May 29, 2013 13389553

Mr. Jeff Koerner, PE
Air Quality Division
Department of Environmental Protection
2600 Blair Stone Road,
MS 5000
Tallahassee, FL 32399-2400

RE: MINOR SOURCE AIR CONSTRUCTION PERMIT APPLICATION
REQUEST FOR TEMPORARY TESTING
CRYSTAL RIVER SOUTH POWER PLANT
FACILITY ID NO. 0170004

Dear Mr. Koerner:

Duke Energy Florida, Inc. (DEF) has prepared this application for a minor source air construction permit for the Crystal River Energy Complex (CREC) to facilitate a test burn program by requesting temporary installation, testing, and operation of new coal blends, equipment and processes at CREC Units 1 and 2. The requested minor source air construction permit would allow a test burn program to demonstrate acceptability of various coal blends for targeted environmental and performance improvements. The intent is to reduce the overall emissions impact (i.e., particulates, acid gases and mercury) relative to the current coal blend(s) by fuel specification and, if appropriate, by other types of post-combustion add-on controls, such as hydrated lime injection and activated carbon injection.

DEF looks forward to working with you on this permitting effort. If you would like to discuss any issues regarding this application, please contact Jamie Hunter of DEF by telephone at (727) 820-5764 or Scott Osbourn, PE of Golder Associates at (813) 287-1717.

Sincerely,

GOLDER ASSOCIATES INC.

Scott Osbourn, PE
Associate and Practice Group Leader

Enclosure

cc: Kelley Boatwright, DEP SW District
Cindy Mulkey, DEP Siting Office
Robby Odom, DEF
Jamie Hunter, DEF

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REPORT

MINOR SOURCE AIR CONSTRUCTION PERMIT APPLICATION

Request for Temporary Testing
Crystal River South Power Plant
Facility ID No. 0170004

Submitted To: Air Quality Division
Department of Environmental Protection
2600 Blair Stone Road
MS 5000
Tallahassee, FL 32399

Submitted By: Golder Associates Inc.
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Distribution: 4 Copies—Florida Department of Environmental Protection
2 Copies—Duke Energy Florida
1 Copy—Golder Associates Inc.

May 2013 **133-89553**

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Golder Associates

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1.0 INTRODUCTION

Duke Energy Florida, Inc. (DEF) has prepared this application for a minor source air construction permit for the Crystal River Energy Complex (CREC) to facilitate a test burn program by requesting temporary installation, testing, and operation of new coal blends, equipment and processes at CREC Units 1 and 2.

The Department's policy is to not issue approval letters for test burns, rather permission is granted through a minor source air construction permit. Therefore, this application is for a minor source air construction permit that would allow a test burn program to demonstrate acceptability of various coal blends for targeted environmental and performance improvements. The details of the project are still being developed; however, the basic concept is that DEF will test burn a Western Bituminous coal blend that may include varying amounts of sub-bituminous coal (i.e., Powder River Basin or PRB coal). The intent is to reduce the overall emissions impact (i.e., particulates, acid gases and mercury) relative to the current coal blend(s) by fuel specification and, if appropriate, by other types of post-combustion add-on controls, such as hydrated lime injection and activated carbon injection. The coal blending (i.e., with sub-bituminous) will be done off-site, so that the effects of fugitive dust will be minimized for the proposed test burn.

The requested minor source air construction permit would allow for temporary operation of a hydrated lime injection (HLI) system, as well as an activated carbon injection (ACI) system for acid gas and mercury control, respectively. The demonstration period is expected to last a sufficient amount of time for DEF to collect performance and emissions data to evaluate the different potential combinations of fuel blends and controls. This may take up to six months, with another month on each end for mobilization and demobilization.

This air permit application consists of the appropriate application form required by the Florida Department of Environmental Protection (FDEP) Form 62-210.900(1), effective 3/11/2010 (see Part II of this application package). This air application report is divided into the following major sections:

- Section 1.0 provides the Project introduction;
- Section 2.0 provides a description of the Project;
- Section 3.0 provides a characterization of potential emissions from the proposed Project; and
- Section 4.0 provides a review of the air requirements applicable to the Project.

2.0 PROJECT DESCRIPTION

The CREC South Plant (i.e., Units 1 and 2) will potentially burn a blend of up to 40/60 percent PRB/Western Bituminous coal. Additionally, lime injection and activated carbon injection are proposed to be carried out upstream of the electrostatic precipitator (ESP). Additional detail on this proposed demonstration project (i.e., equipment specifications, site layout, process flow diagrams, etc.) is presented in Appendix A. The following paragraphs provide additional background on the proposed coal blends, the hydrated lime injection system and the activated carbon injection system.

2.1 Proposed Coal Blends

The coal currently being burned at Crystal River Units 1 and 2 have the following characteristics.

