis for rejecting this technology in favor of the next most stringent technology or propose using it. Rejection of control alternatives may be based on technical or economic infeasibility. Such decisions are made on the basis of physical differences (e.g., fuel type), locational differences (e.g., availability of water), or significant differences that may exist in the environmental, economic, or energy impacts. The differences between the proposed facility and the facility for which the control technique was applied previously must be justified. EPA has issued a draft guidance document on the top-down approach entitled *Top-Down Best Available Control Technology Guidance Document* (EPA, 1990). FDEP utilizes the "top-down" BACT approach.

FDEP performs BACT reviews based on EPA's regulations and guidance in which the most stringent control alternatives are evaluated to identify the "best available control technology" and a related appropriate emissions limitation for each pollutant requiring a BACT determination. This procedure is referred to as the "top down" approach. EPA's BACT guidelines establish a specific five-step analytical process for conducting a BACT determination. The five steps consist of: 1) identifying the potentially applicable control technologies for the proposed process or source, 2) evaluating the technical options for feasibility taking into consideration source specific factors, 3) comparing the remaining control technologies based on effectiveness, 4) evaluating the remaining options taking into consideration energy, environmental, and economic impacts, and 5) selecting BACT based on the above analyses.

3.2.3 Source Impact Analysis

A source impact analysis required pursuant to Rule 62-212.400(5), F.A.C., must be performed for a proposed major source or major modification subject to PSD review for each pollutant for which emissions exceed the significant emission rate (Table 3-2). The PSD regulations specifically provide

for the use of atmospheric dispersion models in performing impact analyses, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated EPA models normally must be used in performing the impact analysis, as required by Rule 62-212.400(6), F.A.C. Specific applications for other than EPA-approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the EPA publication *Guideline on Air Quality Models (Revised)* (EPA, 2005). The source impact analysis for criteria pollutants to address compliance with AAQS and PSD Class II increments may be limited to the modification if the impacts, as a result of the modification, are below significant impact levels, as presented in Table 3-1.

The EPA has proposed significant impact levels for Class I areas as follows:

Pollutant	Averaging Time	Proposed EPA PSD Class I Significant Impact Levels ($\mu g/m^3$)[a]
SO_2	3-hour	1
	24-hour	0.2
	Annual	0.1
PM_{10}	24-hour	0.3
	Annual	0.2
NO_2	Annual	0.1

[a] $\mu g/m^3$ = micrograms per cubic meter.

Although these levels have not been officially promulgated as part of the federal PSD regulations and may not be binding for states in performing PSD reviews, the levels serve as a guideline in assessing a source's impact in a Class I area. FDEP has accepted the use of these significant impact levels.

Various lengths of meteorological data records can be used for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-highest" (HSH) refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If fewer than

5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor normally must be used for comparison to air quality standards.

The term "baseline concentration" refers to a concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition, in the PSD regulations as amended August 7, 1980, baseline concentration means the ambient concentration level that existed in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

- The actual emissions representative of facilities in existence on the applicable baseline date; and
- The allowable emissions of major stationary facilities that commenced construction before January 6, 1975, for SO_2 and PM [total suspended particulate (TSP)] concentrations or February 8, 1988, for NO_2 concentrations, but that were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and, therefore, will affect PSD increment consumption.

- Actual emissions from any major stationary facility on which construction commenced after January 6, 1975, for SO_2 and PM (TSP) concentrations and after February 8, 1988, for NO_2 concentrations; and
- Actual emission increases and decreases at any stationary facility occurring after the baseline date.

In reference to the baseline concentration, the term "baseline date" actually includes three different dates:

- The major facility baseline date, which is January 6, 1975, in the cases of SO_2 and PM (TSP) and February 8, 1988, in the case of NO_2.
- The minor facility baseline date, which is the earliest date after the trigger date on which a major stationary facility or major modification subject to PSD regulations submits a complete PSD application.
- The trigger date, which is August 7, 1977, for SO_2 and PM (TSP) and February 8, 1988, for NO_2.

The minor source baseline date for SO_2 and PM (TSP) has been set as December 27, 1977, for the entire State of Florida [Rules 62-204.200(22) and 204.360, F.A.C.]. The minor source baseline for

NO_2 has been set as March 28, 1988 in Florida [Rules 62-204.200(22) and 204.360, F.A.C.]. It should be noted that references to PM (TSP) are also applicable to PM_{10}.

3.2.4 Air Quality Monitoring Requirements

In accordance with requirements of Rule 62-212.400(7), F.A.C., any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility. For a major modification, the affected pollutants are those that the facility potentially would emit in significant amounts.

Ambient air monitoring for a period of up to 1 year generally is appropriate to satisfy the PSD monitoring requirements. Data for a minimum of 4 months are required. Existing data from the vicinity of the proposed source may be used, if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA, 1987).

The regulations include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that a proposed major stationary facility is exempt from the monitoring requirements with respect to a particular pollutant, if the emissions of the pollutant from the facility would cause, in any area, air quality impacts less than the *de minimis* levels presented in Rule 62-212.400(3)(e), F.A.C. If a facility's predicted impacts are less than the *de minimis* levels, then preconstruction monitoring is not required.

3.2.5 Source Information/GEP Stack Height

Source information must be provided to adequately describe the proposed facility according to Rule 62-212.400(4), F.A.C. The general information required for this facility is presented in Section 2.0.

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant can not be affected by a stack height that exceeds GEP or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations. Identical regulations have been adopted by FDEP (Rule 62-210.550, F.A.C.). GEP stack height is defined as the highest of:

- 65 meters; or

- A height established by applying the formula:

$$H_g = H + 1.5L$$

where: H_g = GEP stack height,

H = Height of the structure or nearby structure, and

L = Lesser dimension (height or projected width) of nearby structure(s); or

- A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to 5 times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 kilometers (km). Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain that exceeds the height calculated by the GEP stack height formula.

3.2.6 Additional Impact Analyses

In addition to air quality impact analyses, federal and State of Florida PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source or modification [Rule 62-212.400(8), F.A.C.]. Impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed. These analyses are required for each pollutant emitted in significant amounts (refer to Table 3-2).

3.2.7 Air Quality Related Values

An Air Quality Related Value (AQRV) analysis is required to assess the potential impact on AQRVs in PSD Class I areas. The Everglades National Park (NP) is the closest Class I area to the PWR facility, and is located about 127.7 km (79.3 miles) south of the site.

The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or*

> *integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978, Vol. 43, #69, p. 15016).*

The AQRVs include visibility, freshwater and coastal wetlands, dominant plant communities, unique and rare plant communities, soils and associated periphyton, and the wildlife dependent on these communities for habitat. Rare, endemic, threatened, and endangered species of the national park and bioindicators of air pollution (e.g., lichens) must also be evaluated.

3.3 Nonattainment Rules

FDEP has nonattainment provisions (Rule 62-212.500, F.A.C.) that apply to all major new facilities located in a nonattainment area. In addition, for major facilities that are located in an attainment or unclassifiable area, the nonattainment review procedures apply if the source or modification is located within the area of influence of a nonattainment area. The PWR facility is located in Palm Beach County, which is classified as an attainment area for all criteria pollutants. Therefore, nonattainment new source requirements are not applicable.

3.4 Emission Standards

3.4.1 New Source Performance Standards

The NSPS are a set of national emission standards that apply to specific categories of new sources. As stated in the 1977 CAA Amendments, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated." EPA's NSPS for stationary gas turbines include 40 CFR 60, Subparts GG and KKKK.

40 CFR 60, Subpart GG was promulgated on September 10, 1979 for stationary gas turbines. The rule is applicable for all stationary gas turbines which commence construction, modification, or reconstruction after October 3, 1977; and have a heat input at peak load equal to or greater than 10 million British thermal units per hour (MMBtu/hr).

40 CFR 60, Subpart KKKK was promulgated on July 6, 2006. The rule is applicable for new gas turbines with a heat input at peak load equal to or greater than 10 MMBtu per hour, based on the higher heating value of the fuel, which commenced construction, modification, or reconstruction after February 18, 2005.

3.4.2 National Emission Standards for Hazardous Air Pollutants

Section 112 of the CAA requires EPA to establish National Emission Standards for Hazardous Air Pollutants (NESHAP) for the control of HAPs from both new and existing major sources. The CAA requires the NESHAP to reflect the maximum degree of reduction in emissions of HAPs that is achievable. This level of control is commonly referred to as the maximum achievable control technology or MACT.

40 CFR 63, Subpart YYYY establishes national emission limitations of HAP emissions from stationary turbines located at major sources of HAP emissions, such as the PWR facility. Combustion turbine engine test cells and stands do not have to meet the requirements of Subpart YYYY, in accordance with 40 CFR 63.6090(5), but may have to meet the requirements of 40 CFR 63, Subpart A, if subject to another NESHAP subpart.

3.4.3 Florida Rules

The facility is a major source of NO_x emissions and is subject to Rule 62-296.570, F.A.C., for Reasonably Available Control Technology (RACT) requirements for major VOC and NO_x emitting facilities. The fuel-specific NO_x emission limits established under this rule includes a NO_x emissions limit of 0.90 lb/MMBtu when firing fuel oil.

Compliance with the NO_x emission limit, for units that are not equipped with a continuous emission monitoring system (CEMS), shall be demonstrated by annual emission testing in accordance with applicable EPA Reference Methods from Rule 62-297.401, F.A.C., or other methods approved by FDEP in accordance with the requirements of Rule 62-297.620, F.A.C., except as otherwise provided in paragraph 62-296.570(4)(b), F.A.C.

3.4.4 Florida Air Permitting Requirements

The FDEP regulations require any new source to obtain an air permit prior to construction. Major new sources must meet the appropriate PSD and nonattainment requirements as discussed previously. Required permits and approvals for air pollution sources include NSR for nonattainment areas, PSD,

NSPS, NESHAP, Permit to Construct, and Permit to Operate. The requirements for construction permits and approvals are contained in Rules 62-4.030, 62-4.050, 62-4.210, 62-210.300(1), and 62-212.400, F.A.C. Specific emission standards are set forth in Chapter 62-296, F.A.C.

3.4.5 Local Air Regulations

The PBCHD is the air compliance authority for the County, implementing FDEP regulations. As conditions of the land development approval for the site, the County established a sulfur limit on light oil of 0.0015 percent.

3.5 Source Applicability

3.5.1 New Source Performance Standards

As previously mentioned, 40 CFR 60, Subpart GG, is applicable to all stationary gas turbines that commence construction, modification, or reconstruction after October 3, 1977; and 40 CFR 60, Subpart KKKK is applicable to all new stationary gas turbines that commenced construction, modification, or reconstruction after February 18, 2005. Because the GG4-9A turbine engines were constructed prior to 1966, they are therefore not subject to 40 CFR 60, Subparts GG or KKKK.

3.5.2 National Emissions Standards for Hazardous Air Pollutants

In accordance with 40 CFR 63.6090(5), the GG4-9A turbine engines are located at a test stand, and are not subject to any other NESHAP subparts. Therefore, the GG4-9A turbine engines are not subject to 40 CFR 63, Subpart YYYY.

3.5.3 Area Classification

The project is located in Palm Beach County, which has been designated by EPA and FDEP as an attainment area (includes unclassifiable) for all criteria pollutants. Palm Beach County and the surrounding counties are designated as PSD Class II areas for SO_2, PM (TSP), and NO_2. The nearest Class I area is the Everglades NP, located about 127.7 km (79.3 miles) to the south of the site.

3.5.4 PSD Review

3.5.4.1 Pollutant Applicability

PWR is considered to be a major facility because the emissions of several regulated pollutants are estimated to exceed 100 TPY. The A-8 and A-9 test stand operation is defined as a major modification under the PSD rules, and PSD review is required for CO, NO_x, and SO_2, as shown in

Table 3-3. Impacts for these pollutants that are predicted to be above the significant impact levels require a modeling analysis incorporating the impacts from other sources. (Note: EPA no longer requires PSD review for HAPs from PSD review. The pollutants vinyl chloride, asbestos, and beryllium are no longer evaluated in PSD review because they are addressed through the NESHAP program.)

As part of the PSD review, a PSD Class I increment analysis is required if the proposed facility's impacts are greater than the proposed EPA Class I significant impact levels. Because the Class I area of the Everglades NP is about 127.7 km (79.3 miles) from the site, a PSD Class I increment analysis and an evaluation of impacts to AQRVs are required. Because other PSD Class I areas are located more than 200 km from the site, the project's impacts are expected to be minimal and impact evaluations for those areas were not performed.

3.5.4.2 Ambient Monitoring

Based on the potential emissions from the GG4-9A turbine engines (see Table 3-4), a pre-construction ambient monitoring analysis is required for NO_2, CO, and ozone (O_3) (based on NO_x emissions). If the net increase in impact of pollutants is less than the applicable *de minimis* monitoring concentration (100 TPY of NO_x in the case of O_3), then an exemption from the pre-construction ambient monitoring requirement is available by Rule 62-212.400(3)(e), F.A.C. In addition, if an acceptable ambient monitoring method for the pollutant has not been established by EPA, monitoring is not required.

As shown in Table 3-4, the impacts of the GG4-9A turbine engines are predicted to be below the applicable *de minimis* monitoring concentration levels for all pollutants. Therefore, pre-construction monitoring is not required to be submitted for those pollutants for this facility.

3.5.4.3 GEP Stack Height Impact Analysis

The GEP stack height regulations allow any stack to be at least 65 meters (213 ft) high without the need to justify the height based on building dimensions. The stacks for the GG4-9A turbine engines will be 26 ft high. These stack heights do not exceed the GEP stack height. However, as discussed in Section 6.0, Air Quality Impact Analysis, since the stack heights are less than GEP, building downwash effects must be considered in the modeling analysis. As a result, the potential for downwash of the GG4-9A engine emissions caused by nearby structures is included in the modeling analysis.

