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Orlando Utilities Commission
Stanton Amendments

B&V Project 143799
September 1, 2006

Mr. Al Linero, P.E.
South Permitting Section
Bureau of Air Regulation
Division of Air Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Road, MS-5500
Tallahassee, FL 32399-2400

Subject: Request to Modify PSD Permit PSD-FL-084

Dear Mr. Linero:

Black & Veatch, on behalf of the Orlando Utilities Commission (OUC), requests per this application, the Department modify the Curtis H. Stanton Energy Center PSD Permit (PSD-FL-084) to include two improvement projects at the Stanton site. These are: (1) the addition of a dibasic acid (DBA) additive system for both Stanton Unit 1 and Unit 2 wet flue gas desulfurization (WFGD) systems and, (2) the addition of a neural network-based combustion optimization system on Units 1 and 2. The DBA additive system will improve the scrubber efficiency of the existing Units 1 and 2 WFGD scrubbers. The neural network-based combustion optimization system will optimize boiler operations through a software installation. The proposed changes do not include the addition of any new emission units and are expected to improve scrubber efficiency and boiler operation. OUC is requesting these changes be incorporated into the facility PSD permit, which can then be incorporated into the facility Site Certification.

As the Department is aware, this is the first of a number of projects that OUC is considering that are focused on reducing air emissions at the Stanton facility. Other projects under consideration include NO_x reduction options for both Stanton Unit 1 and Unit 2, and additional projects that may provide further SO_2 reductions for both units.

DBA Addition

Both Stanton Unit 1 and Stanton Unit 2 utilize an existing WFGD limestone based scrubber to control SO_2 emissions. The function of the DBA Injection System is to enhance the SO_2 removal efficiency by limiting the pH drop at the gas-liquid interface in the scrubber module. Dibasic acid is a mixture of dicarboxylic acids; glutaric, succinic and adipic acids. The ability of dibasic acid to increase the performance of FGD systems has been documented by numerous studies and actual application experience. As the pH at the liquid-gas interface drops, the DBA ions in the recycle slurry act as a chemical buffer to quickly combine with hydrogen ions to suppress the normal drop in pH at the liquid-gas interface across the absorber. The higher pH increases SO_2 absorption and improves FGD performance. The DBA System will maintain a concentration of dibasic acid in the recycle slurry by adding dibasic acid to the additive storage tanks.

Technical Description

The Dibasic Acid Addition System includes the following major components:

- Three 50-percent capacity dibasic acid metering pumps skid mounted with all associated piping, valves and components.
- Dibasic acid storage tank.
- Dibasic acid addition piping and valves from storage tank to pump skid and from pump skid to the existing scrubber additive storage tanks.
- Instrumentation and controls.

A General Arrangement drawing and preliminary Piping and Instrument Diagram of the proposed Dibasic Acid Injection Equipment are attached as part of this application.

The DBA Addition System receives commercial 50% DBA solution from trucks equipped with an unloading means and fills an approximately 12,000-gallon DBA storage tank. The DBA is then pumped at a controlled rate by the DBA metering pumps from the storage tank into the two existing scrubber additive storage tanks. No other modifications to the scrubber additive preparation system are required.

The DBA Addition System includes three 50-percent dibasic acid feed pumps. Each feed pump is capable of supplying the required volume of dibasic acid to treat one additive storage tank. The third pump will be connected as a spare for either tank. The plant has two scrubber additive storage tanks that supply scrubber additive slurry to both units. The existing additive feed piping and valves are arranged such that either tank can provide additive to either or both Units 1 & 2.

It is estimated that, at design condition, the DBA Addition System will supply approximately 18 gallons per hour (gph) to each scrubber additive storage tank (36 gph total) based on the design conditions for the flue gas desulfurization system. The optimum concentration of DBA in the FGD recycle slurry will be determined by in-service testing but is expected to be between 1000 to 3000 mg/l.