- Ash Content: 11.15 percent
- Sulfur Content: 1.02 percent
- Nitrogen Content: 1.35 percent
- Moisture Content: 5.98 percent
- Heating value: 11,700 Btu per pound
- Hardgrove Grindability Index: 44

CR South proposes to burn the following coals (or combinations) in Units 1 and 2:

- Western bituminous coal
- 40/60 percent PRB and Western bituminous blend

As per data provided by Arch Coal, Inc., the properties of both the coals (as received) are as follows:

Black Thunder (PRB)

- Ash Content: 5.20 percent
- Sulfur Content: 0.25 percent
- Nitrogen Content: 0.99 percent (dry basis)
- Moisture Content: 26.42 percent
- Heating Value: 8,910 Btu per pound
- Hardgrove Grindability Index: 56

West Elk (W. Bituminous)

- Ash Content: 8.47 percent
- Sulfur Content: 0.41 percent
- Nitrogen Content: 1.55 percent (dry basis)
- Moisture Content: 10.68 percent
- Heating Value: 11,391 Btu per pound
- Hardgrove Grindability Index: 50

2.2 Hydrated Lime Injection System

For this proposed demonstration project, the hydrated lime sorbent will be transported from a temporary sorbent silo to the injection point(s) in the flue gas stream via a pneumatic conveying system. The location of the hydrated lime injection points will be prior to the ESP. The hydrated lime injection rates will vary during the demonstration period based on emission control levels and operational parameters. The sorbent will react with the acidic compounds in the flue gas stream to form particulate matter that will be removed in the ESP. Appendix A- Figure 1 presents an overview of the hydrated lime storage and pneumatic conveying equipment associated with the demonstration injection system.

As shown in Appendix A- Figure 1, there are two new air emission sources associated with the hydrated lime storage and injection system. These new sources are related to potential emissions that occur when displaced air entrains dust particles as the sorbent storage vessels are filled. To minimize these emissions, the exhaust from the storage vessels and the pneumatic conveyor are routed through fabric filters prior to exhausting to the ambient air; thus the fabric filters associated with each day silo for each unit are the only new emission points. Each silo has dedicated rotary valves and blowers for pneumatic delivery of the sorbent to sets of lances mounted in flue gas ducts at various locations.

As demonstrated in Section 3.0 (Characterization of Emissions), the estimated hydrated lime injection rate at full load can be as much as 1,500 lb/hr/unit. The sorbent storage system has a proposed flow rate of 2,000 cfm through the dust collection system during loading operations, which are estimated to occur for six hours per day. Appendix B also presents detailed calculations on material handling emissions from the proposed sorbent storage and transfer system.

2.3 Activated Carbon Injection System

DEF anticipates that mercury concentrations as a result of burning only the Western bituminous coal or the 40/60 percent PRB and Western bituminous coal blend are expected to be below 4 lb per Terra Btu (TBtu). However, the Project requests the option to evaluate activated carbon injection (ACI) as a means to achieve lower mercury emission levels, if deemed necessary.

For this proposed demonstration project, the ACI sorbent will be transported from a temporary sorbent silo to the injection point(s) in the flue gas stream via a pneumatic conveying system. The location of the ACI injection points will be prior to the ESP. The ACI injection rates will vary during the demonstration period based on emission control levels and operational parameters. The AC will react with mercury in the flue gas stream to form particulate matter that will be removed in the ESP. The AC storage and pneumatic conveying equipment associated with the demonstration injection system will be similar to the hydrated lime injection system.

As shown in Appendix A- Figure 1, there are two new air emission sources associated with the sorbent storage and injection system. These new sources are related to potential emissions that occur when displaced air entrains dust particles as the sorbent storage vessels are filled. To minimize these emissions, the exhaust from the storage vessels and the pneumatic conveyor are routed through fabric filters prior to exhausting to the ambient air; thus the fabric filters associated with each day silo for each unit are the only new emission points. Each silo has dedicated rotary valves and blowers for pneumatic delivery of the sorbent to sets of lances mounted in flue gas ducts.

Variations in the duct geometry of the Crystal River Units 1 and 2 may require injection rates up to 400 pounds per hour of activated carbon per hour in each unit. The AC storage system has a proposed flow rate of 2,000 cfm through the dust collection system during loading operations, which are estimated to occur for six hours per day. Appendix A also presents detailed calculations on material handling emissions from the proposed sorbent storage and transfer system.

3.0 CHARACTERIZATION OF EMISSIONS

A comparison of potential air emission rates was carried out to compare the air emission constituents resulting from the combustion of 40/60 percent PRB/western bituminous coal (accompanied by injection of lime and activated carbon) with the air emissions associated with the current fuel and method of operation.

It was concluded that the proposed blend will potentially result in lower emission rates of all criteria pollutants listed below:

- Particulate matter (PM/PM10/PM2.5);
- Sulfur dioxide (SO2);
- Nitrogen oxides (NOx);
- Carbon monoxide (CO); and
- Volatile organic compounds (VOCs).

