TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

City of Gainesville, Gainesville Regional Utilities (GRU)

605 SE 3rd Street
Gainesville, Florida 34610

J.R. Kelly Generating Station
Facility ID No. 0010005

PROJECT

Draft Permit No. 0010005-010-AC/PSD-FL-276B
Application for Minor Source Air Construction Permit
Revisions to Previously Issued AC/PSD Permits

COUNTY

Alachua County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

October 2013

1. GENERAL PROJECT INFORMATION

Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control - General Provisions); 62-210 (Stationary Sources - General Requirements); 62-212 (Stationary Sources - Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources - Emissions Monitoring). Specifically, air construction permits are required pursuant to Rules 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations on a quarterly basis in Rule 62-204.800, F.A.C.

Facility Description and Location

This facility is an existing electrical generation plant categorized under Standard Industrial Classification No. 4911. This existing plant is located in Alachua County at 605 SE 3rd Street, Gainesville. UTM Coordinates are: Zone 17, 372.00 km East and 3280.20 km North; Latitude: 29° 38’ 48” North and Longitude: 82° 19’ 19” West.

This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to state and federal Ambient Air Quality Standards (AAQS).

Facility Regulatory Categories

- Based on the Title V air operation permit renewal application received on May 20, 2013, this facility will no longer be a major source of hazardous air pollutants (HAP).
- This facility does operate units subject to the acid rain provisions of the Clean Air Act (CAA).
- The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is a major stationary source in accordance with Rule 62-212.400 (PSD), F.A.C.

Project Description

The applicant applied on August 26, 2013, to the Department for a minor source air construction (AC) permit. The minor source AC permit is for revisions to the previously issued AC/Prevention of Significant Deterioration (PSD) permits, Permit Nos. 0010005-002-AC/PSD-FL-276 (Project).

Application Processing Schedule

Minor Source Air Construction Permit Application received on August 26, 2013 (complete).

{This document is posted and available on the Department’s world wide web site (Link to Air Projects - Division of Air Resource Management - FDEP).}

Relevant Documents

- Permit No. 0010005-002-AC/PSD-FL-276 original PSD permit.
- Permit No. 0010005-008-AV, Current Valid Title V Air Operation Permit (a renewal).

2. PSD APPLICABILITY

General PSD Applicability

For areas currently in attainment with the state and federal AAQS or areas otherwise designated as unclassifiable, the Department regulates major stationary sources of air pollution in accordance with Florida's PSD preconstruction review program as defined in Rule 62-212.400, F.A.C. Under preconstruction review, the Department first must determine if a project is subject to the PSD requirements ("PSD applicability review") and, if so, must conduct a PSD preconstruction review. A PSD applicability review is required for projects at new and existing major stationary sources. In addition, proposed projects at existing minor sources are subject to a PSD applicability review to determine whether potential emissions *from the proposed project itself* will exceed the PSD major stationary source thresholds. A facility is considered a major stationary source with respect to PSD if it emits or has the potential to emit:

- 250 tons per year or more of any regulated air pollutant; or
- 100 tons per year or more of any regulated air pollutant and the facility belongs to one of the following 28 PSD-major facility categories: fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), Kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants and charcoal production plants.

Once it is determined that a project is subject to PSD preconstruction review, the project emissions are compared to the "significant emission rates" defined in Rule 62-210.200, F.A.C. for the following pollutants: carbon monoxide (CO); nitrogen oxides (NO_X); sulfur dioxide (SO_2); particulate matter (PM); particulate matter with a mean particle diameter of 10 microns or less (PM_{10}); volatile organic compounds (VOC); lead (Pb); fluorides (F); sulfuric acid mist (SAM); hydrogen sulfide (H_2S); total reduced sulfur (TRS), including H_2S; reduced sulfur compounds, including H_2S; municipal waste combustor organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans; municipal waste combustor metals measured as PM; municipal waste combustor acid gases measured as SO_2 and hydrogen chloride (HCl); municipal solid waste landfills emissions measured as non-methane organic compounds (NMOC); and mercury (Hg). In addition, significant emissions rate also means any emissions rate or any net emissions increase associated with a major stationary source or major modification which would construct within 10 kilometers of a Class I area and have an impact on such area equal to or greater than 1 $\mu g/m^3$, 24-hour average.

If the potential emissions equal or exceed the defined significant emissions rate of a PSD pollutant, the project is considered "significant" for the pollutant and the applicant must employ the Best Available Control Technology (BACT) to minimize the emissions and evaluate the air quality impacts. Although a facility or project may be *major* with respect to PSD for only one regulated pollutant, it may be required to install BACT controls for several "significant" regulated pollutants.