TABLE 3-1
NATIONAL AND STATE AAQS, ALLOWABLE PSD INCREMENTS, AND SIGNIFICANT IMPACT LEVELS
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Averaging Time	National AAQS ($\mu g/m^3$)			PSD Increments[a] ($\mu g/m^3$)		Significant Impact Levels[b] ($\mu g/m^3$)	
		Primary	Secondary	Florida	Class I	Class II	Class I	Class II
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	0.1	1
Particulate Matter[c]								
PM_{10}	Annual Arithmetic Mean	NA	NA	50	4	17	0.2	1
	24-Hour Maximum	150	150	150	8	30	0.3	5
$PM_{2.5}$	Annual Arithmetic Mean	15	15	NA	NA	NA	NA	NA
	24-Hour Maximum	35	35	NA	NA	NA	NA	NA
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	0.1	1
	24-Hour Maximum	365	NA	260	5	91	0.2	5
	3-Hour Maximum	NA	1,300	1,300	25	512	1	25
Ozone[d]	1-Hour Maximum[e]	235	235	235	NA	NA	NA	NA
	8-Hour Maximum	147	147	NA	NA	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	1.5	NA	NA	NA	NA

Notes:
NA = Not applicable, i.e., no standard exists.
Particulate matter (PM_{10}) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.
Particulate matter ($PM_{2.5}$) = particulate matter with aerodynamic diameter less than or equal to 2.5 micrometers.

[a] Short-term maximum concentrations are not to be exceeded more than once per year except for the PM_{10} and ozone AAQS. The 24-hour PM_{10} AAQS is attained when the expected number of days per year with a 24-hour concentration above 150 μ/m^3 is equal to or less than 1. For modeling purposes, compliance is based on the sixth highest 24-hour concentration over a 5-year period. For ozone, the daily maximum 1-hour concentration cannot be exceeded an average of more than one per year.

[b] Maximum concentrations are not to be exceeded.

[c] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour standard of 65 g/m^3 (3-year average of 98th percentile) and an annual standard of 15 g/m^3 (3-year average at community monitors).

[d] The ozone standard was modified to be 0.08 ppm; achieved when 3-year average of 99th percentile is 0.08 ppm 157 μ/m^3 or less. FDEP has not yet adopted these standards.

[e] 0.12 ppm; achieved when the expected number of days per year with concentrations above the standard is fewer than 1.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978, 40 CFR 50; 40 CFR 52.21, Florida Chapter 62.204, F.A.C.

TABLE 3-2
PSD SIGNIFICANT EMISSION RATES AND
***DE MINIMIS* MONITORING CONCENTRATIONS**
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Regulated Under	Significant Emission Rate (TPY)	*De Minimis* Monitoring Concentration[a] ($\mu g/m^3$)
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Nitrogen Dioxide	NAAQS, NSPS	40	14, annual
Particulate Matter [PM (TSP)]	NSPS	25	10, 24-hour
Particulate Matter (PM_{10})	NAAQS	15	10, 24-hour
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Lead	NAAQS	0.6	0.1, 3-month
Mercury	NESHAP	0.1	0.25, 24-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Sulfuric Acid Mist	NSPS	7	NM
Hydrogen Sulfide	NSPS	10	0.2, 1-hour
Total Fluorides	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY[b]

Notes:
Ambient monitoring requirements for any pollutant may be exempted if the impact of the increase in emissions is below de minimis monitoring concentrations.
NAAQS = National Ambient Air Quality Standards.
NM = No ambient measurement method established; therefore, no de minimis concentration has been established.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.
$\mu g/m^3$ = micrograms per cubic meter.

[a] Short-term concentrations are not to be exceeded.
[b] No de minimis concentration; an increase in VOC or NOx emissions of 100 TPY or more will require monitoring analysis for ozone.
Sources: 40 CFR 52.21; Rule 62-212.400.

TABLE 3-3
MAXIMUM ESTIMATED PROPOSED EMISSIONS
COMPARED TO THE PSD SIGNIFICANT EMISSION RATES
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Pollutant Emissions (TPY)		PSD Review
	Potential Emissions from Project[a]	Significant Emission Rate	
Carbon Monoxide	388.1	100	Yes
Nitrogen Dioxide	343.7	40	Yes
Particulate Matter [PM (TSP)]	4.02	25	No
Particulate Matter (PM_{10})	2.40	15	No
Sulfur Dioxide	63.7	40	Yes
Lead	7.81E-03	0.6	No
Mercury	6.70E-04	0.1	No
Reduced Sulfur Compounds	NEG	10	No
Sulfuric Acid Mist	NEG	7	No
Hydrogen Sulfide	NEG	10	No
Total Fluorides	NEG	3	No
Total Reduced Sulfur	NEG	10	No
Volatile Organic Compounds (Ozone)	0.229	40	No

Notes:
NEG = Negligible.

[a] Refer to Tables 2-3 and 2-4.

TABLE 3-4
PREDICTED NET INCREASE IN IMPACTS DUE TO THE PROPOSED PROJECT COMPARED TO PSD *DE MINIMIS* MONITORING CONCENTRATIONS
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Predicted Increase in Impacts[a] ($\mu g/m^3$)	*De Minimis* Monitoring ($\mu g/m^3$)
Carbon Monoxide	110.0	575, 8-hour
Nitrogen Dioxide[b]	0.66	14, annual
Nitrogen Dioxide (as a precursor to O_3)[c]	343.7 TPY	100 TPY
Sulfur Dioxide	4.40	13, 24-hour

[a] See Section 6.0 for air dispersion modeling results.

[b] Based on worst case load conditions and 8,760 hours per year. This is a conservative estimate of maximum annual impacts since the requested maximum hours/year of operation is 3,000.

[c] No *de minimis* concentration; an increase in NO_x emissions of 100 TPY or more will require monitoring analysis for O_3.

4.0 CONTROL TECHNOLOGY REVIEW

4.1 Applicability

The PSD regulations require new major stationary sources to undergo a control technology review for each pollutant that may potentially be emitted above significant amounts. The control technology review requirements of the PSD regulations are applicable to the GG4-9A turbine engines for CO, NO_x, and SO_2 (refer to Section 3.0), which require that BACT be applied for these pollutants.

This section presents the proposed BACT for these pollutants. The approach to the BACT analysis is based on the regulatory definitions of BACT, as well as consideration of EPA's current policy guidelines requiring a top-down approach. A BACT determination requires an analysis of the economic, environmental, and energy impacts of the proposed and alternative control technologies [Rules 62-210.200(40) and 62-212.400(4)(c), F.A.C.]. The analysis must, by definition, be specific to the turbine engines (i.e., case by case).

4.2 Overview of Proposed BACT

The project's GG4-9A turbine engines drive large compressors to supply air to the engine components that are being tested on the test stands A-8 and A-9. They are not industrial gas turbines used for stationary power generation with continuous base-load operation.

As described in Section 2.0, various engine load conditions are created for the test engines by varying the compressor discharge pressure. As the compressor discharge pressure is varied, the load on the GG4-9A turbine engines also varies. During normal test stand operations, the engines operate at various loads based on the test need, usually remaining at idle between tests. During testing, the test engines are subjected to extreme operating conditions such as the use of "rapid transients". To simulate rapid transients, the GG4-9A engines are taken from idle to full power or from full power to idle within a time period of a few seconds. Due to these rapid load changes, pre- or post-combustion CO, NO_x, or SO_2 emissions control technologies are considered to be technically infeasible for these engines.

EPA's RACT/BACT/LAER Clearinghouse (RBLC) database in their Clean Air Technology Center (CATC) website was searched for potentially applicable control options for turbines at test facilities. The search results presented in Table 4-1 show that no controls were applied.

Since control technologies are not feasible, none are proposed for the Project's two GG4-9A turbine engines. As part of the five-step BACT analysis, however, potential control technologies are identified followed by technical feasibility analysis in the following sections for the pollutants subject to BACT.

4.3 BACT Analysis

The approach to the BACT analysis is based on the regulatory definitions of BACT, as well as consideration of EPA's current policy guidelines requiring a top-down approach. A BACT determination requires analyses of the economic, environmental, and energy impacts of the proposed and alternative control technologies. The analyses must, by definition, be specific to the project (i.e., case-by-case).

4.3.1 Summary of Top-Down Process

The control technology review process and the "top-down" approach for BACT determination are described in Section 3.2. This procedure includes a five-step process for considering all available control technologies from most stringent to least stringent. The most stringent control technology is considered BACT unless the applicant demonstrates, and the permitting authority agrees, that technical considerations or energy, environmental, or economic impacts justify elimination of the most stringent technology and selection of a less stringent technology.

A summary of each of the five steps in the top-down process is described below. This process was repeated for each pollutant emitted from the turbine engines (CO, NO_x, and SO_2).

Step 1 – Identify All Control Technologies

The primary objective of Step 1 is to identify all potentially applicable control options. Potentially applicable control options are those air pollution control technologies, or techniques, with a practical potential for application to the emission unit and regulated pollutant under evaluation. Potentially applicable control options are categorized as lower emitting processes/practices or add-on controls.

A lower polluting process/practice is considered applicable if it has been demonstrated in a similar application. An add-on control is considered applicable if it can properly function given the physical and chemical characteristics of the pollutant-bearing emission stream. Combinations of control options should be considered whenever such combinations would provide more effective emissions control.

Step 2 – Eliminate Technically Infeasible Options

The objective of Step 2 is to refine the list of potentially applicable control technology options developed in Step 1 by evaluating the technical feasibility of each of the control technology options.

Per the EPA's Draft NSR Workshop Manual (EPA, 1990, New Source Review Workshop Manual, Chapter B, Section III.B.), control technologies that have been installed and operated successfully on the type of source under review are "demonstrated" and are considered technically feasible. For technologies that have not been demonstrated for a particular source type, EPA's Draft Manual states the following regarding technical feasibility:

Two key concepts are important in determining whether an undemonstrated technology is feasible: "availability" and "applicability." As explained in more detail below, a technology is considered "available" if it can be obtained by the applicant through commercial channels or is otherwise available within the common sense meaning of the term. An available technology is "applicable" if it can reasonably be installed and operated on the source type under construction. A technology that is available and applicable is technically feasible (EPA, 1990, New Source Review Workshop Manual, Chapter B, Section IV.B).

Per this guidance, a technology is considered technically infeasible if it is not available or not applicable. EPA's Draft NSR Manual provides additional guidance on availability and applicability of a given technology for a particular source type:

A control technique is considered available if it has reached the licensing and commercial sales stage of development. A source would not be required to experience extended time delays or resources penalties to allow research to be conducted on a new technique. Neither is it expected that an applicant would be required to experience extended trials to learn how to apply a technology on a totally new and dissimilar source type. Consequently, technologies in the pilot scale testing stages of development would be considered available for BACT review (EPA, 1990, New Source Review Workshop Manual, Chapter B, Section IV.B).

Commercial availability by itself, however, is not necessarily sufficient basis for concluding a technology to be applicable and, therefore, technically feasible. Technical feasibility, as determined in Step 2, also means a control option may reasonably be deployed on or "applicable" to the source type under consideration. Technical judgment on the part of the applicant and the review authority is

to be exercised in determining whether a control alternative is applicable to the source type under consideration.

In general, a commercially available control option will be presumed applicable if it has been or is soon to be deployed (e.g., is specified by permit) on the same or similar source type. Absent a showing of this type, technical feasibility would be based on examination of the physical and chemical characteristics of the pollutant-bearing gas stream and comparison to the gas stream characteristics of the source types to which the technology has been applied previously. Deployment of the control technology on an existing source with similar gas stream characteristics is generally sufficient for concluding technical feasibility, barring a demonstration to the contrary.

In the Step 2 analysis, each technology presented in Step 1 is evaluated to determine whether the technology is both available and applicable. Control technologies that are not available or not applicable are determined to be technically infeasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

In Step 3 of the "top-down" approach, control technologies not eliminated in Step 2 are ranked in order of control effectiveness.

The ranking of the control options initially involves the establishment of appropriate units of emission performance. Once measure of performance is established, factors such as the operational characteristics of each of the control technologies and any operating assumptions are considered in establishing emissions reduction potential.

After identifying the appropriate performance units and establishing the emissions performance levels for each control technology, a table is developed to rank the control technology options by their respective emissions performance from lowest to highest emissions level (highest to lowest control effectiveness).

Step 3 of the analysis also includes a list of energy, environmental, and economic impacts associated with each control option. These impacts are evaluated in the next step of the analysis.

Step 4 – Evaluate the Most Effective Controls and Document Results

The purpose of Step 4 is to either confirm the suitability of the top ranked control technology option as BACT, or provide clear justification for determination that a lower-ranked control technology option is BACT for the case under consideration. In order to establish the suitability of a control technology option, a case-by-case evaluation of energy, environmental, and economic impacts of the control technology is performed.

The energy impacts analysis determines whether the energy requirements of the control technology would result in any significant energy penalties or benefits. The environmental impacts analysis considers site-specific impacts of the solid, liquid, and gaseous discharges that would result from implementation of the control technology. The economic impacts analysis considers the cost effectiveness and the incremental cost effectiveness to establish whether the control technology would result in a negative economic impact.

The case-by-case determinations consider both beneficial and adverse direct impacts from energy, environmental, and economic standpoints. In cases where the determination establishes that there are significant energy, environmental, and/or economic issues that would preclude the selection of the evaluated alternative as BACT, the basis for this determination is clearly documented, and the next most effective alternative is similarly evaluated. This process continues until the evaluated alternative is not rejected and is selected as BACT.