PM is directly related to the ash content of the coal. The combined ash content of the blend (including even the addition of hydrated lime upstream of the ESP) is estimated to be below that of the current coal. Therefore, a reduction in PM emissions is expected at the stack.

Similarly, emissions of SO2 and NOx are related to the sulfur and nitrogen content of the proposed blend. An analysis of the proposed blend, as well as the current fuel, indicated that the sulfur, as well as nitrogen content, of the proposed blend are lower than that of the current coal. Thus, a reduction in emissions of SO2 and NOx (assuming that thermal NOx is comparable to the existing coal) is expected as a result of combustion of the proposed blend.

Finally, emissions of CO and VOC are related to combustion efficiency which, in turn, is related to the fineness of grinding that can be obtained. A comparison of the Hardgrove Grindability Index (HGI) indicates that PRB and the Western bituminous coals have higher HGI than the current coal; thus indicating better grindability and higher degree of fineness. Thus, it is concluded that emissions of CO and VOCs resulting from the proposed blend will be lower than that resulting from the current blend. The details of the evaluation are provided below.

3.1 Combustion Emissions

Description of Units 1 and 2

Unit 1 has the following characteristics:

- Heat input Rate: 3,750 million Btu per hour
- Stack gas flow rate: 1,407,923 ACFM at 291^0F

Unit 2 has the following characteristics:

- Heat input Rate: 4,795 million Btu per hour
- Stack gas flow rate: 1,931,324 ACFM at 300^0F

It is estimated that hydrated lime will be injected at a rate of 1,500 pounds per hour in each unit at the air heater outlet (upstream of the ESP) for acid gas mitigation.

The properties of the coal proposed to be burned at Crystal River Units 1 and 2 were summarized in the previous section. Calculations for coal blend properties are presented below to estimate which of the following blends constitutes the worst case blend:

- 40/60 blend based on weight
- 40/60 blend based on heat input into the boilers

Blend based on 40/60 weight basis

If the blend is based on weight basis, the average ash content and the coal heating value are estimated as follows:

$$Weighted\ Coal\ Ash = (0.4 \times 5.2\%) + (0.6 \times 8.47\%) = 7.162\ percent$$

Similarly, the weighted average coal heating value is estimated as follows:

$$Weighted\ Heating\ Value = (0.4 \times 8{,}910) + (0.6 \times 11{,}391) = 10{,}399\ BTU\ per\ pound$$

Thus on a "million Btu" basis, the ash content of the blend is estimated as shown below:

$$Coal\ ash\ in\ blend = \frac{7.162\ lb\ ash}{100\ lb\ coal} \times \frac{lb\ coal}{10{,}399\ Btu} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{6.887\ lb\ ash}{million\ Btu}$$

In addition to the ash, an estimated 1,500 lb of hydrated lime will be injected in the flue gas entering the Unit 1 ESP. On a million Btu basis, the addition of hydrated lime is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{1{,}500\ lb\ hydrated\ lime}{hour} \times \frac{hour}{3{,}750\ million\ Btu} = \frac{0.4\ lb\ additional\ PM}{million\ Btu}$$

On a million Btu basis, the addition of activated carbon is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{240\ lb}{hour} \times \frac{hour}{3{,}750\ million\ Btu} = \frac{0.064\ lb\ additional\ PM}{million\ Btu}$$

The total PM (coal ash and hydrated lime) entering the Unit 1 ESP is estimated to be:

$$total\ PM\ entering\ Unit\ 1\ ESP = \frac{6.887\ lb\ ash}{million\ Btu} + \frac{0.4\ lb\ hydrated\ lime}{million\ Btu} + \frac{0.064\ lb\ AC}{million\ Btu} = \frac{7.351\ total\ PM}{million\ Btu}$$

In addition to the ash, an estimated 1,500 lb of hydrated lime and 240 lb of activated carbon will be injected in the flue gas entering the Unit 2 ESP. On a million Btu basis, the addition of hydrated lime is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{1{,}500\ lb\ hydrated\ lime}{hour} \times \frac{hour}{4{,}795\ million\ Btu} = \frac{0.313\ lb\ additional\ PM}{million\ Btu}$$

On a million Btu basis, the addition of activated carbon is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{240\ lb}{hour} \times \frac{hour}{4{,}795\ million\ Btu} = \frac{0.050\ lb\ additional\ PM}{million\ Btu}$$

The total PM (coal ash and hydrated lime) entering the Unit 2 ESP is estimated to be:

$$total\ PM\ entering\ the\ Unit\ 2\ ESP = \frac{6.887\ lb\ ash}{million\ Btu} + \frac{0.313\ lb\ hydrated\ lime}{million\ Btu} + \frac{0.050\ lb\ AC}{million\ Btu} = \frac{7.250\ total\ PM}{million\ Btu}$$