The system tank, feed pumps, piping, and valves will be constructed of stainless steel. The dibasic acid storage tank will have internal heaters and a top mounted mixer to allow proper mixing and heated storage (dibasic acid must be maintained at a temperature of at least 104°F). Flush connections are provided for flushing dibasic acid from pipes after unloading and prior to extended system lay-up.

The dibasic acid storage tank and pump skid will be installed in a concrete containment area, which will have a low-point sump with a normally-closed discharge valve. Paved access to the tank and skid area will be provided from existing site roads.

Control of the DBA feed pumps will be through the plant Distributed Control System (DCS). Since the feed rate required is largely dependent on the loss of DBA in the byproduct produced, the feed to the reagent storage tank will be in proportion to the limestone slurry production rate. The limestone slurry feed rate to the reaction tank is proportional to the byproduct produced and serves to match the DBA feed to the changing conditions of unit load and fuel sulfur content. Adjustments to the DBA injection proportion will be made by plant personnel as required based on periodic sampling of the reaction tank concentration. If required, short term adjustments of the acid concentration in the reaction tank due to process upsets or recycle pump failure can be facilitated through manual feed of DBA directly into the FGD reaction tanks.

Environmental Consequences of Installation and Operation
OUC anticipates no adverse environmental impacts resulting from the approval and implementation of this system.

The anticipated benefits of using dibasic acid in the flue gas desulfurization system include the following.

- Improved scrubber SO_2 removal efficiency.
- Increased flexibility in fuel selection.
- Improved ability to handle swings in inlet SO_2.

Liquid dibasic acid will be delivered using commercial trucks to a tank located within a reinforced concrete containment sized for the full tank volume plus an allowance for direct rainfall on the containment. The containment will be furnished with a sump with a normally closed valve. Periodically, operators will drain rainfall water from the containment into the process area wastewater collection system, which routes

process area drainage into the Recycle Basin. If there is leakage, the containment and sump contents will be scavenged using a temporary sump pump to a truck or temporary tank. The collected dibasic acid will be reused or disposed offsite to a FDEP-approved disposal facility.

Bulk dibasic acid is considered a corrosive liquid and is non-flammable, having a flash point of 450 F. It is a skin and eye irritant. None of the components present in DBA are listed as a potential carcinogen.

A small concentration of dibasic acid will be contained in the residual moisture in the conditioned dewatered flue gas desulfurization by-product that is placed in the on-site combustion waste storage area. This small amount of residual DBA will not impact the properties of the by-product.

Note that the DBA will be handled as a solution and none of the equipment listed above are sources of air emissions. In fact, the only expected impact on air emissions from the operation of this system is a reduction in SO_2 emissions due to the improved efficiency of the scrubber.

The DBA addition systems may result in an increase in limestone usage and scrubber byproduct production due to increased SO_2 removal. While the use of DBA may result in slightly improved calcium utilization, if it is conservatively assumed that there is no improvement in calcium utilization, the percent increase in SO_2 removal associated with DBA use will result in an equivalent percent increase in limestone use and scrubber byproduct production. Emissions associated with limestone use are reported in the Annual operating report (AOR) for the facility using an emission factor of 0.00031 lb/ton of material processed. As such, the increase in PM/PM_{10} emissions associated with increased limestone handling would be negligible.

Neural Network

A neural network-based combustion optimization system is a software addition that can be used to optimize and fine-tune boiler operations. The neural network software models the relationships between various operator controlled parameters that affect boiler emissions and thermal performance, and through links to the plant distributed control system (DCS) and combustion control system logic, automatically adjusts the operator settings as needed to provide the most efficient operation of the units.

The function of the combustion optimization system is to enhance the capability of the existing DCS and boiler controls to manage controllable parameters that affect boiler emissions and thermal performance. Installation of the neural network is not anticipated to result in a physical change to the boiler, in that it simply involves the use of an inductive mathematical model of boiler operations that will be used to assist the existing boiler control system to optimize boiler operations. Also, because the combustion optimization system only works to manage and optimize movement within existing plant operator adjustable parameters, it will not change any of the parameters that the operators currently use to manage and optimize boiler operation; thus, it is not considered a change in the method of operation of the boiler.