Step 5 – Most Effective Control Alternative not Eliminated Selected as BACT

In Step 5, the highest ranked control technology not eliminated in Step 4 is selected as BACT.

4.4 BACT Analysis for the GG4-9A Turbine Engines

This section contains the BACT analysis for the CO, NO_x, and SO_2 emissions from the turbine engines.

4.4.1 Carbon Monoxide

Step 1 – Identification of CO Control Technologies

CO emissions are a result of incomplete thermal oxidation of carbon contained within the fuel. When the turbine engines are operating at full load, the combustion system operates at high firing temperatures and most of the CO is oxidized to carbon dioxide (CO_2). But at low loads, when the firing temperature is lower, the CO to CO_2 oxidation reaction is quenched by the cool regions near the

walls of the combustion chamber. This results in increased CO emissions at low loads. The GG4-9A turbine engines at the PWR Palm Beach test facility idle for 24 percent of the total annual operating hours, but CO emissions due to idling are more than 60 percent of the annual CO emissions.

The EPA's RBLC database was queried for CO BACT determinations for turbines at test facilities; the results are presented in Table 4-1. As shown, control technologies were not applied for CO emissions.

The following potential control options are identified and discussed in the following paragraphs:

- Combustion controls,
- Oxidation catalyst, and
- SCONO$_x$™ process.

Combustion Controls

CO emissions are generated from the incomplete combustion of carbon in the fuel and organic compounds. Optimization of the combustion chamber designs and operation practices that improve the oxidation process and minimize incomplete combustion is the primary mechanism available for lowering CO emissions. This process is often referred to as combustion controls.

Oxidation Catalyst

Catalytic oxidation technology is primarily designed to reduce CO emissions. Oxidation catalysts operate at elevated temperatures. In the presence of an oxidation catalyst, excess oxygen (O_2) in the exhaust reacts with CO to form CO_2. No chemical reagent is necessary. The oxidation catalyst is typically a precious metal catalyst. None of the catalyst components are considered toxic.

Oxidation catalysts are susceptible to fine particles suspended in the exhaust gases that can foul and poison the catalyst. Catalyst poisoning reduces catalyst activity and pollutant removal efficiencies. The catalytic oxidation of CO in the combustion gases to CO_2 takes place in temperatures ranging from 500 to 1,100 degrees Fahrenheit (°F).

SCONO$_x$™ Process

The SCONO$_x$™ system, described in detail in Subsection 4.4.2, also controls CO. The SCONO$_x$™ system employs a single catalyst to simultaneously oxidize CO to CO_2 and NO to NO_2. The SCONO$_x$™ operates at a temperature range of 300 to 700°F.

Step 2 – Technical Feasibility Analysis

Technical feasibility of the potential control options is evaluated below:

- **Combustion Controls.** Turbine combustors typically have high combustion temperature. As a result, CO emissions from the turbine combustor units are inherently low. However, at low load conditions, high CO emissions are a result of low combustion temperature and combustion chamber design has no effect on it. Most of the CO emissions from the GG4-9A turbine engines are due to idling and low load conditions. The idling is necessary so that the turbines don't have to be started before every test.

  As a result, combustion controls is considered to be not technically feasible for the GG-4A turbine engines at the PWR facility.

- **Oxidation Catalyst.** The oxidation catalyst system is effective within the temperature window of 500 to 1,100°F. Most of the CO emissions from the GG4-9A turbine engines are due to idling when the exhaust temperature is also below the optimum temperature range.

  Since most of the CO emissions will not be controlled, an oxidation catalyst system is considered to be not feasible for the GG4-9A turbine engines at the PWR test facility.

- **SCONO$_x$™.** As described in the BACT evaluation for NO_x in Section 4.4.2, SCONO$_x$™ is considered to be not technically feasible for the GG4-9A turbines.

Step 3 – Rank Control Technologies by Control Effectiveness

In Step 3 of the "top-down" approach, control technologies not eliminated in Step 2 are ranked in order of control effectiveness. All the control technologies considered in Step 2 are considered as not technically feasible.

Step 4 – Evaluate the Most Effective Controls

Since all the control technologies considered in Step 2 are considered as technically infeasible, no evaluation was done.

Step 5 – Select BACT

In the absence of any feasible control technologies currently available, direct atmospheric exhaust with no controls is determined to be the BACT for CO.

4.4.2 Nitrogen Oxides

Step 1 – Identification of NO_x Control Technologies

In addition to searching the EPA's RBLC database, the following resources were used as references:

- PSD Permit Application for Test Cell 2 and 5 Modification, GE Aviation, Lynn, MA, CH2MHill, September 2007.
- Nitrogen Oxide Emissions and Their Control from Uninstalled Aircraft Engines in Enclosed Test Cell, Joint EPA – U.S. Department of Transportation (DOT) Report, Report No. EPA 453/R-94-068, October 1994.
- Regulatory Support Document, Control of Air Pollution from Aircraft and Aircraft Engines, from the Direct Final Review of Aircraft Emission Standards, U.S. EPA, February 1997.
- Best Available Control Technology Analysis for Modification of Engine Test Cells at Tinker Air Force Base, Oklahoma, Air Force Center for Environmental Excellence (AFCEE), July 2006.

The report entitled "Nitrogen Oxide Emissions and Their Control from Uninstalled Aircraft Engines in Enclosed Test Cell," Report No. EPA-453/R-94-068, October 1994, concludes that there are no existing technologies for control of NO_x that have been applied (full scale) to aircraft engine test cells in the United States.

The EPA's RBLC database was queried for NO_X BACT determinations for turbines at test facilities; the results are presented in Table 4-2.

The following control technologies were identified as potentially available and are discussed in the following paragraphs:

- Water or steam injection;
- Selective Catalytic Reduction (SCR);
- $SCONO_x$™ process; and
- Selective Non-Catalytic Reduction (SNCR).

Water or Steam Injection

The injection of water or steam in the combustion zone reduces the flame temperature with a corresponding decrease of thermal NO_x emissions. It is an effective mechanism to control NO_x emissions during steady-state operation. The amount of NO_x reduction possible depends on the combustor design and the water-to-fuel ratio employed. An increase in the water to fuel ratio will

western portions of the Loxahatchee NWR, most notably melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthifolius*), Old World climbing fern (*Lygodium microphyllum*), water lettuce (*Pistia stratioides*), and water hyacinth (*Eichhornia crassipes*).

Soils in the area are primarily histosols, which are peat soils with high amounts of organic matter. The agricultural lands surrounding the site are part of the Everglades Agricultural Area, which is noted for its "muck", i.e., rich, black soil that is very fertile.

According to the modeling results presented in Section 6.0, the maximum air quality impacts due to the project are predicted to be below the significant impact levels. Therefore, the impacts are well below the AAQS and PSD increments. The AAQS were established to protect both public health and welfare. Public welfare is protected by the secondary AAQS, which Florida has adopted. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings (EPA, 2007) (Federal Register, Vol. 72, #132, pp. 37867-37916, July 2007).

Since the project's impacts on the local air quality are predicted to be less than the significant impact levels and less than the effect levels on soils and vegetation, the project's impacts on soils, vegetation, and wildlife in the project's vicinity are expected to be negligible. With regard to O_3 concentrations, VOC and NO_x emissions are precursors to O_3 formation, and the project's VOC and NO_x emissions represent an insignificant increase in VOC and NO_x emissions for Palm Beach County (see Subsections 7.1.2.1 and 7.1.2.2). The project's maximum NO_x emissions are 1,003.5 TPY. These emissions represent an approximate increase in total county-wide NO_x emissions of 2.7 percent.

7.3.2 Impacts on Wildlife

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the National AAQS. This occurs in non-attainment areas, e.g., Los Angeles Basin. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations (Newman and Schreiber, 1988). Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed (Newman, 1981).

Although air pollution impacts to wildlife have been reported in the literature, many of the incidents involved acute exposures to pollutants, usually caused by unusual or highly concentrated releases or unique weather conditions. It is highly unlikely that emissions from PWR will cause adverse effects to wildlife due to the project's low impacts, well below the AAQS. Coupled with the mobility of wildlife, the potential for exposure of wildlife to the project's impacts is extremely unlikely.

7.4 Impacts to AQRVs in the Everglades NP PSD Class I Area

7.4.1 Identification of AQRVs and Methodology

An AQRV analysis was conducted to assess the potential risk to AQRVs at the Everglades NP due to the proposed emissions from the project. The Everglades NP is the closest PSD Class I area to the site, located approximately 128 km south of the PWR site.

The U.S. Department of the Interior in 1978 defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978, Vol. 43, #69, p. 15016).*

The AQRVs include visibility, freshwater and coastal wetlands, dominant plant communities, unique and rare plant communities, soils and associated periphyton, and the wildlife dependent on these communities for habitat. Rare, endemic, threatened, and endangered species of the national park and bioindicators of air pollution (e.g., lichens) are also evaluated.

For each pollutant emitted in excess of the EPA significant emission rate, additional analyses are required to determine the project's maximum impacts on AQRVs at the PSD Class I area. For the Everglades NP PSD Class I area, the AQRVs that need to be addressed for the project are visibility impairment and sulfur and nitrogen deposition. The evaluation of visibility impairment is in the form of regional haze determined for a 24-hour averaging time. Total nitrogen and total sulfur deposition are predicted for an annual averaging time.

The maximum concentrations for CO, NO_2, and SO_2 are shown in Table 7-4 for the annual, 24-hour, 8-hour, 3-hour and 1-hour averaging times. These maximum concentrations were compared to the potential effect levels for vegetation and wildlife in Subsection 7.2.

7.4.2 Impacts to Soils

The soils of the Everglades NP are generally classified as histosols or entisols. Histosols (peat soils) are organic and have extremely high buffering capacities based on their CEC, base saturation, and bulk density. Therefore, they would be relatively insensitive to atmospheric inputs. The entisols are shallow sandy soils overlying limestone, such as the soils found in the pinelands. The direct connection of these soils with subsurface limestone tends to neutralize any acidic inputs. Moreover, the groundwater table is highly buffered due to the interaction with subsurface limestone formations, which results in high alkalinity (as calcium carbonate).

The relatively low sensitivity of the soils to acid inputs, coupled with the extremely low ground-level concentrations of air pollutants projected for the Everglades NP from the PWR project emissions, precludes any significant impact on soils.

7.4.3 Impacts to Vegetation

7.4.3.1 Carbon Monoxide

The maximum 1-hour average CO concentration due to the project is 4.4 $\mu g/m^3$ in the Class I area, which is 0.00006 percent of the minimum value that caused inhibition in laboratory studies (i.e., 6.85×10^6 $\mu g/m^3$, see Subsection 7.2.2.1). The amount of damage sustained at this level, if any, for 1 hour would have negligible effects over an entire growing season. The maximum predicted annual concentration of 0.012 $\mu g/m^3$ reflects a more realistic, yet conservative, CO impact level for the Class I area. This maximum concentration is predicted to be less than 0.000002 percent of the value that caused cytochrome *c* oxidase inhibition (6.85×10^5 $\mu g/m^3$).

7.4.3.2 Nitrogen Dioxide

The maximum 1-, 3-, and 8-hour average NO_2 concentrations due to the project are predicted to be 0.92, 0.71, and 0.57 $\mu g/m^3$, respectively, at the Class I area. These concentrations are approximately 0.004 to 0.024 percent of the levels that could potentially injure 5 percent of vascular plant foliage (i.e., 3,800 to 15,000 $\mu g/m^3$; see Subsection 7.2.2.2), and 0.16 percent of the concentration that caused adverse effects in lichen species in acute exposure scenarios (564 $\mu g/m^3$; see Subsection 7.2.2.2). For chronic exposure, the maximum annual NO_2 concentration due to the project is predicted to be

0.0040 $\mu g/m^3$ at the Class I area, which is less than 0.0002 percent of the level that caused minimal yield loss and chlorosis in plant tissue (2,000 $\mu g/m^3$; see Subsection 7.2.2.2).

Although it has been shown that simultaneous exposure to SO_2 and NO_2 results in synergistic plant injury (Ashenden and Williams, 1980), the magnitude of this response is generally only 3 to 4 times greater than either gas alone, and usually occurs at unnaturally high levels of each gas. Therefore, the project's concentrations within the Everglades NP are still far below the levels that potentially cause plant injury for either acute or chronic exposure.

7.4.3.3 NO_x Emissions and Impacts to Ozone

NO_x emissions are precursors to O_3 formation. Based on the O_3 monitoring concentrations measured in Palm Beach County, and NO_x emissions increases due to the project, the potential change in O_3 concentrations due to the project is expected to be minimal, with the maximum O_3 concentrations in the region to remain in compliance with the AAQS. As discussed in Subsection 7.3.1, the project is projected to increase county-wide NO_x emissions by less than 3 percent. These increases are even less when the total emissions from the southeast Florida air shed are considered.

7.4.3.4 Sulfur Dioxide

The maximum annual average SO_2 concentration at the Class I area resulting from the PWR project is 0.0009 $\mu g/m^3$, less than 0.01 percent of the concentration that damaged the most sensitive lichen species (8 $\mu g/m^3$; see Subsection 7.2.2.4). The maximum 3-, 8-, and 24-hour average SO_2 concentrations for the project are predicted to be 0.12, 0.097, and 0.040 $\mu g/m^3$, respectively, at the Class I area. The maximum 3-hour average SO_2 concentration predicted for the project at the Class I area is less than 0.02 percent of the acute exposure that caused damage to sensitive species of vegetation (i.e., 790 $\mu g/m^3$; see Subsection 7.2.2.4). The modeled annual incremental increase in SO_2 adds only slightly to background levels of this gas and poses no threat to vegetation within the Everglades NP.