The average sulfur content is estimated as follows:

$$Weighted\ Coal\ Sulfur = (0.4 \times 0.25\%) + (0.6 \times 0.41\%) = 0.346\ percent$$

Thus on a “million Btu” basis, the coal SO2 of the blend is estimated as shown below:

$$Coal\ SO_2\ in\ blend = \frac{0.346\ lb\ S}{100\ lb\ coal} \times \frac{lb\ coal}{10{,}399\ Btu} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{0.666\ lb\ SO_2}{million\ Btu}$$

The average nitrogen content is estimated as follows:

Convert the nitrogen content to as received basis, for each coal, as follows:

Black Thunder:

$$0.99\ percent\ (dry) \times \frac{(100 - 26.42)\ lb\ dry\ coal}{100\ lb\ as\ received\ coal} = 0.73\ percent\ (as\ received)$$

West Elk:

$$1.55\ percent\ (dry) \times \frac{(100 - 10.68)\ lb\ dry\ coal}{100\ lb\ as\ received\ coal} = 1.38\ percent\ (as\ received)$$

$$Weighted\ Coal\ Nitrogen = (0.4 \times 0.73\%) + (0.6 \times 1.38\%) = 1.12\ percent$$

Thus on a “million Btu” basis, the coal Nitrogen of the blend is estimated as shown below:

$$Coal\ Nitrogen\ in\ blend = \frac{1.12\ lb\ N}{100\ lb\ coal} \times \frac{lb\ coal}{10{,}399\ Btu} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{1.08\ lb\ N}{million\ Btu}$$

Worst Case-- Western Bituminous Coal (Weight Basis)

While it should be noted that the above worst case PRB/Western bituminous coal blend (calculated on a “weight-basis”, is the worst case “blend”, emissions may be higher from the firing of W. bituminous coal only. The following calculations characterize the emissions from W. bituminous coal only:

On a “million Btu” basis, the ash content of the W. Bit is estimated as shown below:

$$Coal\ ash\ in\ W.Bit = \frac{8.47\ lb\ ash}{100\ lb\ coal} \times \frac{lb\ coal}{11{,}391\ Btu} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{7.43\ lb\ ash}{million\ Btu}$$

In addition to the ash, an estimated 1,500 lb of hydrated lime and 240 lb of activated carbon will be injected in the flue gas entering the Unit 1 ESP. On a million Btu basis, the addition of hydrated lime is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{1{,}500\ lb\ hydrated\ lime}{hour} \times \frac{hour}{3{,}750\ million\ Btu} = \frac{0.4\ lb\ additional\ PM}{million\ Btu}$$

On a million Btu basis, the addition of activated carbon is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{240\ lb}{hour} \times \frac{hour}{3{,}750\ million\ Btu} = \frac{0.064\ lb\ additional\ PM}{million\ Btu}$$

The total PM (coal ash and hydrated lime) entering the Unit 1 ESP is estimated to be:

$$total\ PM\ entering\ the\ Unit\ 1\ ESP = \frac{7.43\ lb\ ash}{million\ Btu} + \frac{0.4\ lb\ hydrated\ lime}{million\ Btu} + \frac{0.064\ lb\ AC}{million\ Btu} = \frac{7.89\ total\ PM}{million\ Btu}$$

In addition to the ash, an estimated 1,500 lb of hydrated lime and 240 lb of activated carbon will be injected in the flue gas entering the Unit 2 ESP. On a million Btu basis, the addition of hydrated lime is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{1{,}500\ lb\ hydrated\ lime}{hour} \times \frac{hour}{4{,}795\ million\ Btu} = \frac{0.313\ lb\ additional\ PM}{million\ Btu}$$

On a million Btu basis, the addition of activated carbon is estimated to result in an additional PM loading into the ESP of:

$$Additional\ PM\ entering\ the\ ESP = \frac{240\ lb}{hour} \times \frac{hour}{4{,}795\ million\ Btu} = \frac{0.050\ lb\ additional\ PM}{million\ Btu}$$

The total PM (coal ash and hydrated lime) entering the Unit 2 ESP is estimated to be:

$$total\ PM\ entering\ the\ Unit\ 2\ ESP = \frac{7.43\ lb\ ash}{million\ Btu} + \frac{0.313\ lb\ hydrated\ lime}{million\ Btu} + \frac{0.050\ lb\ AC}{million\ Btu} = \frac{7.79\ total\ PM}{million\ Btu}$$

On a “million Btu” basis, the coal SO2 of the W. Bit is estimated as shown below:

$$Coal\ SO_2\ in\ W.Bit = \frac{0.41\ lb\ S}{100\ lb\ coal} \times \frac{lb\ coal}{11{,}391\ Btu} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{0.72\ lb\ SO_2}{million\ Btu}$$