Technical Description

The neural network system supplements, but does not replace, the fundamental control, start-up, ramping and shutdown functions of the plant DCS or boiler control system. The combustion optimization system uses neural network-based inductive models and advanced search optimization methodologies to identify and then 'learn' the complex relationships between the dozens of existing controllable parameters within the boiler and the key performance metrics such as NO_x, CO, opacity, and boiler thermal efficiency. The combustion optimization system uses this knowledge to calculate the supervisory set points required to improve the mixing of fuel and air within the combustion zone, as well as mill outlet temperatures, feeder biases and other controllable parameters. These set points are down loaded to the DCS in real-time.

The combustion optimization system runs on a dedicated server pc and communicates directly with the plant DCS, typically through the plant historian, to collect data and download recommended set points. The primary goal of the supervisory service is to fine-tune boiler operations while maintaining process control and safety boiler operating constraints. The combustion optimization system recommendations are transferred to the DCS control logic through a transfer block that selects either the operator's manual bias or the combustion optimization system's automatic bias

Each unit will have between 15 and 40 manipulated variables. Typical variables include:

- Oxygen bias
- Forced draft bias
- Induced draft bias
- Furnace pressure set point
- Overfire air dampers
- Primary air bias
- Mill outlet temperature bias
- Burner primary or secondary air damper bias

The operator enables the supervisory service via customized DCS displays installed with the system implementation. From these displays the operator can turn the system on and off, as well as enable or disable individual controllers. The neural models are configured with minimum and maximum constraints as well as rate of change limits to keep the models from issuing recommendations that infringe on safe and effective boiler operating conditions for key parameters such as CO and opacity. Further, the supervisory set point and bias recommendations downloaded by the combustion optimization system are constrained within the DCS to avoid process disturbances and smoothly ramp any changes. The combustion optimization and DCS are configured to provide bumpless transfer when switching from one mode to the other.

Environmental Consequences of Installation and Operation

OUC anticipates no adverse environmental impacts resulting from the approval and implementation of the neural network-based combustion optimization system.

The anticipated benefits of using a neural network-based combustion optimization system include the following.

- Enhancement of the ability of the existing DCS and boiler control system to fine-tune boiler operations that affect boiler emissions and thermal performance.
- Ability to be configured to manage and optimize the sometimes competing objectives of reduced stack NO_x, increased boiler efficiency, reduced loss-on- ignition, reduced opacity and reduced reagent consumption (if an SCR is in place.)
- Self-evaluation and "learning" capabilities, so the system can be left in supervisory control of a plant indefinitely resulting in sustainable benefits.
- Quick adaptation to physical changes in the boiler combustion zone, such as Low NO_x burners and overfire air, as well as backend emissions control hardware changes, such as SCR and FGD retrofits.

Regardless of the physical configuration of the units, now and in the future, the boiler optimization system will provide supervisory assistance to the DCS and boiler combustion controls to best manage emissions and thermal performance objectives.