7.4.3.5 Sulfuric Acid Mist

Although not required for PSD review, the project's SAM emissions are addressed because SO_2 concentrations can lead directly to the formation of SAM concentrations. No significant adverse effects on vegetation are expected from the project's SAM emissions, since the SO_2 concentrations are predicted to be well below levels that have been documented as adversely affecting vegetation. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of

soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein et al., 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

7.4.3.6 Summary

In summary, the phytotoxic effects of the project's emissions within the Everglades NP are expected to be minimal. It is important to note that emissions were evaluated with the assumption that 100 percent was available for plant uptake. This is rarely the case in a natural ecosystem.

7.4.4 Impacts to Wildlife

The project's low emissions are well below the AAQS, which are protective of soils, vegetation, and wildlife resources. The maximum predicted impacts of the project in the Class I area are up to 6 orders of magnitude lower than values of potential impacts to wildlife shown in Table 7-3. No significant effects on wildlife AQRVs from SO_2, NO_x, and CO are expected.

7.4.5 Impacts upon Visibility

7.4.5.1 Introduction

The CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I areas. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. Sources of air pollution can cause visible plumes if emissions of PM_{10} and NO_x are sufficiently large. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background (e.g., the sky or a terrain feature, such as a mountain). PSD Class I areas, such as national parks and wilderness areas, are afforded special visibility protection designed to prevent plume visual impacts to observers within a Class I area.

Visibility is an AQRV for the Everglades NP. Visibility can take the form of plume blight for nearby areas, or regional haze for long distances (e.g., distances beyond 50 km). Because the Everglades NP lies more than 50 km from the PWR site, the change in visibility is analyzed as regional haze.

Currently there are several air quality modeling approaches recommended by the IWAQM to perform these analyses. The IWAQM consists of EPA and FLMs of Class I areas who are responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations

have been summarized in the IWAQM Phase 2 report and the FLAG document. The methods and assumptions recommended in these documents were used to assess visibility impairment due to the project.

7.4.5.2 Visibility Analysis at Everglades NP

Methodology

Based on the FLAG document, current regional haze guidelines characterize a change in visibility by the change in the light-extinction coefficient (b_{ext}). The b_{ext} is the attenuation of light per unit distance due to the scattering and absorption by gases and particles in the atmosphere. A change in the extinction coefficient produces a perceived visual change. An index that simply quantifies the percent change in visibility due to the operation of a source is calculated as:

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

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

b_{extb} is the background extinction coefficient.

The purpose of the visibility analysis is to calculate the extinction at each receptor for each day (24-hour period) of the year due to the proposed project. The FLMs have recommended that a project's impacts be compared to a screening criterion based on a change in extinction of 5 percent or greater for any day of the year. If a project's impacts were less than the screening criterion, the project's impacts are assumed not to have an adverse impact on regional haze and no additional analyses would be required.

Processing of visibility impairment for this study was performed with the CALPUFF model and the CALPUFF post-processing program CALPOST. The analysis was conducted in accordance with the most recent guidance from the FLAG document. The CALPUFF postprocessor model CALPOST is used to calculate the combined visibility effects from the different pollutants that are emitted from the project. Daily background extinction coefficients are calculated on an hour-by-hour basis using hourly relative humidity data from CALMET and hygroscopic and non-hygroscopic extinction components specified in the FLAG document (i.e., Visibility Method 2). For the Everglades NP, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse megameters (Mm^{-1}).

CALPOST then calculates the percent extinction change for each day of the year. The visibility impairment criterion is 5.0 percent. Prior correspondence with the NPS, the FLM for the Everglades NP,

has indicated that visibility results using monthly relative humidity factors (i.e., Visibility Method 6) can also be provided. It is noted that Visibility Method 6 is currently used for visibility impact analyses associated with BART regulations and is proposed for visibility assessment for PSD applications in the recent draft revised FLM's AQRV Workgroup (FLAG) Phase I Report (June 27, 2008 Draft), referred to as the proposed FLAG document.

Results

The results of the visibility analysis at the Everglades NP are presented in Table 7-5. Using Method 2, the project's maximum change in visibility is predicted to be approximately 3.99 percent. Using Method 6, which is the preferred method under the proposed FLAG document, the project's maximum change in visibility is predicted to be approximately 1.67 percent, well below the FLM's recommended screening criterion of 5 percent change. As a result, the project is not expected to have an adverse impact on existing regional haze at the PSD Class I area of the Everglades NP.

7.4.6 Sulfur and Nitrogen Deposition

7.4.6.1 General Methods

As part of the AQRV analyses, total nitrogen (N) and sulfur (S) deposition rates were predicted for the project at the Everglades NP. The deposition analysis criterion is based on the annual averaging period. The total deposition is estimated in units of kilograms per hectare per year (kg/ha/yr) of N or S. The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- Nitrogen oxides (NO_x), dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

For S deposition, the species include:

- Sulfur dioxide (SO_2), wet and dry deposition; and
- Ammonium sulfate (SO_4), wet and dry deposition.

The CALPUFF model produces results in units of micrograms per square meter per second ($\mu g/m^2/s$), which are then converted to units of kg/ha/yr.

Deposition analysis thresholds (DATs) for total N and S deposition of 0.01 kg/ha/yr were provided by the FLM. A DAT is the additional amount of N or S deposition within a Class I area below which estimated impacts from a new or modified source are considered insignificant. The FLM has recommended DATs of 0.01 kg/ha/yr for both N and S deposition. The maximum N and S depositions predicted for the project are, therefore, compared to these DATs or significant impact levels.

7.4.6.2 Results

The maximum predicted total annual N and S depositions predicted for the project in the PSD Class I area of the Everglades NP are summarized in Table 7-6. The maximum annual N and S deposition rates for the project are predicted to be 0.0018 and 0.0007 kg/ha/yr, respectively. The deposition rates are well below the N and S DATs of 0.01 kg/ha/yr.

TABLE 7-1
SO_2 EFFECTS LEVELS FOR VARIOUS PLANT SPECIES
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Plant Species	Observed Effect Level ($\mu g/m^3$)	Exposure (Time)	Reference
Sensitive to tolerant	920 (20 percent displayed visible injury)	3 hours	McLaughlin and Lee, 1974
Lichens	200 to 400	6 hr/wk for 10 weeks	Hart et al., 1988
Cypress, slash pine, live oak, mangrove	1,300	8 hours	Woltz and Howe, 1981
Jack pine seedlings	470-520	24 hours	Malhotra and Kahn, 1978
Black oak	1,310	Continuously for 1 week	Carlson, 1979

TABLE 7-2
SENSITIVITY GROUPINGS OF VEGETATION BASED ON VISIBLE INJURY AT DIFFERENT SO_2 EXPOSURES[a]
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Plant Species	Observed Effect Level ($\mu g/m^3$)	Exposure (Time)	Reference
Sensitive	1,310 - 2,620 $\mu g/m^3$	790 - 1,570 $\mu g/m^3$	Ragweeds
	(0.5 - 1.0 ppm)	(0.3 - 0.6 ppm)	Legumes
			Blackberry
			Southern pines
			Red and black oaks
			White ash
			Sumacs
Intermediate	2,620 - 5,240 $\mu g/m^3$	1,570 - 2,100 $\mu g/m^3$	Maples
	(1.0 - 2.0 ppm)	(0.6 - 0.8 ppm)	Locust
			Sweetgum
			Cherry
			Elms
			Tulip tree
			Many crop and garden species
Resistant	>5,240 $\mu g/m^3$	>2,100 $\mu g/m^3$	White oaks
	(>2.0 ppm)	(>0.8 ppm)	Potato
			Upland cotton
			Corn
			Dogwood
			Peach

[a] Based on observations over a 20-year period of visible injury occurring on over 120 species growing in the vicinities of coal-fired power plants in the southeastern United States.

Source: EPA, 1982a.

TABLE 7-3
EXAMPLES OF REPORTED EFFECTS OF AIR POLLUTANTS AT CONCENTRATIONS BELOW NATIONAL SECONDARY AMBIENT AIR QUALITY STANDARDS
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Plant Species	Observed Effect Level ($\mu g/m^3$)	Exposure (Time)	Reference
Sulfur Dioxide[a]	Respiratory stress in guinea pigs	427 to 854	1 hour
	Respiratory stress in rats	267	7 hours/day; 5 day/week for 10 weeks
	Decreased abundance in deer mice	13 to 157	continually for 5 months
Nitrogen Dioxide[b,c]	Respiratory stress in mice	1,917	3 hours
	Respiratory stress in guinea pigs	96 to 958	8 hours/day for 122 days
Particulates[a]	Respiratory stress, reduced respiratory disease defenses	120 PbO_3	continually for 2 months
	Decreased respiratory disease defenses in rats, same with hamsters	100 $NiCl_2$	2 hours

[a] Source, Newman and Schreiber, 1988.

[b] Gardner and Graham, 1976.

[c] Trzeciak et al., 1977.

TABLE 7-4
MAXIMUM POLLUTANT CONCENTRATIONS PREDICTED
AT THE EVERGLADES NATIONAL PARK
PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Pollutant	Averaging Time	Maximum Predicted Concentration[a,b] (ug/m^3)		
		2001	2002	2003
CO	Annual	0.0093	0.0094	0.0122
	24-Hour	1.0700	1.0008	0.8921
	8-Hour	3.0253	1.9360	2.4796
	3-Hour	3.7745	3.2617	2.9838
	1-Hour	4.0086	4.2012	4.4416
NO_2	Annual	0.0032	0.0029	0.0040
	24-Hour	0.2029	0.1797	0.1951
	8-Hour	0.4600	0.4812	0.5698
	3-Hour	0.7102	0.6415	0.6111
	1-Hour	0.7927	0.9182	0.8308
SO_2	Annual	0.0006	0.0007	0.0009
	24-Hour	0.0353	0.0399	0.0342
	8-Hour	0.0939	0.0803	0.0972
	3-Hour	0.1243	0.1205	0.1112
	1-Hour	0.1393	0.1696	0.1733

[a] Concentrations are based on highest predicted concentrations from CALPUFF using 3 years of meteorological data for 2001 to 2003.

[b] Based on the worst case emission rate.

TABLE 7-5
MAXIMUM 24-HOUR VISIBILITY IMPAIRMENT PREDICTED FOR THE PROPOSED PROJECT AT THE EVERGLADES NP PSD CLASS I AREA PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Background Extinction Method	Visibility Impairment (%) [a] 2001	2002	2003	Visibility Impairment Criterion (%)
Method 2 with RHMAX = 95 Percent	2.85	3.94	3.74	5.0
Method 6 with monthly F(RH) factors	1.07	1.64	1.50	5.0

Note: RHMAX is the maximum relative humidity used in the model; F(RH) is the relative humidity factor.

[a] Concentrations are highest predicted using CALPUFF V5.8 with CALMET V5.8 4-km Domains, 2001 to 2003. Background extinctions calculated using FLAG Document (December 2000) and stated method.

TABLE 7-6
ANNUAL TOTAL NITROGEN AND SULFUR DEPOSITION PREDICTED FOR THE PROPOSED PROJECT AT THE EVERGLADES NP PSD CLASS I AREA PRATT & WHITNEY ROCKETDYNE, WEST PALM BEACH, FLORIDA

Species	Year	Total Deposition (Wet & Dry) ($g/m^2/s$)	Total Deposition (Wet & Dry) (kg/ha/yr)[a]	Deposition Analysis Threshold[b] (kg/ha/yr)
Nitrogen (N) Deposition	2001	3.48E-12	0.0011	0.01
	2002	5.57E-12	0.0018	0.01
	2003	4.55E-12	0.0014	0.01
Sulfur (S) Deposition	2001	1.71E-12	0.0005	0.01
	2002	2.25E-12	0.0007	0.01
	2003	1.70E-12	0.0005	0.01

[a] Conversion factor is used to convert $g/m^2/s$ to kg/hectare (ha)/yr with the following units:

$g/m^2/s$ x 0.001 kg/g
x 10,000 m^2/hectare
x 3,600 sec/hr
x 8,760 hr/yr = kg/ha/yr
or
$g/m^2/s$ x 3.154E+08 = kg/ha/yr

[b] Deposition analysis thresholds (DATs) for nitrogen deposition provided by the U.S. Fish and Wildlife Service, January 2002. A DAT is the additional amount of N or S deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant.