The average nitrogen content is estimated as follows:

Convert the nitrogen content to as received basis, as follows:

$$1.55\ percent\ (dry) \times \frac{(100 - 10.68)\ lb\ dry\ coal}{100\ lb\ as\ received\ coal} = 1.38\ percent\ (as\ received)$$

Thus on a “million Btu” basis, the coal Nitrogen of the blend is estimated as shown below:

$$Coal\ Nitrogen\ in\ W.Bit = \frac{1.38\ lb\ N}{100\ lb\ coal} \times \frac{lb\ coal}{11{,}391\ Btu} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{1.21\ lb\ N}{million\ Btu}$$

Properties of Coal currently burned in Crystal River Units 1 and 2

The coal currently being burned at Crystal River Units 1 and 2 have the characteristics that were summarized in Section 2.1.

Based on the properties of the current coal, the ash content expressed as pounds per million Btu is estimated as follows:

$$Coal\ ash\ in\ current\ coal = \frac{11.15\ lb\ ash}{100\ lb\ coal} \times \frac{lb\ coal}{11{,}700\ Btu} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{9.53\ lb\ ash}{million\ Btu}$$

The coal SO2 content expressed as pounds per million Btu is estimated as follows:

$$Coal\ SO_2\ in\ current\ coal = \frac{1.02\ lb\ ash}{100\ lb\ coal} \times \frac{lb\ coal}{11{,}700\ Btu} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{1.74\ lb\ SO_2}{million\ Btu}$$

The coal Nitrogen content expressed as pounds per million Btu is estimated as follows:

$$Coal\ Nitrogen\ in\ current\ coal = \frac{1.35\ lb\ N}{100\ lb\ coal} \times \frac{lb\ coal}{11{,}700\ Btu} \times \frac{1{,}000{,}000\ Btu}{million\ Btu} = \frac{1.154\ lb\ N}{million\ Btu}$$

*Coal properties for this **current coal** are as follows:*

- Blend Sulfur Content: 1.74 lb SO2/million Btu
- Blend PM loading into the Unit 1 & 2 ESP: 9.53 lb/million Btu
- Blend Nitrogen Content: 1.154 lb/million Btu
- Blend heating value: 11,700 Btu per pound
- Hardgrove Grindability Index: 44

*Worst Case **PRB-Western Bituminous Coal Blend** (Weight Basis) coal properties are as follows:*

- Blend Sulfur Content: 0.666 lb SO2/million Btu
- Blend PM loading into the Unit 1 ESP: 7.351 lb/million Btu
- Blend PM loading into the Unit 2 ESP: 7.250 lb/million Btu
- Blend Nitrogen Content: 1.08 lb/million Btu
- Blend heating value: 10,399 Btu per pound
- Hardgrove Grindability Index: 50 - 56

*Worst Case **Western Bituminous Only** (Weight Basis) coal properties are as follows:*

- Blend Sulfur Content: 0.72 lb SO2/million Btu
- Blend PM loading into the Unit 1 ESP: 7.89 lb/million Btu
- Blend PM loading into the Unit 2 ESP: 7.79 lb/million Btu
- Blend Nitrogen Content: 1.21 lb/million Btu
- Blend heating value: 11,391 Btu per pound
- Hardgrove Grindability Index: 50

Comparison of Air Emission Constituents for Current and Proposed Coals

The comparisons of air emission constituents for the proposed coal blends and current coal are based on the above coal blend characteristics.

The comparison of coal SO2, PM loading into the ESP and nitrogen indicates that combustion of current coal has the potential to result in higher quantities of SO2, PM loading into the ESP (PM comparison for the proposed coal blends includes the contribution of hydrated lime injection and activated carbon) and nitrogen oxides. Regarding emissions of nitrogen oxides, the firing of “W. bituminous coal only” results in a slightly higher calculated coal nitrogen content than the current coal. However, for any additional

blending with PRB coal, the nitrogen content would be lower than current coal. In addition, the moisture content of the W. bituminous coal is significantly greater than that of the current coal (10.68 percent vs. 5.98 percent), which should result in lower thermal NOx than the current coal. Emissions of carbon monoxide (CO) and volatile organic compounds (VOC) are based on the combustion efficiency. The higher the degree of complete combustion, the lower the CO and VOC emissions.

One measure of potential for high degree of combustion is the fineness of grinding that can be obtained. The finer the grind, more complete the combustion. The HGI for the current coal is reported to be 44 whereas the proposed PRB coal and Western bituminous coals have HGIs of 56 and 50. Thus, it is reasonable to conclude that the proposed blend can be ground more effectively into smaller particle size than the current coal. The higher fineness is expected to result in a higher degree of combustion resulting in lower CO and VOC emissions than is currently obtained.