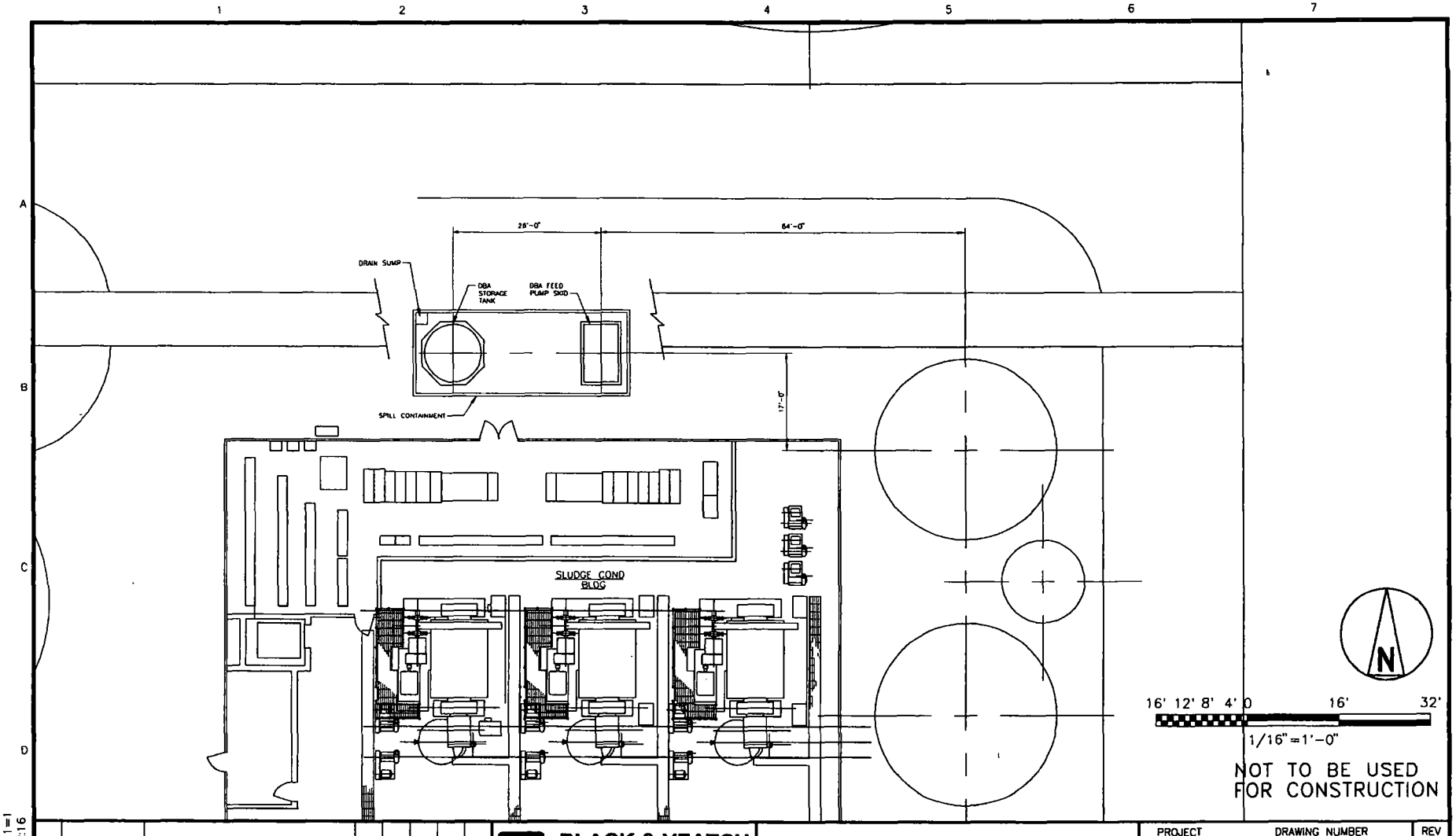
OUC appreciates the opportunity to work with the Department in obtaining the required air quality permit modifications for improved operations at the Curtis H. Stanton Energy Center. Should you have any questions or concerns regarding this submittal, please do not hesitate to contact me at (913) 458-7563 or Denise Stalls of OUC at (407) 737-4236.

Sincerely,

Mike Soltys
Site Certification Coordinator

Enclosures

cc: Fred Haddad, OUC
Denise Stalls, OUC
Buck Oven, FDEP
Myron Rollins



NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
A	06-27-2006	ISSUED FOR REVIEW	BDS	BDS		DPT	