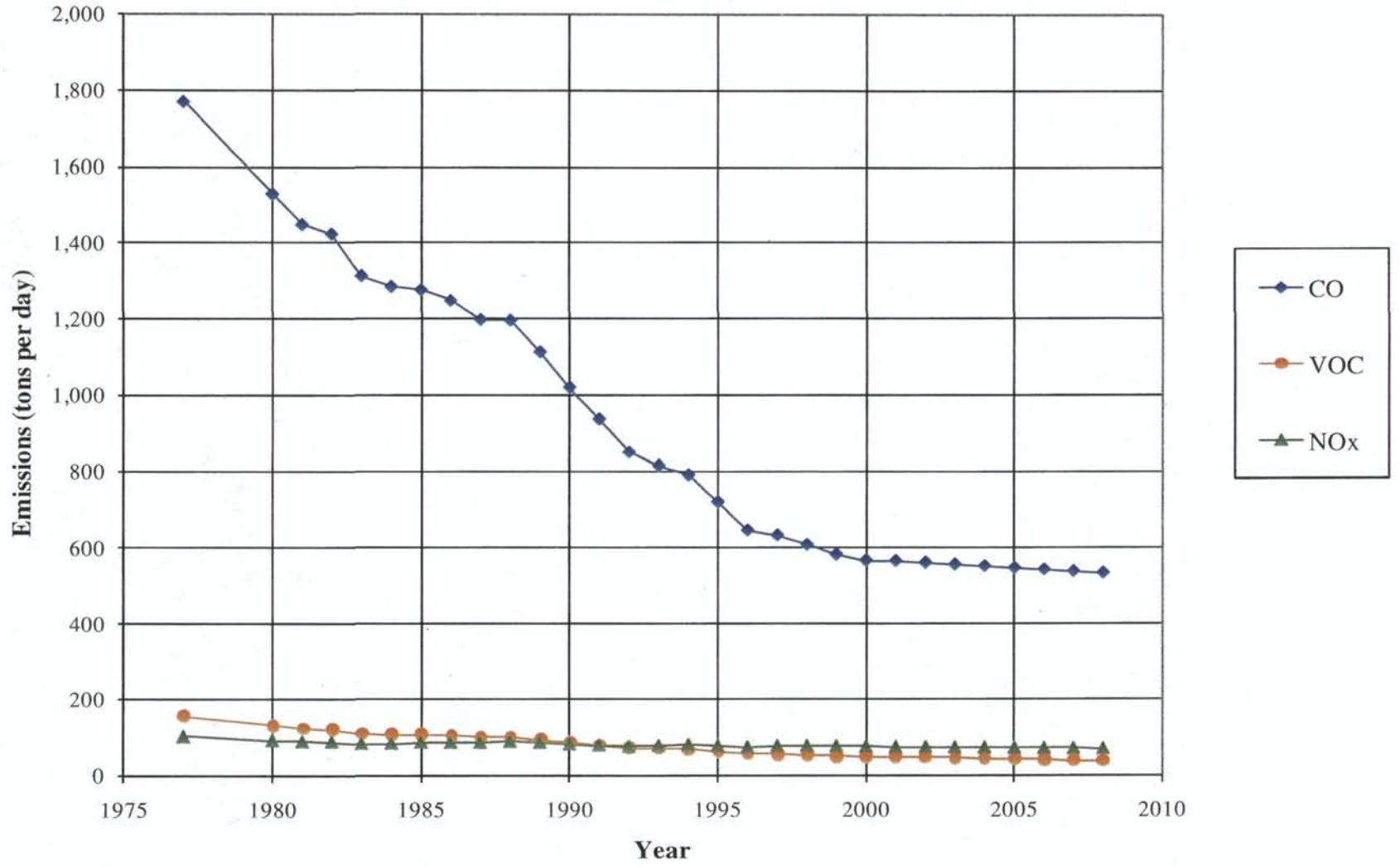


Figure 7-1
Mobile Source Emissions (tons per day) of CO, VOCs and NO_x in Palm Beach County

Source: Golder, 2009.

Golder Associates

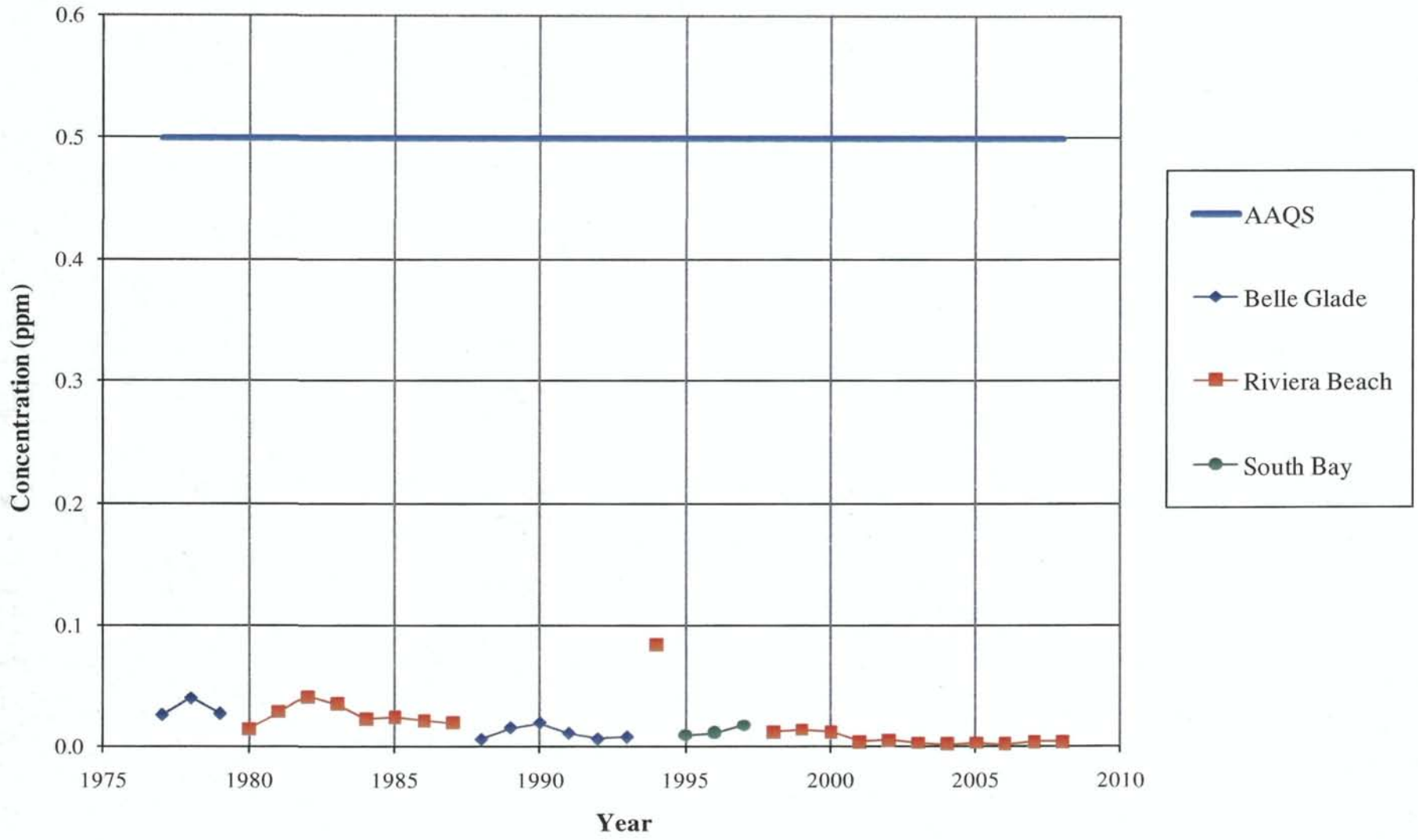


Figure 7-2
1-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

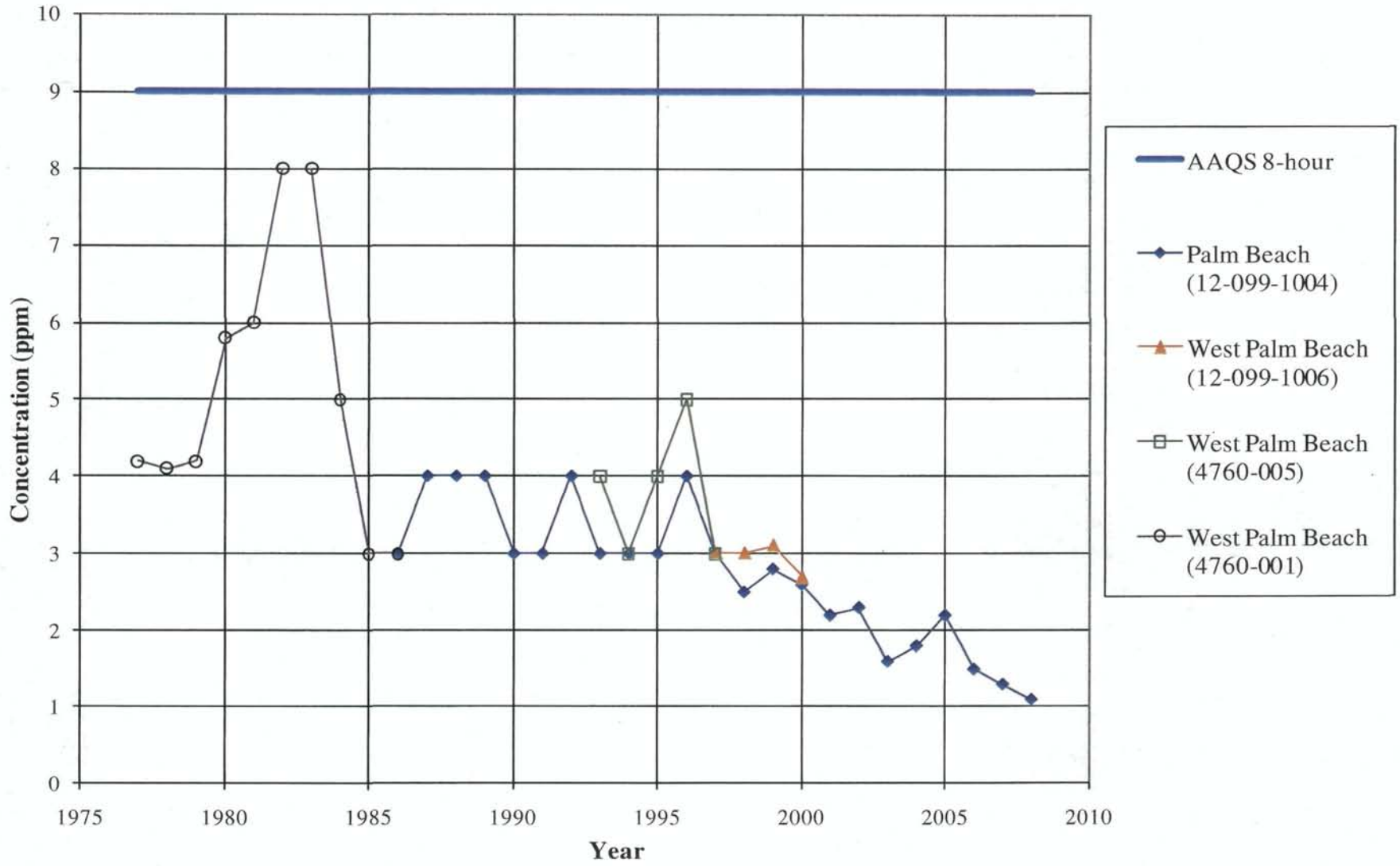


Figure 7-3
8-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

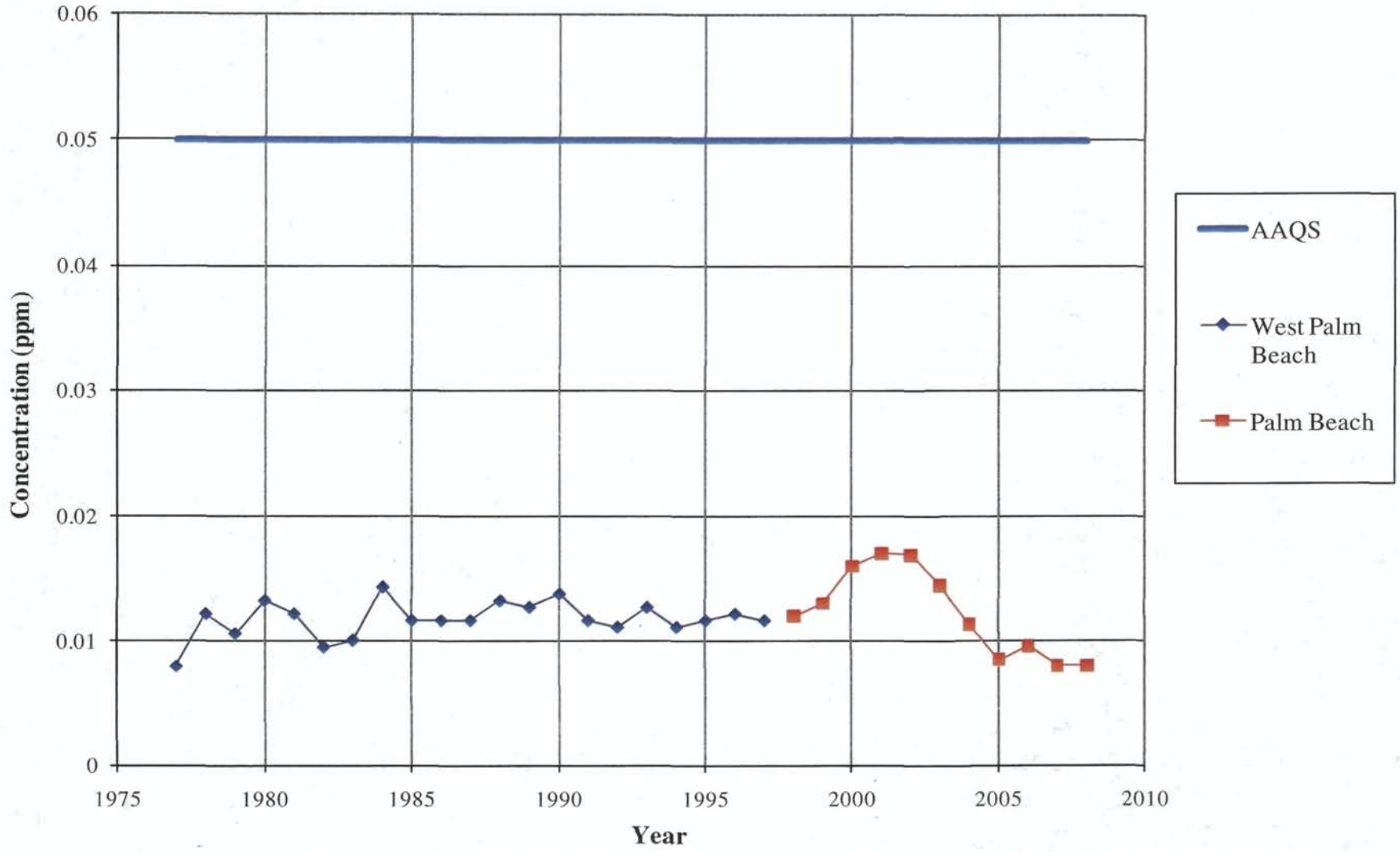


Figure 7-4
Measured Annual Average Nitrogen Dioxide Concentrations from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

