



Environmental Consulting & Technology, Inc.

August 26, 2013

Mr. Scott M. Sheplak, P.E.
Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road, M.S. 5500
Tallahassee, Florida 32399-2400

**RE: Gainesville Regional Utilities
J.R. Kelly Generating Station Title V Renewal Application
Request to Concurrently Modify Air Construction Permit**

Dear Scott:

Gainesville Regional Utilities (GRU) submitted an application to renew its J.R. Kelly Generating Station (KGS) Title V Air Operation Permit No. 0010005-008-AV on May 8, 2013. Subsequently, on July 1, 2013 GRU submitted a request to revise several conditions of this Title V air operation permit.

In response to your July 3, 2013 email, GRU requests a concurrent modification of previously issued Air Construction Permit PSD-FL-276/0010005-002-AC to reflect the changes to the current Title V air operation permit conditions that were requested in the July 1, 2013 submittal. As requested in your July 3, 2013 email, a revised Page 2 of the Department's Application for Air Permit – Long Form, responsible official and professional engineer certifications, technical justification for the requested permit condition changes to CC-1 startup hours, and updated general startup/shutdown procedures are attached for your review.

Your continued processing of the KGS Title air operation permit renewal application is appreciated. Please contact Regina Embry at (352) 393-1299 (embryrg@gru.com) if you need any additional information.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.

Thomas W. Davis, P.E.
Principal Engineer

cc: Regina Embry, GRU

Attachment

3701 Northwest
98th Street
Gainesville, FL
32606

(352)
332-0444

FAX (352)
332-6722

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

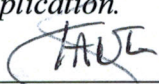
GRU has been issued a Final Title V Operation Permit from the FDEP authorizing operation of the J.R. Kelly Generating Station. Final Title V Operation Permit Renewal Number 0010005-008-AV was issued with an effective date of January 1, 2009 and an expiration date of December 31, 2013.

In accordance with Rule 62-213.420(1)(a)2., F.A.C., an application for a Title V permit renewal must be submitted at least 225 days prior to permit expiration for permits that expire on or after June 1, 2009. For the J.R. Kelly Generating Station, this regulatory deadline results in the submittal of a Title V permit renewal application no later than May 20, 2013. This application and supporting documents constitutes GRU's request for concurrent processing of the renewal of Final Title V Operation Permit Renewal Number 0010005-008-AV per Chapter 62-213.400, F.A.C., and modification of Air Construction Permit PSD-FL-276/0010005-002-AC.

APPLICATION INFORMATION


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: John W. Stanton, Assistant General Manager – Energy Supply
2. Application Responsible Official Qualification (Check one or more of the following options, as applicable): <input type="checkbox"/> 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. <input type="checkbox"/> For a partnership or sole proprietorship, a general partner or the proprietor, respectively. <input checked="" type="checkbox"/> For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official. <input checked="" type="checkbox"/> The designated representative at an Acid Rain source.
3. Application Responsible Official Mailing Address... Organization/Firm: City of Gainesville, Gainesville Regional Utilities (GRU) Street Address: P.O. Box 147117 (A132) City: Gainesville State: Florida Zip Code: 32614-7117
4. Application Responsible Official Telephone Numbers... Telephone: (352) 393-1789 ext. Fax: (352) 334-2786
5. Application Responsible Official Email Address: stantonjw@gru.com
6. Application Responsible Official Certification: <i>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.</i>  _____ Signature 8-22-13 _____ Date

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: Thomas W. Davis Registration Number: 36777
2. Professional Engineer Mailing Address... Organization/Firm: Environmental Consulting & Technology, Inc. Street Address: 3701 Northwest 98th Street City: Gainesville State: Florida Zip Code: 32606-5004
3. Professional Engineer Telephone Numbers... Telephone: (352) 248 – 3351 ext. Fax: (352) 332 - 6722
4. Professional Engineer Email Address: tdavis@ectinc.com
5. Professional Engineer Statement: <i>I, the undersigned, hereby certify, except as particularly noted herein*, that:</i> <i>(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</i> <i>(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.</i> <i>(3) If the purpose of this application is to obtain a Title V air operation permit (check here <input type="checkbox"/>, 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.</i> <i>(4) If the purpose of this application is to obtain an air construction permit (check here <input type="checkbox"/>, 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 <input checked="" type="checkbox"/>, 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.</i> <i>(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 <input type="checkbox"/>, 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.</i> Signature:  36777 Date: <u>8/23/13</u> (Seal) STATE OF FLORIDA PROFESSIONAL ENGINEER

* Attach any exception to certification statement.