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BLACK & VEATCH CORPORATION

ENGINEER DPT | DRAWN BDS | CHECKED | DATE 06-27-06

ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER UNITS 1 & 2

GENERAL ARRANGEMENT
DIBASIC ACID INJECTION

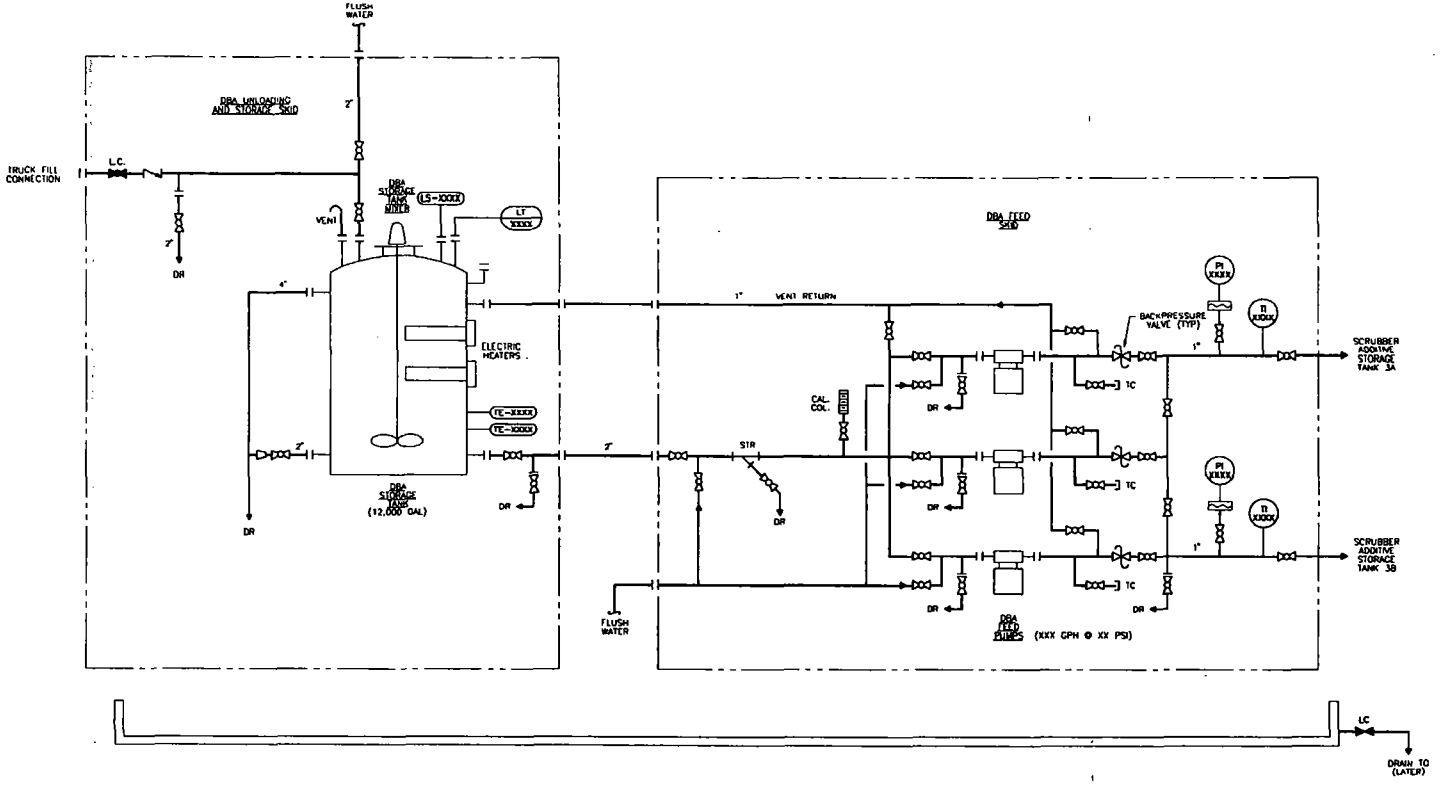
PROJECT 143799-CBST-M1002 | DRAWING NUMBER | REV A

CODE

AREA

NOTES:

1. SYSTEM CODE IS 1CCH UNLESS NOTED OTHERWISE.
2. ALL SYSTEM COMPONENTS ARE SERIES 1CCH-BBBB-MNNN.
3. STORAGE TANK, PIPING AND VALVES TYPE 304L STAINLESS STEEL.
4. ALL BALL VALVES EXCEPT AS NOTED.
5. ALL EQUIPMENT PIPING AND VALVES TO HAVE HEAT TRACING.