PSD Applicability for Project

The project will revise miscellaneous underlying AC/PSD permit specific conditions. No physical construction is required or authorized. The project will not cause or authorize any increases in emissions nor change the allowable capacity of the units. Therefore, this project is not subject to PSD preconstruction review.

3. DEPARTMENT REVIEW

On July 1, 2013, in the Requested Changes document the applicant requested Specific Condition B.18. in the current Title V air operation permit, Permit No. 0010005-008-AV, to be revised (see page 2, requested item 3.). Specific Condition B.18. pertains to excess emissions from the Combined-Cycle Unit No. 1 (CC-1). Specific Condition B.18. limits the duration of excess emissions.

A basis (brief description) for the requested changes was included in the July 1, 2013 letter (see page 3). The applicant's bases for the requested changes are reproduced here for convenience:

> Applicant's Basis for Request:
> "*During the spring 2013 KGS Unit CC-1 outage, a high pressure/low pressure (HP/LP) overhaul was performed on the Unit 8 steam turbine – this steam turbine was originally installed in 1965. During the overhaul both the HP and LP turbine sections were disassembled and evaluated for condition and repair. This was the first planned inspection of the Unit 8 steam turbine since it had been repowered for operation with combined cycle Unit CC-1 which was placed in service in 2001. Significant damage was found in the HP Steam Chest, HP Nozzle Section, and HP Casing. The HP Steam Chest and HP Nozzle sections experience the highest temperatures and pressure in the turbine. Most of the damage in the HP Casing was in the admission end, where the highest temperatures would be found. In each of these cases, thermal cycling during Unit CC-1 startup and shutdown is believed to be the primary source of the damage. In order to preserve the life of the Unit 8 steam turbine, the rate at which temperature changes occur in this area must be reduced. Steam temperature is driven by the Unit CC-1 gas turbine exhaust temperature, which is a function of its load. To extend the time over which the steam turbine reaches full temperature, the time required for the gas turbine to reach full load must also be extended*."

As indicated by the applicant's basis for the request above, thermal cycling during startups was cited as a cause of damages to the steam turbine unit's specific components, e.g., the HP Steam Chest, the HP Nozzle Section, and the HP Casing. The time required for the gas turbine to reach full load must be extended to prevent damage to the unit's specific components. Specific Condition B.18. limits the duration excess emissions during 'cold start-up.' Specific Condition B.18. does not address specifically excess emissions during periods of 'warm start-up' or 'hot start-up.'

The applicant's specific requested changes to the excess emissions provisions in the July 1, 2013 letter are to change:

1. the duration of 'cold start-up' from 4 hours to 8 hours (also to re-define 'cold start-up');
2. add a distinct period for 'warm start-up' with a duration of 7 hours; and,
3. add a distinct period for 'hot start-up' with a duration of 4 hours.

Facility Name-Site Name **Unit Description(s)** **Combined cycle unit Mfr, Model No. & MW output**	**Requested** **Duration for 'cold start-up'** **hours in a 24-hour period**	**Requested** **Duration for 'warm start-up'** **hours in a 24-hour period**	**Requested** **Duration for 'hot start-up'** **hours in a 24-hour period**
GRU-J.R. Kelly's Combined-Cycle Unit No. 1 CC-1 (E.U. ID No. 010) GE Model PG7121 (7EA), 133 MW unit Steam turbine was originally installed in 1965; the re-powered combined cycle unit was on commercial operation in 2001	8	7	4

Specific Condition B.18. originates from underlying air construction (AC) permits, specifically, PSD-FL-276/0010005-002-AC, Specific Condition 21. The permit specific condition could not be revised in the Title V air

operation permit alone; the underlying AC/PSD permits needed to be revised.

On July 3, 2013, the Department requested an application to revise the underlying AC/PSD permits along with technical information/justification to further support the request. The applicant submitted the request to revise the underlying AC/PSD permits along with technical justification to support the requested changes on August 26, 2013. The technical justification was in the form of excerpts from an analysis from a combustion turbine consulting company, Intertek AIM[1]. These requested changes are a direct result of the GRU-J.R. Kelly's commissioned independent study on the GRU-J.R. Kelly's CC-1's performance. Intertek AIM completed the technical study (analysis). The technical analysis provides in detail the sequence of events/activities for the requested excess emission durations (time periods) for 'cold start-up,' 'warm start-up' and 'hot start-up' (see pages 3 - 4 of the "CC-1 Startups" document - a technical analysis). For example, on page 3 of the Intertek AIM report the sequencing of the following specific events/activities are extracted and shown here:

…

A. Cold start-up

Duration, hours	Specific Events/Activities Description
0.50	CT Startup
2.50	Establish HRSG Steam Conditions
3.00	Roll Steam Turbine Steam Turbine Speed Soak
1.75	Steam Turbine Load Soak Load Steam Turbine
Total = 7.8	

…

The total duration for the sequencing of events/activities for 'cold start-up' are shown as 7.8 hours. In summary, to prevent damage to the unit (previously mentioned in the applicant's basis for request) these are the sequencing of events/activities recommend by Intertek AIM for the operator to follow. This total time corresponds to the timeframe in which potential excess emissions could occur. GRU-J.R. Kelly's procedures for startup and shutdown (Attachment L) for the combined cycle unit were also revised as part of the August 26, 2013 submittal.