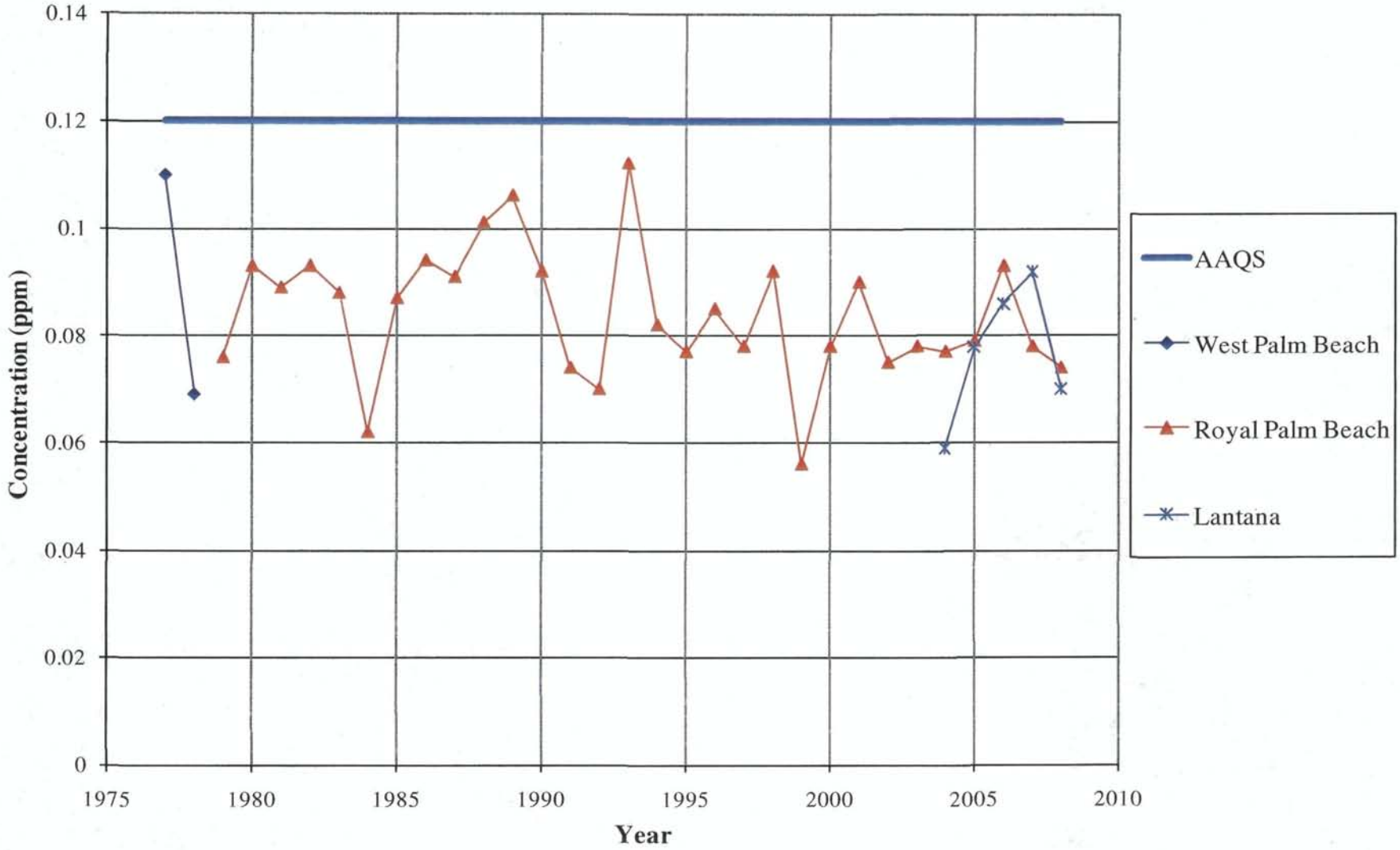


Figure 7-5
1-Hour Average Ozone Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

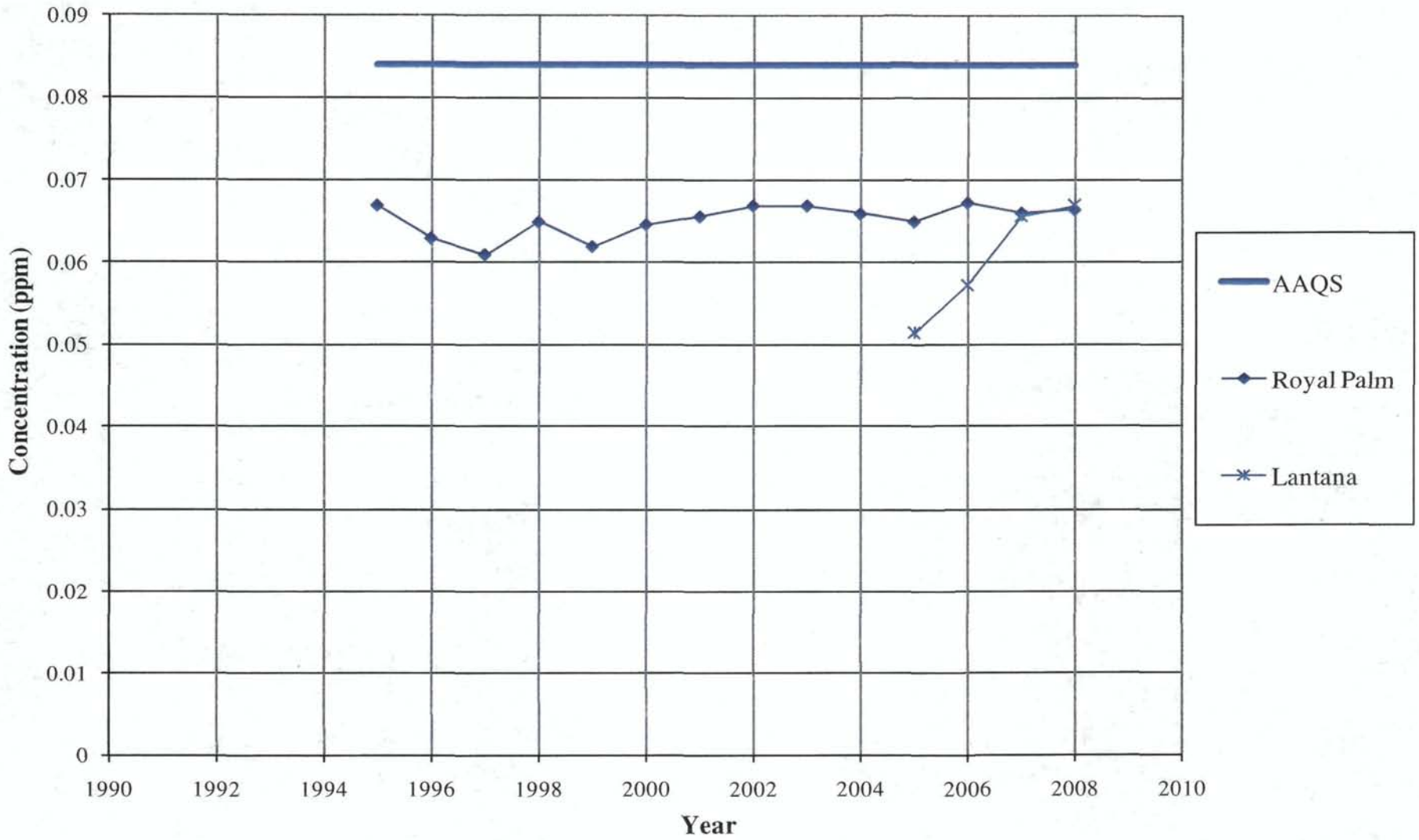


Figure 7-6
8-Hour Average Ozone Concentrations (3-year Average of the 4th Highest Values)
Measured from 1995 to 2007 - Palm Beach County

Source: Golder, 2009.