3.2 Material Handling and Storage Emissions

Material handling and storage emissions will result from the use of hydrated lime and ACI. Appendix A presents detailed calculations on material handling emissions from the proposed sorbent storage and transfer systems. The emission estimates assume year-round operation and are therefore considered to be a conservative estimate of potential emissions. The PTE emissions from the proposed sorbent storage and injection systems for Units 1 and 2 at the Crystal River Power Plant will be considered insignificant since the proposed activity emits less than 5 TPY of any criteria pollutant. New source review for the proposed project will not be triggered since the PTE $PM_{2.5}$ emission estimate is less than the 10 tons per year emission increase threshold.

4.0 REGULATORY APPLICABILITY

The regulations applicable to the boilers will remain unchanged from those indicated in the current Title V Operating Permit as a result of the proposed demonstration Project discussed in the preceding sections. The addition of the temporary sorbent injection systems will result in a slight increase in PM emissions due to the sorbent handling and storage. The emissions calculations for these insignificant units are presented in Appendix A of this report. The vented emissions from the proposed dry sorbent storage system will be subject to the following standards:

4.1 Prevention of Significant Deterioration

This regulation does not apply to the proposed changes because emissions of PSD pollutants from the facility are anticipated to decrease as a result of the demonstration project, including the installation of the sorbent injection systems.

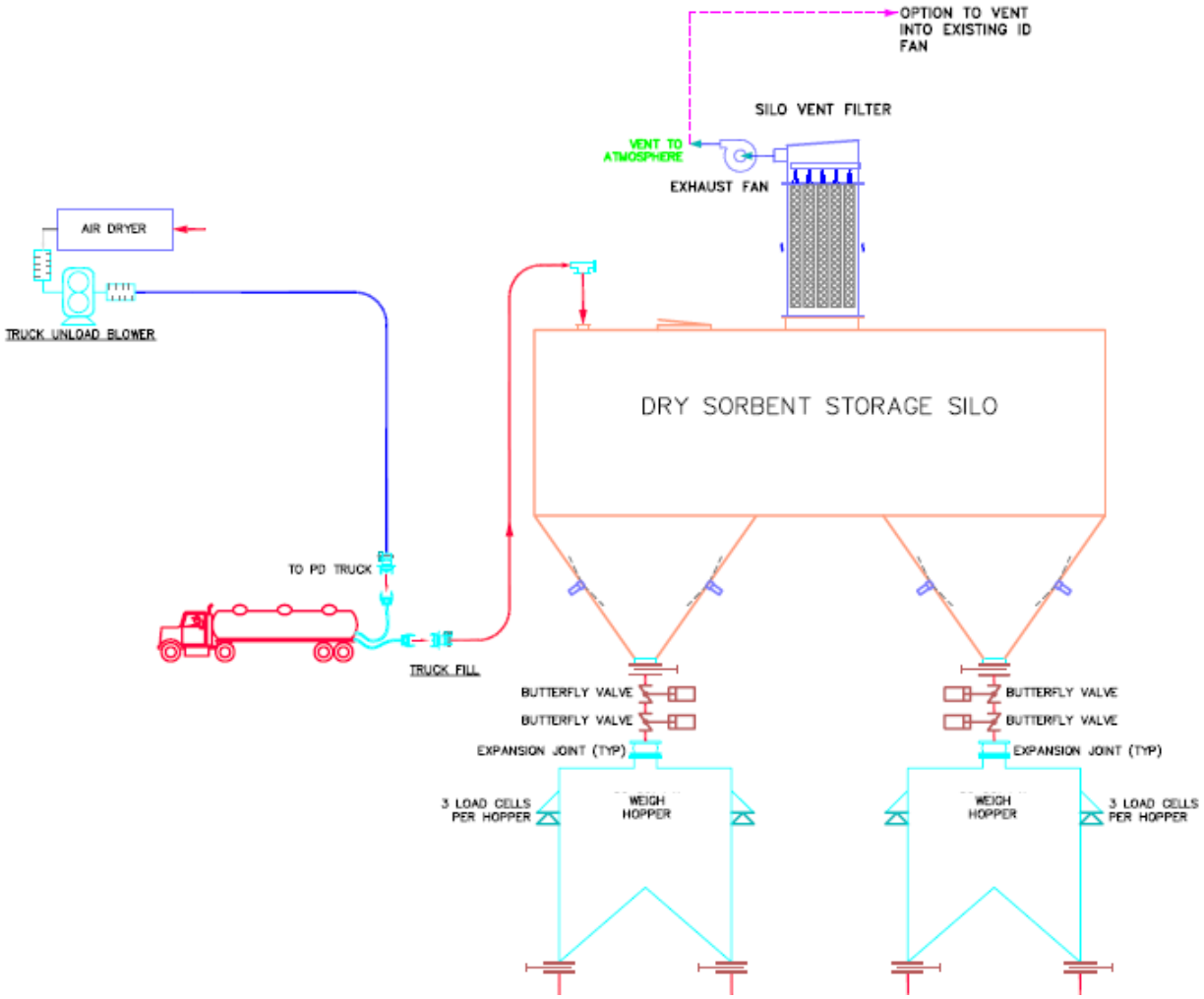
4.2 Control of Visible Emissions

The vented emissions from the proposed dry sorbent storage systems will be subject to these standards. Visible emissions from these sources will not be more than 5 percent opacity when averaged over a six-minute period. The bagfilters in the design specification will ensure compliance with this standard.