J.R. KELLY GENERATING STATION
TITLE V AIR OPERATION PERMIT RENEWAL
CC-1 STARTUPS

Intertek Asset Integrity Management (AIM) Services (Intertek AIM) was retained by GRU to analyze and quantify the historical and near-term future cost of cycling Kelly Generating Station (KGS) combined-cycle unit (CC1). The analysis includes past station operations and cycles using megawatt production data, cost data, and critical process data to understand the total cost attributable to cycling damage. Intertek AIM utilized its team review, including subject matter experts from each equipment specialty group, with over 200 years of combined experience in heat recovery steam generators (HRSG), combustion turbines (CT), and balance-of-plant (BOP) equipment to validate the design and process issues for CC1. Issues identified by Intertek AIM include the following:

- (1) The extensive cycling history and the high number of cycles for CC1 impact the continued cost of operation, as the unit continues to cycle as in the past. CC1 is experiencing a high level of cycling fatigue of the CT, HRSG, and the steam turbine (ST) but has performed well.
- (2) Indications of latent damage led us to recommend additional actions to maintain the reliable cyclic operation, and failures may be expected unless cycling countermeasures are implemented.
- (3) The equivalent hot start (EHS) damage analysis indicates that CC1's cumulative EHS are quite damaging due to high ramp rates during startup and shutdown.
- (4) The process of signature data analysis indicates that severe thermal fatigue damage is occurring on several major HRSG, power piping, and turbine components. The examination and analyses of the data provided by Kelly for hot, warm, and cold starts and shutdowns show the high thermal ramp rates in the HRSG superheaters, drum and STs.
- (5) These maximum thermal ramp rates are all occurring when the CT is already at about 30 MW output. Normally, the maximum thermal ramp rate occurs during first fire of the CT before the unit has synchronized. The fact that the maximum ramp rates occur when the unit is at 30 MW shows that the units are ramping up to full load very quickly. It is this ramp-up of the CT that is causing these very high and damaging thermal ramp rates in the HRSG, piping, and ST.

J.R. KELLY GENERATING STATION
TITLE V AIR OPERATION PERMIT RENEWAL
CC-1 STARTUPS

- (7) Cycling damage examples for CC1 include:
 - a. ST damage
 - b. High pressure superheater (HPSH) tube leaks and HPSH 2 lower header replacement
 - c. High thermal ramp rates in the superheater (SH) systems have shortened the life of HRSG, power piping, and ST components. They have accrued latent damage even though the damage has not yet resulted in failures in these systems.
 - d. CT and generator early life failures
- (8) Intertek AIM recommends that the operating procedures, control tuning, ramp rate controls, and plant equipment be carefully evaluated to mitigate the severity of the thermal fatigue damage per cycle and to optimize dispatch, station reliability, and maintenance costs.
- (9) Immediate attention should be directed at the startup procedures. Revisions in the starting point of the steam drains and sky valve or a new small bypass system are needed to protect the SH and ST during startup until a steam temperature match and adequate turbine steam flow is established.
- (10) Modify cold startup procedure to support HRSG circulation and temperature balancing to reduce thermal shocking. This could include the early use of the high pressure (HP) sky vent valve and/or a new small steam bypass dump to the condenser, increased drain flow, or blowdown to the condenser hot well to reduce the thermal ramp on all starts.
- (11) Provide operator alarms for thick metal component temperature rate of change and revise training and procedures as appropriate to achieve effective rates of change under cold, warm, and hot starts for slow, medium, and fast startups. For steam-touched components, ramp rates with an absolute value greater than 700°F per hour are considered very damaging. The recommended upper limit for steam-touched components is 400°F per hour. The recommended upper limit for water-touched components is 200°F per hour. For water-touched components (e.g., feedwater heaters) the thermal ramp rates with an absolute value greater than 400°F per hour are considered very damaging. The limits are based on the maximum change in

J.R. KELLY GENERATING STATION
 TITLE V AIR OPERATION PERMIT RENEWAL
 CC-1 STARTUPS

temperature in a 15-minute interval multiplied by 4 (60 min/15 min) to get an equivalent hourly thermal ramp rate.