Golder Associates

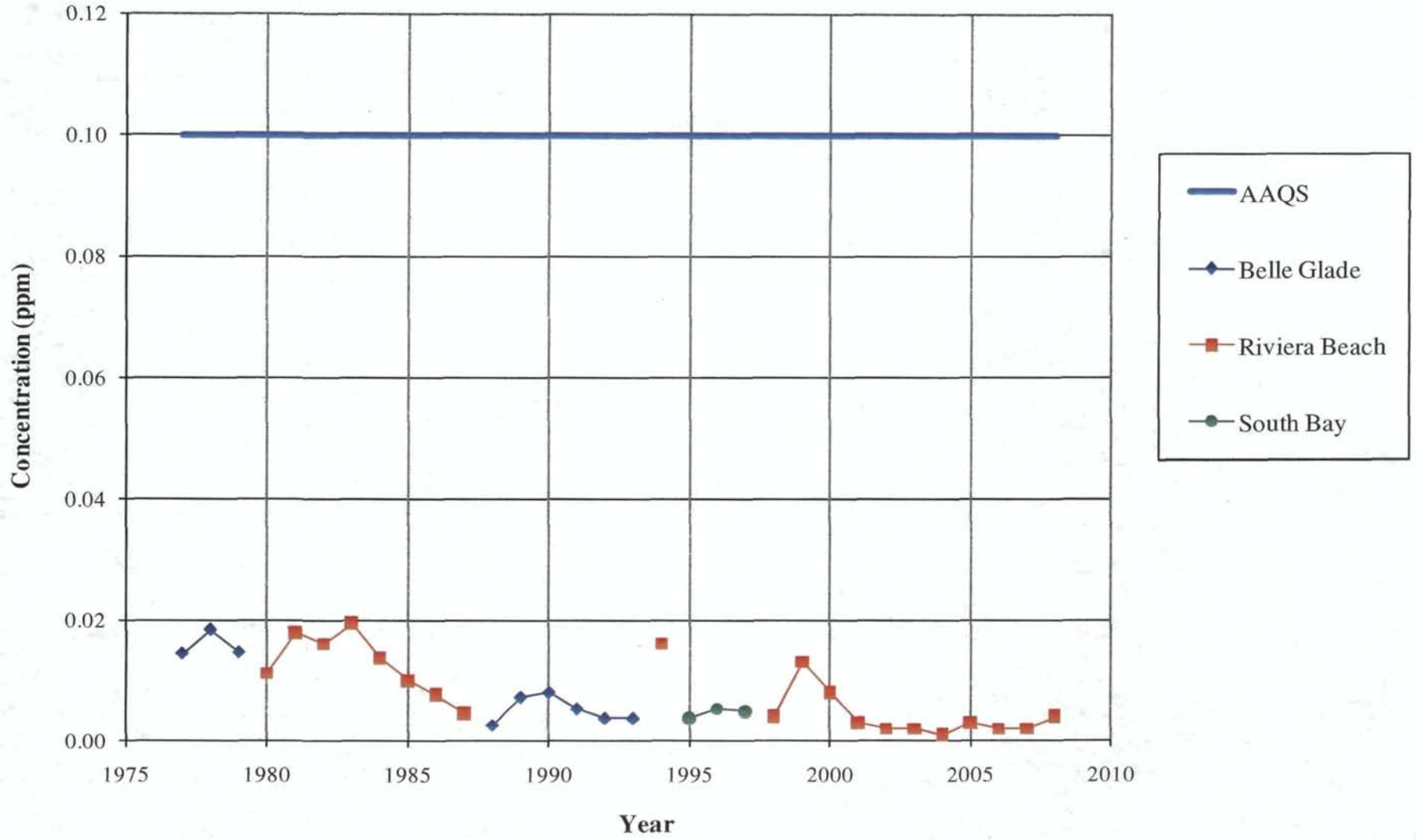


Figure 7-7
24-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

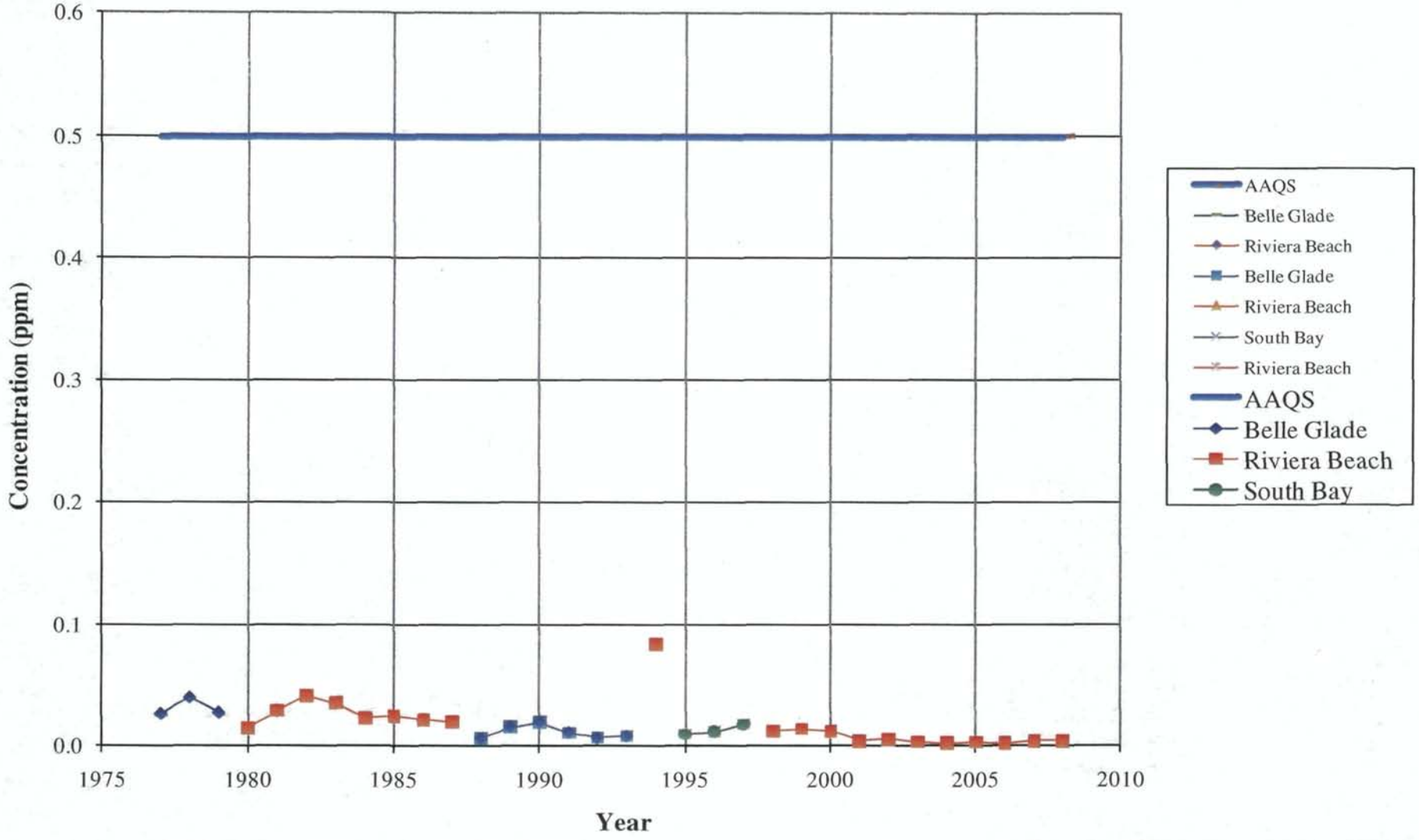


Figure 7-8
3-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) Measured from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

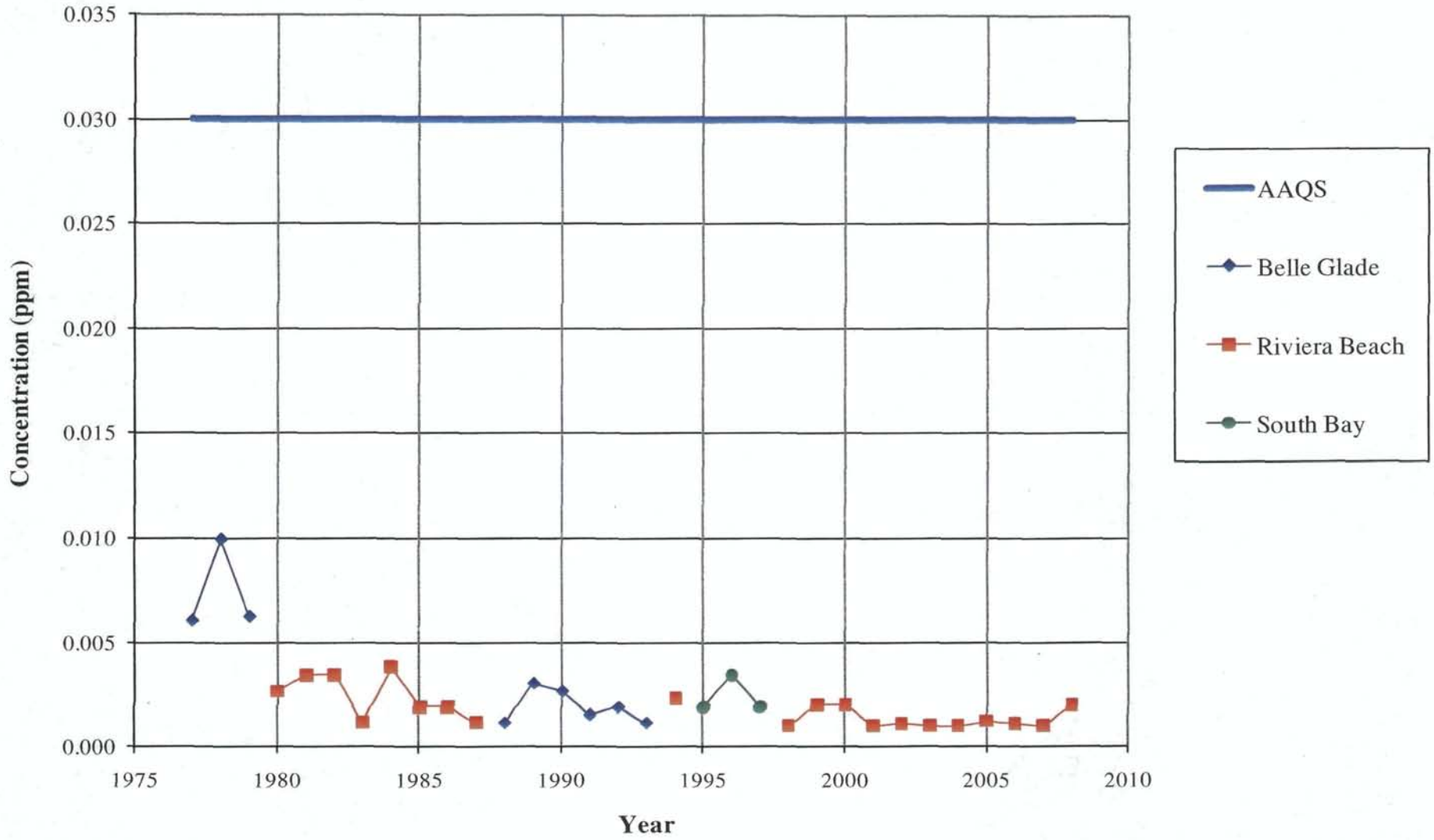


Figure 7-9
Annual Average Sulfur Dioxide Concentrations Measured from 1977 to 2007 – Palm Beach County

Source: Golder, 2009.

Golder Associates

8.0 REFERENCES

Air Force Center for Environmental Excellence (AFCEE). Best Available Control Technology Analysis for Modification of Engine Test Cells at Tinker Air Force Base, Oklahoma. July 2006.

Ashenden, T.W. and I.A.D. Williams. 1980. Growth Reductions on *Lolium multiflorum* Lam. and *Phleum pratense* L. as a Result of SO_2 and NO_2 pollution. Environ. Pollut. Ser. A. 21:131-139.

Auer, A.H., 1978. Correlation of Land Use and Cover with Meteorological Anomalies. J. Applied Meteorology, Vol. 17.

Blett, T., Geiser, L., and E. Porter. 2003. Air pollution-related lichen monitoring in National Parks, Forests, and Refuges: Guidelines for Studies Intended for Regulatory and Management Purposes. NPS D2292. National Park Service Air Resources Division; U.S. Forest Service Air Resource Management Program; U.S. Fish and Wildlife Service Air Quality Branch

Carlson, R.W. 1979. Reduction in the Photosynthetic Rate of *Acer quercus* and *Fraxinus* Species Caused by Sulfur Dioxide and Ozone. Environ. Pollut. 18:159-170.

CH2MHill. 2007. PSD Permit Application for Test Cell 2 and 5 Modification, GE Aviation, Lynn, MA. September 2007.

DeWit, T. 1976. Epiphytic lichens and air pollution in the Netherlands. *Biliotheca Lichenologica* 5:1-227.

EmeraChem. 2004. Multipollutant Emission Reduction Technology for Stationary Gas Turbines and IC Engines

Federal Land Managers. 2000. The Federal Land Manager's Air Quality Relative Values Workgroup (FLAG) Phase I Report.

Fields, R.F. 1988. Physiological responses of lichens to air pollutant fumigations. In: Nash, T.H. III, ed. *Lichens, Bryophytes and Air Quality*. Biblio. Lichenol. 30. J. Cramer, Berlin-Stuttgart.

Florida Electric Power Coordinating Group, Inc. 1986. Florida Acid Deposition Study Final Report: A Synthesis of the Florida Acid Deposition Study. Vol II – Sections 4.0, 5.0, and 6.0.

Goldstein, R.A. et al. 1985. Plant Response to SO_2: An Ecosystem Perspective. In: Sulfur Dioxide and Vegetation, pp. 403-417. W.E. Winner et al., editors. University of Florida. Gainesville, Florida.

Hart, R., P.G. Webb, R.H. Biggs, and K.M. Portier. 1988. The Use of Lichen Fumigation Studies to Evaluate the Effects of New Emission Sources on Class I Areas. J. Air Poll. Cont. Assoc. 38:144-147.

Hawsworth, D.L., and F. Rose. 1970. Qualitative scale for estimating sulphur dioxide pollution in England and Wales using epiphytic lichens. *Nature* 227:145-148.

Heck, W.W. and D.T. Tingey. 1979. Nitrogen Dioxide: Time-Concentration Model to Predict Acute Foliar Injury. EPA-600/3-79-057, U.S. Environmental Protection Agency, Corvallis, OR.

Holopainen, T., and L. Karenlampi. 1984. Injuries to lichen ultrastructure caused by sulphur dioxide fumigations. *New Phytologist* 98:285-294.

Holzworth, G.C., 1972. Mixing Heights, Wind Speeds and Potential for Urban Air Pollution Throughout the Contiguous United States. Pub. No. AP-101. U.S. Environmental Protection Agency.

Horsman, D.C. and Wellburn, A.R. 1976. Appendix II, Guide to Metabolic and Biochemical Effects of Air Pollutants in Higher Plants. Editor T.A. Mansfield. Cambridge University Press, Cambridge, England.

Huber, A.H. and W.H. Snyder, 1976. Building Wake Effects on Short Stack Effluents. Preprint Volume for the Third Symposium on Atmospheric Diffusion and Air Quality, American Meteorological Society, Boston, Massachusetts.

Institute of Clean Air Companies. 2006. Typical Installation Timelines for NO_x Emissions Control Technologies on Industrial Sources

Interagency Monitoring of Protected Visual Environments (IMPROVE). 2006. Revised IMPROVE Algorithm from Estimating Light Extinction from Particle Spectrum Data.

Johnson, D.W. 1979. Air pollution and the distribution of corticolous lichens in Seattle, Washington. *Northwest Science* 53(4):257-263.

LeBlanc, F., Rao, D.N., and G. Comeau. 1972. The epiphytic vegetation of *Populus balsamifera* and its significance as an air pollution indicator in Sudbury, Ontario. *Canadian Journal of Botany* 50:519-528.

Malhotra, S.S. and A.A. Kahn. 1978. Effect of Sulfur Dioxide Fumigation on Lipid Biosynthesis in Pine Needles. Phytochemistry 17:241-244.

Mandoli, B.L. and P.S. Dubey. 1988. The Industrial Emission and Plant Response at Pithampur (M.P.). Int. J. Ecol. Environ. Sci. 14:75-79.

Matsumaru, T., T. Yoneyama, T. Totsuka, and K. Shiratori. 1979. Absorption of Atmospheric NO_2 by Plants and Soils. Soil Sci. Plant Nutr. 25:255-265.

McLaughlin, S.B. and N.T. Lee. 1974. Botanical Studies in the Vicinity of the Widows Creek Steam Plant. Review of Air Pollution Effects Studies, 1952-1972, and Results of 1973 Surveys. Internal Report I-EB-74-1, TVA.

Middleton, J.T. et al. 1950. Smog in the South Coastal Area of California. California Agriculture 4:7-11.

Naik, R.M., A.R. Dhage, S.V. Munjal, P. Singh, B.B. Desai, S.L. Mehta, and M.S. Naik. 1992. Differential Carbon Monoxide Sensitivity of Cytochrome c Oxidase in the Leaves of C3 and C4 Plants. Plant Physiology 98:984-987.

National Park Service. 2006. Everglades National Park AQRV's. U.S. Department of the Interior. http://www2.nature.nps.gov/air/Permits/ARIS/ever/aqrv.cfm

Newman, J.R. 1981. Effects of Air Pollution on Animals at Concentrations at or Below Ambient Air Standards. Performed for Denver Air Quality Office, National Park Service, U.S. Department of the Interior. Denver, Colorado.

Newman, J.R. and R.K. Schreiber. 1988. Air Pollution and Wildlife Toxicology. Environmental Toxicology and Chemistry. 7:381-390.

Pollok, M., U. Hever, and M.S. Naik. 1989. Inhibition of stomatal opening in sunflower leaves by carbon monoxide and reversal of inhibition by light. Planta 178:223-230.

Porter, E.M. 1996. Air Quality and Air Quality Related Values in Chassahowitzka National Wildlife Refuge and Wilderness Area. Air Quality Branch, U.S. Fish and Wildlife Service, Denver, Colorado.

Ravera, O. 1989. Ecological Assessment of Environmental Degradation, Pollution, and Recovery. Commission of the European Communities.

U.S. Department of Agriculture, Soil Conservation Service. 1990. Soil Survey of Putnam County, Florida.

U.S. Department of Agriculture, Soil Conservation Service. 1977. Soil Survey of Hernando County, Florida.

U.S. Department of Agriculture, Soil Conservation Service. 1991. Soil Survey of Citrus County, Florida.