4.3 Particulates from Fugitive Non-Process Dust Emission Sources

The facility will not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess visible emissions beyond the property boundary. Haul roads and material handling operations will be maintained in a manner that will minimize fugitive dust emissions.

FIGURE A-1
PROPOSED SORBENT INJECTION SYSTEM



CLIENT/PROJECT **Progress Energy Florida, Inc.**			TAMPA, FLORIDA Golder Associates				TITLE: **FIGURE A-1 – PRPOSED SORBENT INJECTION SYSTEM**
	DRAWN BY: PP	REVIEWED BY: SO	DATE: 5/22/13	NOT TO SCALE	FILE NO.:	JOB NO.: 133-89553	REQUEST FOR TEMPORARY TESTING CRYSTAL RIVER SOUTH PERMIT APPLICATION

APPENDIX A
MATERIAL HANDLING AND STORAGE EMISSION ESTIMATES

APPENDIX A
MATERIAL HANDLING AND STORAGE EMISSION ESTIMATES

SUBJECT:	Proposed Temporary Sorbent Injection System Unit 1 and 2, Crystal River Power Plant, Florida				
Job No.	133-89553	**Made by:**	SHO	**Date:**	5/22/2013
Ref.		**Checked:**		**Sheet:**	1 of 1
		Reviewed:			

OBJECTIVE: Calculate the potential to emit (PTE) emissions from the proposed sorbent injection systems for Units 1 and 2 at Crystal River Power Plant.

APPROACH: Use manufacturer guaranteed emission factors and filtration efficiencies to calculate the potential to emit (PTE) for the proposed project.

SOLUTION: A delivery truck will pneumatically fill the storage silo directly with hydrated lime and activated carbon. The delivery truck will unload the sorbents at 2,000 scfm for a proposed duration of six hours a day to the storage silo. The proposed sorbent injection system may be installed on both units, Unit 1 and 2. See Figure 1 of the application for the proposed process diagram of the sorbent injection system.

Emission Factors:

Pollutant	Emission Factors	Units	Source
PM*	See PM2.5	Grains/ACF	Manufacture's Specifications
PM10*	See PM2.5	Grains/ACF	Manufacture's Specifications
PM2.5	0.015	Grains/ACF	Manufacture's Specifications

*PM and PM10 are incorporated in PM2.5

Parameters:

Flow Rate	2000	cfm/unit	
Hours of Operation	6	hrs/day	Assumed maximum
Number of Fabric Filters	2	fabric filter/unit	Assumed maximum

Calculations:

Unit 1

Hydrated Lime:

2,000 ft3	0.015 grains PM2.5	1 pound PM2.5	60 minutes	6 hour	365 days =	563.1	lbs PM2.5
min	ft^3	7000 grains PM2.5	1 hour	1 day	1 year		year

Activated Carbon:

2,000 ft3	0.015 grains PM2.5	1 pound PM2.5	60 minutes	6 hour	365 days =	563.1	lbs PM2.5
min	ft^3	7000 grains PM2.5	1 hour	1 day	1 year		year

Unit 2

Hydrated Lime:

2,000 ft3	0.015 grains PM2.5	1 pound PM2.5	60 minutes	6 hour	365 days =	563.1	lbs PM2.5
min	ft^3	7000 grains PM2.5	1 hour	1 day	1 year		year

Activated Carbon:

2,000 ft3	0.015 grains PM2.5	1 pound PM2.5	60 minutes	6 hour	365 days =	563.1	lbs PM2.5
min	ft^3	7000 grains PM2.5	1 hour	1 day	1 year		year

Proposed Project Total PM2.5:	2,252.6	lbs PM2.5 / year	=	1.1	ton PM2.5 / year

CONCLUSION: The PTE emissions from the proposed sorbent injection systems for Units 1 and 2 at Crystal River Power Plant will be considered insignificant since the proposed activity emits less than 5 TPY of any criteria pollutant. New source review for the proposed project will not be triggered since the PTE PM/PM10/PM2.5 emission estimates are less than the respective SER emission increase thresholds.