NOT TO BE USED FOR CONSTRUCTION

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
B	08/23/2006	ISSUED FOR OWNER REVIEW SPEC'S	RCH				
A	06/27/2006	ISSUED FOR REVIEW	JLH				

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF FLORIDA

SIGNED _____

DATE _____ REG NO. _____

BLACK & VEATCH CORPORATION

ENGINEER JLH

CHECKED DATE

ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER UNITS 1 & 2

PIPING AND INSTRUMENT DIAGRAM
DIBASIC ACID INJECTION

PROJECT 143799 DRAWING NUMBER CCH-M2148 REV B

CODE

AREA

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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 any air construction permit at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air permit. Also use this form to apply for an air construction permit:

- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- Where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- Where the applicant proposes 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/renewal Title V air operation permit.

Air Construction Permit & Title V Air Operation Permit (Concurrent Processing Option) – Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: Orlando Utilities Commission
2. Site Name: Curtis H. Stanton Energy Center
3. Facility Identification Number: 0950137
4. Facility Location...
   Street Address or Other Locator: 5100 South Alafaya Trail
   City: Orlando County: Orange Zip Code: 32831
5. Relocatable Facility? ☐ Yes ☒ No
6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: Denise M. Stalls, Vice President Environmental Affairs
2. Application Contact Mailing Address...
   Organization/Firm: Orlando Utilities Commission
   Street Address: P.O. Box 3193
   City: Orlando State: FL Zip Code: 32802
3. Application Contact Telephone Numbers...
   Telephone: (407) 737-4236 ext. Fax: (407) 384-4020
4. Application Contact Email Address: dstalls@ouc.com

Application Processing Information (DEP Use)

1. Date of Receipt of Application: 9-7-06
2. Project Number(s): 0950137-011-AC
3. PSD Number (if applicable):
4. Siting Number (if applicable):

APPLICATION INFORMATION

Purpose of Application

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

Air Construction Permit

[X] 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

Air permit approval to install dibasic acid (DBA) additive systems to the wet FGD scrubber systems for Stanton Unit 1 and Unit 2. Air permit approval to install a neural-network based combustion optimization system on Stanton Unit 1 and Unit 2. A detailed description is provided in the letter submittal provided with this application.

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee

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 :
   Frederick F. Haddad, Jr.

2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: Orlando Utilities Commission
   Street Address: P.O. Box 3193
   City: Orlando State: FL Zip Code: 32802

3. Owner/Authorized Representative Telephone Numbers...
   Telephone: (407) 244-8732 ext. Fax: (407) 275-4120

4. Owner/Authorized Representative Email Address: fhaddad@ouc.com

5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the facility 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 requirements identified in this application to which the facility 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.

Signature

8/30/2006
Date

Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V 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.

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 Email 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: Larry Todd Newland
   Registration Number: 64188
2. Professional Engineer Mailing Address...
   Organization/Firm: Black & Veatch
   Street Address: 11000 Regency Parkway, Suite 100
   City: Cary State: NC Zip Code: 27518
3. Professional Engineer Telephone Numbers...
   Telephone: (919) 462-7415 ext. Fax: (919) 468-9212
4. Professional Engineer Email Address: newlandlt@bv.com
5. Professional Engineer Statement:

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

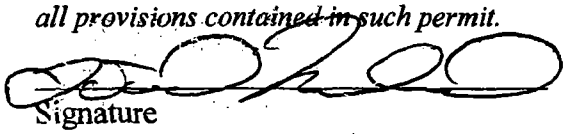
(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions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

8.30.2006
Date

(seal)

* Attach any exception to certification statement.