U.S. Environmental Protection Agency. 1978. Guidelines for Determining Best Available Control Technology (BACT). Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency (EPA). 1982. Air Quality Criteria for Particulate Matter and Sulfur Oxides. Vol. 3.

U.S. Environmental Protection Agency. 1987. Ambient Monitoring Guidelines for Prevention of Significant Deterioration. EPA Report No. EPA 450/4-87-007.

U.S. Environmental Protection Agency. 1990a. New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting.

U.S. Environmental Protection Agency. 1990b. "Top-Down" Best Available Control Technology Guidance Document (Draft). Research Triangle Park, North Carolina.

U.S. Environmental Protection Agency. 1993. "Alternative Control Techniques Document – NO_x Emissions from Stationary Gas Turbines". Pages 6-20.

U.S. Environmental Protection Agency. 1994. Nitrogen Oxide Emissions and Their Control from Uninstalled Aircraft Engines in Enclosed Test Cell, Joint EPA – U.S. Department of Transportation (DOT) Report, Report No. EPA 453/R-94-068, October 1994.

U.S. Environmental Protection Agency. 1997. Regulatory Support Document, Control of Air Pollution from Aircraft and Aircraft Engines, from the Direct Final Review of Aircraft Emission Standards. February 1997.

U.S. Environmental Protection Agency. 1998. The Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts.

U.S. Environmental Protection Agency. 2004. User's Guide for the AMS/EPA Regulatory Model-AERMOD. Through Addendum, October 2004.

U.S. Environmental Protection Agency. 2005. Guideline on Air Quality Models. Appendix W, 40 CFR 52.

Vatavuk, William M. 1990. Estimating Costs of Air Pollution Control. Lewis Publishers. Chelsea, Michigan.

Woltz, S.S. and T.K. Howe. 1981. Effects of Coal Burning Emissions on Florida Agriculture. In: The Impact of Increased Coal Use in Florida. Interdisciplinary Center for Aeronomy and (other) Atmospheric Sciences. University of Florida, Gainesville, Florida.

Zahn, R. 1975. Gassing Experiments with NO_2 in Small Greenhouses. Staub Reinhalt. Luft 35:194-196.

APPENDIX A

APPLICATION FOR AIR PERMIT

Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit:

- For any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial, revised, or renewal Title V air operation permit.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **United Technologies Corp/Pratt & Whitney**	
2. Site Name: **Pratt & Whitney**	
3. Facility Identification Number: **0990021**	
4. Facility Location... Street Address or Other Locator: **17900 Beeline Highway (SR-710)** City: **Jupiter** County: **Palm Beach** Zip Code: **33478**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **Mr. Dean Gee**
2. Application Contact Mailing Address... Organization/Firm: **Pratt & Whitney** Street Address: **P.O. Box 109600, MS 717-03** City: **West Palm Beach** State: **Florida** Zip Code: **33410-9600**
3. Application Contact Telephone Numbers... Telephone: **(561) 796-2108** ext. Fax: **(561) 796-2787**
4. Application Contact Email Address: **dean.gee@pw.utc.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	3. PSD Number (if applicable):
2. Project Number(s):	4. Siting Number (if applicable):

APPLICATION INFORMATION

Purpose of Application

This application for air permit is being submitted to obtain: (Check one)

Air Construction Permit

☒ Air construction permit.

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

Air Operation Permit

☐ Initial Title V air operation permit.

☐ Title V air operation permit revision.

☐ Title V air operation permit renewal.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☐ Air construction permit and Title V permit revision, incorporating the proposed project.

☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

The purpose of this application is to request the issuance of an air construction permit to include an increase in the operating hours of the two GG4-9 turbine engines utilized at the RAM Test Facility to 3,000 hours.

A PSD Analysis report is included in this application submittal.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
079	Two JP-8 fired industrial turbine engines	AC1A	$7,500

Application Processing Fee

Check one: ☒ Attached - Amount: $ 7,500 ☐ Not Applicable

APPLICATION INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :
   Mr. Steve Bouley, Vice President
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **Pratt & Whitney**
   Street Address: **P.O. Box 109600, MS 717-03**
   City: **West Palm Beach** State: **Florida** Zip Code: **33410-9600**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(561) 796-2327** ext. Fax: **(561) 796-9221**
4. Owner/Authorized Representative E-mail Address: **Steven.Bouley@pwr.utc.com**
5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.

Steven N Bouley
Signature

08-27-09
Date

APPLICATION INFORMATION

Application Responsible Official Certification

Complete if applying for an initial, revised, or renewal Title V air operation permit or concurrent processing of an air construction permit and revised or renewal Title V air operation permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name:

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):

- ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
- ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
- ☐ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
- ☐ The designated representative at an Acid Rain source, CAIR source, or Hg Budget source.

3. Application Responsible Official Mailing Address...
Organization/Firm:
Street Address:
City: State: Zip Code:

4. Application Responsible Official Telephone Numbers...
Telephone: ( ) ext. Fax:

5. Application Responsible Official E-mail Address:

6. Application Responsible Official Certification:

I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

Signature Date

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: **Brian A. Storey**
   Registration Number: **66766**
2. Professional Engineer Mailing Address...
   Organization/Firm: **Golder Associates Inc.****
   Street Address: **6026 NW 1st Place**
   City: **Gainesville** State: **FL** Zip Code: **32607**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336-5600** ext. **21127** Fax: **(352) 336-6603**
4. Professional Engineer E-mail Address: **bstorey@golder.com**
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

Brian A Storey #66766
Signature

08/24/09
Date

(seal)

* Attach any exception to certification statement.
**Board of Professional Engineers Certificate of Authorization #00001670.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **17** East (km) **567.3** North (km) **2974.4**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **26/53/28** Longitude (DD/MM/SS) **80/19/20**	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	3. Governmental Facility Code: **0**	4. Facility Status Code: **A**
7. Facility Comment :			

Facility Contact

1. Facility Contact Name: **Mr. Dean Gee**
2. Facility Contact Mailing Address... Organization/Firm: **Pratt & Whitney** Street Address: **P.O. Box 109600, MS 717-03** City: **West Palm Beach** State: **Florida** Zip Code: **33410-9600**
3. Facility Contact Telephone Numbers: Telephone: **(561) 796-2108** ext. Fax: **(561) 796-2787**
4. Facility Contact Email Address: **dean.gee@pw.utc.com**

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) ext. Fax: ( )
4. Facility Primary Responsible Official E-mail Address:

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. ☒ Title V Source	
4. ☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☒ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. ☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. ☒ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:	

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
Nitrogen Oxides - NOx	A	N
Carbon Monoxide - CO	A	N
Total Hazardous Air Pollutants - Total HAPS	A	N
Volatile Organic Compounds - VOC	B	N
Sulfur Dioxide - SO2	B	N
Particulate Matter - PM	B	N
Particulate Matter < 10 microns - PM10	B	N
Fluorides - FL	B	N
Individual Hazardous Air Pollutants - HAP	A	N

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility-Wide Cap [Y or N]? (all units)	3. Emissions Unit ID's Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **PSD Report** ☐ Previously Submitted, Date:____
2. Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **PSD Report** ☐ Previously Submitted, Date:____
3. Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID:____ ☒ Previously Submitted, Date: **December 2008**

Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: ☐ Attached, Document ID:____ ☒ Not Applicable (existing permitted facility)
2. Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL): ☐ Attached, Document ID:____
3. Rule Applicability Analysis: ☐ Attached, Document ID:____
4. List of Exempt Emissions Units: ☐ Attached, Document ID:____ ☒ Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification: ☐ Attached, Document ID:____ ☒ Not Applicable
6. Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable
7. Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units:
   ☐ Attached, Document ID:_____ ☐ Not Applicable (no exempt units at facility)

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities: (Required for initial/renewal applications only)
   ☐ Attached, Document ID:_____ ☐ Not Applicable (revision application)

2. Identification of Applicable Requirements: (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought)
   ☐ Attached, Document ID:_____
   ☐ Not Applicable (revision application with no change in applicable requirements)

3. Compliance Report and Plan: (Required for all initial/revision/renewal applications)
   ☐ Attached, Document ID:_____
   Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.

4. List of Equipment/Activities Regulated under Title VI: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____
   ☐ Equipment/Activities Onsite but Not Required to be Individually Listed
   ☐ Not Applicable

5. Verification of Risk Management Plan Submission to EPA: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____ ☐ Not Applicable

6. Requested Changes to Current Title V Air Operation Permit:
   ☐ Attached, Document ID:_____ ☐ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Facilities Subject to Acid Rain, CAIR, or Hg Budget Program

1. Acid Rain Program Forms:

   Acid Rain Part Application (DEP Form No. 62-210.900(1)(a)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not an Acid Rain source)

   Phase II NO_X Averaging Plan (DEP Form No. 62-210.900(1)(a)1.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable

   New Unit Exemption (DEP Form No. 62-210.900(1)(a)2.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable

2. CAIR Part (DEP Form No. 62-210.900(1)(b)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not a CAIR source)

3. Hg Budget Part (DEP Form No. 62-210.900(1)(c)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not a Hg Budget unit)

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

EMISSIONS UNIT INFORMATION
Section [1]
Two GG4-9A Turbine Engines

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
Two GG4-9A, JP8-fired turbine engines

3. Emissions Unit Identification Number: **079**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A			**37**

8. Federal Program Applicability: (Check all that apply)

☐ Acid Rain Unit

☐ CAIR Unit

☐ Hg Budget Unit

9. Package Unit:
Manufacturer: **Pratt & Whitney** Model Number: **GG4-9A**

10. Generator Nameplate Rating: **19.5** MW

11. Emissions Unit Comment:

EMISSIONS UNIT INFORMATION
Section [1]
Two GG4-9A Turbine Engines

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:
2. Control Device or Method Code:

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:	
2. Maximum Production Rate:	
3. Maximum Heat Input Rate: **272.1** million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule: hours/day weeks/year	days/week **3,000** hours/year
6. Operating Capacity/Schedule Comment: **Operating hours are limited to 3,000 hours per year. Refer to PSD Report for maximum heat input rate calculations.**	

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **Stack**	2. Emission Point Type Code: **1**	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:		
5. Discharge Type Code: **V**	6. Stack Height: **26** feet	7. Exit Diameter: **5.9** feet
8. Exit Temperature: **750**°F	9. Actual Volumetric Flow Rate: **328,000** acfm	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
15. Emission Point Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Internal combustion engines: Industrial: Kerosene/Naphtha (jet fuel)**		
2. Source Classification Code (SCC): **2-02-009-01**	3. SCC Units: **1,000 gallons burned**	
4. Maximum Hourly Rate: **2.04**	5. Maximum Annual Rate: **6,120**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum annual rate based on operating 3,000 hours per year. HHV of JP-8 fuel = 19,910 Btu/lb, and the density is 6.70 lb/gal.**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
Carbon Monoxide - CO			NS
Nitrogen Oxides - NOx			NS
Particulate Matter - PM			NS
Particulate Matter <10 microns - PM10			NS
Sulfur Dioxide - SO2			NS
Total Hazardous Air Pollutants - HAPS			NS
Volatile Organic Compounds - VOC			NS

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **CO**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **597.3** lb/hour **388.1** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **Refer to PSD Report.** Reference:	7. Emissions Method Code: **1**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Emission factors based on July 31, 2008 stack testing results. Refer to PSD Report.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **NOx**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **299.9** lb/hour **343.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **Refer to PSD Report.** Reference:	7. Emissions Method Code: **1**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Emission factors based on July 31, 2008 stack testing results. Refer to PSD Report.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.34** lb/hour **4.02** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **7.2 x 10^{-3} lb/MMBtu** Reference: **AP-42, Chapter 3.1, Table 3.1-2a**	7. Emissions Method Code: **3**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Refer to PSD Report.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

<u>Allowable Emissions</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **PM10**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **2.00** lb/hour **2.40** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.3 x 10^{-3} lb/MMBtu** Reference: **AP-42, Chapter 3.1, Table 3.1-2a**	7. Emissions Method Code: **3**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Refer to PSD Report.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **SO2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **53.0** lb/hour **63.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.114 lb/MMBtu** Reference: **AP-42, Chapter 3.1, Table 3.1-2a**	7. Emissions Method Code: **3**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years

10. Calculation of Emissions:

Emission factor based on a sulfur content of 0.113 percent for JP-8 fuel. Refer to PSD Report.

SO_2 (lb/MMBtu) = 1.01 x (0.113) = 0.114 lb/MMBtu

11. Potential, Fugitive, and Actual Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **HAPS**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.598** lb/hour **0.719** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: **Refer to PSD Report.**	7. Emissions Method Code: **3**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Refer to PSD Report.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.190** lb/hour **0.229** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **4.1 x 10^{-4} lb/MMBtu** Reference: **AP-42, Chapter 3.1, Table 3.1-2a**	7. Emissions Method Code: **3**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **Refer to PSD Report.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE20**	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: **20** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9**	
5. Visible Emissions Comment: **The maximum period of excess opacity allowed is 2 hours in a 24-hour period as stated in Rule 62-296.320(4)(b), F.A.C.**	

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor ____ of ____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor ____ of ____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **PSD Report** ☐ Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **PSD Report** ☐ Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **PSD Report** ☐ Previously Submitted, Date _____

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____
   ☒ Not Applicable

6. Compliance Demonstration Reports/Records:
   ☐ Attached, Document ID: _____
   Test Date(s)/Pollutant(s) Tested: _____
   ☒ Previously Submitted, Date: **September 11, 2008**
   Test Date(s)/Pollutant(s) Tested: **July 31, 2008/NO_X and CO**
   ☐ To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   ☐ Not Applicable

   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   ☐ Attached, Document ID: _____ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☒ Attached, Document ID: **PSD Report** ☐ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements Comment