Of importance to note is that the steam turbine was originally installed in 1965. The combined cycle unit's CT/HRSG was manufactured by General Electric (GE) and is a Model PG7121 (7EA). Commercial operation of the re-powered combined cycle unit was on February 17, 2001. The combustion turbine (CT) has a nominal 83 megawatt (MW) rating. Steam produced by the HRSG is routed to the existing Unit No. 8 steam turbine-electrical generator to generate 40-50 MW of additional electricity. In combined-cycle mode (CT + HRSG), CC-1 has a nominal electrical generation capacity of 133 MW when firing natural gas and 136 when firing fuel oil.

The technical analysis performed by Intertek AIM was the first in-depth evaluation since the unit had been repowered. The unit had been repowered for operation with combined cycle Unit CC-1 in 2001.

GRU-J.R. Kelly provided excess emissions data to the Department. The data was confirmed by the Department.

The Department accepts the applicant's technical justifications in support of making the specific requested changes to the site-specific excess emission provisions in the AC/PSD permits for the GRU-J.R. Kelly's Combined-Cycle Unit No. 1. Extending and specifying the durations for 'cold start-up,' 'warm start-up' and 'hot start-up' can prevent damage to the Combined-Cycle Unit's specific components.

The following other projects with excess emission provision revisions for combined cycle units were approved by the Department recently:

Facility Name-Site Name **Permit No., Issuance date** **Unit Description(s)** **Combined cycle unit Mfr, Model No. & MW output**	**Duration for 'cold start-up'** **hours in a 24-hour period**	**Duration for 'warm start-up'** **hours in a 24-hour period**	**Duration for 'hot start-up'** **hours in a 24-hour period**
FPL-Martin Power Plant Draft Permit No. 0850001-032-AC, 08/09/2013 {Link to Air Projects - Division of Air Resource Management - FDEP} CT 3A, 3B, 4A & 4B (E.U. ID Nos. 003-006) 2 - "2-on-1" units GE Model MS7001 FA, 215 MW units Commercial operation in 1994	8	4 [2 warm startups per 24-hour period]	NA {4 implied [2 warm startups per 24-hour period]}
FPL-Manatee Power Plant Final Permit No. 0810010-018-AC, 09/03/2013 {Link to Air Projects - Division of Air Resource Management - FDEP} Unit 3A, Unit 3B, Unit 3C & Unit 3D (E.U. ID Nos. 005-008) 1 - "4-on-1" unit GE Model PG7241 FA, 170 MW units Commercial operation in 2005	4	8	NA {8 implied}
Florida Municipal Power Agency- Treasure Coast Energy Center Final Permit No. 1110121-006-AC, 09/04/2012 {Link to Air Projects - Division of Air Resource Management - FDEP} Unit 1 (E.U. ID No. 001) 1 - "1-on-1" unit GE Model PG7241 FA, 170 MW unit Commercial operation in 2008	6	4	2

Based upon the above project listing the requested changes are somewhat consistent with other recently revised AC/PSD permits for somewhat similar combined cycle units. As previously mentioned, the GRU-J.R. Kelly's Combined-Cycle Unit No. 1 is different from the above listed units in that it has a steam turbine that is from 1965.

Based on other somewhat similar combined cycle units and for the specific, unique reasons described in the site-specific study (analysis) by the combustion turbine consulting company, Intertek AIM, a slight variation to the durations of excess emissions is acceptable.

The requested changes to the excess emission provisions are due to the uniqueness of the configuration of the GRU-

J.R. Kelly's Combined-Cycle Unit No. 1 as described by the applicant in this request. This determination is an exceptional case and does not establish precedence for other combined-cycle units.

4. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state rules and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the draft permit. No air quality modeling analysis is required because the project does not result in a significant increase in emissions.

Mr. Scott M. Sheplak, P.E. is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting him by telephone at 850/717-9074 or by e-mail at scott.sheplak@dep.state.fl.us in the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

References

[1] Intertek AIM World Wide Web Site: http://www.intertek.com/about/.