- (12) Operators should monitor and document temperature ramp rates. Excessive ramp rates should be alarmed and carefully monitored for critical components.
- (13) Reduce CT load when blending on cold starts until the steam turbine is warmed and online. This may require modifying the CT MW ramp rate to optimize the balance between generation flexibility and minimized thermal shocking.

Based on the above, the following tables summarize the requested durations of cold, warm, and hot starts.

A. Cold Starts

Duration (hours)	Description	Temperature Increase (°F)	Temperature Increase Rate (°F/hr)
0.50	CT Startup	N/A	N/A
2.50	Establish HRSG Steam Conditions	775	310
3.00	Roll Steam Turbine	460	153
	Steam Turbine Speed Soak		
1.75	Steam Turbine Load Soak	450	257
	Load Steam Turbine		
Total = 7.8			

J.R. KELLY GENERATING STATION
TITLE V AIR OPERATION PERMIT RENEWAL
CC-1 STARTUPS

B. Warm Starts

Duration (hours)	Description	Temperature Increase (°F)	Temperature Increase Rate (°F/hr)
0.50	CT Startup	N/A	N/A
2.50	Establish HRSG Steam Conditions	725	290
1.5	Roll Steam Turbine	250	167
	Steam Turbine Speed Soak		
1.75	Bring Steam Turbine to Sync Speed	450	257
	Steam Turbine Load Soak		
	Load Steam Turbine		
Total = 6.3			

C. Hot Starts

Duration (hours)	Description	Temperature Increase (°F)	Temperature Increase Rate (°F/hr)
0.50	CT Startup	N/A	N/A
1.50	Establish HRSG Steam Conditions	450	300
1.75	Bring Steam Turbine to Sync Speed	450	257
	Steam Turbine Load Soak		
	Load Steam Turbine		
Total = 3.8			

ATTACHMENT L

PROCEDURES FOR STARTUP AND SHUTDOWN

COMBINED/SIMPLE CYCLE COMBUSTION TURBINE CC-1 (EU ID 010)

STARTING SEQUENCE

Upon receiving the startup signal from the plant control system, the turbine will proceed automatically through the following sequence:

1. Lube oil pump starts.
2. Compressor for clutch air starts and clutch is engaged.
3. Turning gear starts.
4. Starting device runs and accelerates from low speed. Turning gear shutdown at 20-percent speed.
5. At about 20-percent speed, the ignition is turned on and fuel is injected. The machine accelerates to approximately 55-percent speed; starting device clutch disengages and starting device shuts down.
6. The unit is run at 95-percent speed for the required warmup period and then accelerated to synchronous speed.

Specific startup temperatures and durations are as follows:

A. Cold Starts

Duration (hours)	Description	Temperature Increase (°F)	Temperature Increase Rate (°F/hr)
0.50	CT Startup	N/A	N/A
2.50	Establish HRSG Steam Conditions	775	310
3.00	Roll Steam Turbine	460	153
	Steam Turbine Speed Soak		
1.75	Steam Turbine Load Soak	450	257
	Load Steam Turbine		

ATTACHMENT L

PROCEDURES FOR STARTUP AND SHUTDOWN

B. Warm Starts

Duration (hours)	Description	Temperature Increase (°F)	Temperature Increase Rate (°F/hr)
0.50	CT Startup	N/A	N/A
2.50	Establish HRSG Steam Conditions	725	290
1.5	Roll Steam Turbine	250	167
	Steam Turbine Speed Soak		
1.75	Bring Steam Turbine to Sync Speed	450	257
	Steam Turbine Load Soak		
	Load Steam Turbine		

C. Hot Starts

Duration (hours)	Description	Temperature Increase (°F)	Temperature Increase Rate (°F/hr)
0.50	CT Startup	N/A	N/A
1.50	Establish HRSG Steam Conditions	450	300
1.75	Bring Steam Turbine to Sync Speed	450	257
	Steam Turbine Load Soak		
	Load Steam Turbine		

SHUTDOWN SEQUENCE

1. The unit runs for the required length of time at idle speed to assure proper cool down.
2. A relay turns the control switch to off and fuel is shut down. The lube oil pump starts at approximately 80-percent speed and the machine continues deceleration.
3. Clutch is engaged.
4. The turning gear starts and drives machine spindle for completion of the cooling off period.
5. The clutch is disengaged and turning gear and lube oil pump shut down.