PART II
FDEP 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: **DUKE ENERGY FLORIDA , INC.**	
2. Site Name: **CRYSTAL RIVER POWER PLANT**	
3. Facility Identification Number: **0170004**	
4. Facility Location... Street Address or Other Locator: **NORTH OF CRYSTAL RIVER, WEST OF U.S. 19** City: **CRYSTAL RIVER** County: **CITRUS** Zip Code: **34428**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **JAMIE HUNTER, LEAD ENVIRONMENTAL SPECIALIST**
2. Application Contact Mailing Address... Organization/Firm: **DUKE ENERGY FLORIDA, INC.** Street Address: **299 FIRST AVENUE, NORTH, PEF 903** City: **ST. PETERSBURG** State: **FL** Zip Code: **33701**
3. Application Contact Telephone Numbers... Telephone: (**727**) **820-5764** ext. Fax:
4. Application Contact E-mail Address: **Jamie.Hunter@duke-energy.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

Duke Energy Florida, Inc. (DEF), is submitting this application for a minor source air construction permit for the Crystal River Energy Complex (CREC) to facilitate a test burn program by requesting temporary installation, testing, and operation of new coal blends, equipment and processes at CREC Units 1 and 2. This demonstration program is to demonstrate the acceptability of various coal blends for targeted environmental and performance improvements. The details of the project are still being developed, however, the basic concept is that DEF will test burn a Western Bituminous coal blend that may include varying amounts of sub-bituminous coal (i.e., Powder River Basin or PRB coal). The intent is to reduce the overall emissions impact (i.e., particulates, acid gases and mercury) relative to the current coal blend(s) by fuel specification and, if appropriate, by other types of post-combustion add-on controls, such as hydrated lime injection and activated carbon injection.

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
001	Unit 1 Fossil Fuel Steam Generator	AC1F	NA
002	Unit 2 Fossil Fuel Steam Generator	AC1F	NA

Application Processing Fee

Check one: ☐ Attached - Amount:_____ ☒ Not Applicable

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name :
   ROBBY ODOM, STATION MANAGER
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **DUKE ENERGY FLORIDA, INC.**
   Street Address: **299 FIRST AVENUE, NORTH, CN77**
   City: **ST PETERSBURG** State: **FLORIDA** Zip Code: **33701**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(352) 501-5682** ext. Fax: **(352) 501-5787**
4. Owner/Authorized Representative E-mail Address: **ROBBY.ODOM@DUKE-ENERGY.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.

   Signature

   5/29/13
   Date

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 or CAIR 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

Professional Engineer Certification

1. Professional Engineer Name: **Scott H. Osbourn**
   Registration Number: **57557**
2. Professional Engineer Mailing Address...
   Organization/Firm: **Golder Associates Inc.***
   Street Address: **5100 West Lemon St., Suite 208**
   City: **Tampa** State: **FL** Zip Code: **33609**
3. Professional Engineer Telephone Numbers...
   Telephone: **(813) 287-1717** ext. **53304** Fax: **(813) 287-1716**
4. Professional Engineer E-mail Address: **sosbourn@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.

Signature

5/29/13
Date

(seal)

SCOTT H. OSBOURN LICENSE No. 57557 STATE OF FLORIDA PROFESSIONAL ENGINEER

*** 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) **334.3** North (km) **3204.5**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **28/57/34** Longitude (DD/MM/SS) **82/42/01**	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **49**	6. Facility SIC(s): **4911**
7. Facility Comment :			

Facility Contact

1. Facility Contact Name: **JAMIE HUNTER, LEAD ENVIRONMENTAL SPECIALIST**
2. Facility Contact Mailing Address... Organization/Firm: **DUKE ENERGY FLORIDA, INC.** Street Address: **299 FIRST AVENUE, NORTH, PEF 903** City: **ST PETERSBURG** State: **FLORIDA** Zip Code: **33701**
3. Facility Contact Telephone Numbers: Telephone: **(727) 820-5764** ext. Fax:
4. Facility Contact E-mail Address: **Jamie.Hunter@duke-energy.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]?
$PM/PM_{10}/PM_{2.5}$	**A**	**N**
CO	**A**	**N**
VOC	**A**	**N**
SO_2	**A**	**N**
NO_x	**A**	**N**
SAM	**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: _____ ☒ Previously Submitted, Date: **May 20, 2009**
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: _____ ☒ Previously Submitted, Date: **May 20, 2009**
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: **May 20, 2009**

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: **See Report**
3.	Rule Applicability Analysis: ☒ Attached, Document ID: **See Report**
4.	List of Exempt Emissions Units: ☐ Attached, Document ID:_____ ☒ Not Applicable (no exempt units at facility)
5.	Fugitive Emissions Identification: ☒ Attached, Document ID: **See Report** ☐ Not Applicable
6.	Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
7.	Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
8.	Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
9.	Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
10.	Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications -- NA

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: NA
   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: **May 20, 2009**
   ☐ 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: **May 20, 2009**
   ☐ 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: **May 20, 2009**
   ☐ Not Applicable (not a CAIR source)

Additional Requirements Comment