One Energy Place
Pensacola, Florida 32520

Tel 850.444.6111

GULF POWER
A SOUTHERN COMPANY

Certified Mail

February 2, 2005

Mr. Mike Halpin, P.E.
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Mail Station #5510
Tallahassee, Florida 32399-2400

Dear Mr. Halpin:

RE: CRIST MERCURY RESEARCH CENTER CONSTRUCTION PERMIT
ADDITIONAL INFORMATION REQUEST RESPONSE
TITLE V PERMIT NO: 0330045-009-AV

Thanks for the quick response to our request for a construction permit to build and operate a mercury research center at Plant Crist. Gulf Power hereby submits additional information as outlined in our telephone discussion on January 25, 2005. There were three (3) items noted in your request.

1) **What is the projected term of the project?**
Gulf Power believes the project will last approximately 5 years. However, we would request that the construction permit be renewable to allow the project to be extended if requested.

2) **A letter containing a PE Statement certifying emission estimates from the project.**
Attached is a certification statement by Greg N. Terry certifying emission estimates based on the following plant design data assuming a 100% capacity factor which would over estimate the emissions on an annual basis:

Total Flow: 25000 acfm @ 700F (~50,000 lb/hr)
Flue gas constituents
N2 72%
CO2 13.4%
SO2 500 ppm
NOx 460 ppm
Ash 2.7 gr/wscf
H2O 11%
O2 3.5%

NOX
For NOx reductions, the SCR is will be designed to a nominal 90% reduction. This leads to a reduction of 22 lbs/hr, or 99 tons/yr.

Ammonia
Ammonia slip, estimated using 5 ppm slip from the SCR, generates 0.153 lbs/hr of ammonia from the SCR. Using TRI estimates, the total vapor phase emissions from the unit is estimated at 15 lbs/yr.

Activated Carbon
Activated carbon injection concentrations typically average around 15 lbs/mmacf for ESP injection and 1.5 lbs/mmacf for baghouse injection. However, we have seen injections as high as 30 lbs/mmacf. Because we have tested that high, we used 30 lb/mmacf as the upper estimate for activated carbon. At 30, the total activated carbon injected is 131 tons/yr. We expect virtually no increase in particulate emissions, since as a worst case the carbon will have to slip through 2 cold ESPs (ours in the research facility and Unit 5 cold side), and a baghouse.

SO2
The center will have an operational FGD that will treat approximately 1 MW of flue gas, or about 20% of the total research facility flow. In this case, the SO2 feed to the FGD is 12 lb/hr. Assuming an average of 90% control, a 45 ton/yr of SO2 reduction expected. The 45 tons/yr of SO2 should generate approximately 96 tons/yr of gypsum.

Sulfuric Acid Mist
Sulfuric acid mist will be produced as a by product of the research center control equipment. Using TRI emission factors, annual emissions of H2SO4 is estimated to be approximately 1000 lbs per year.

Particulate
There will be no change in particulate emissions (PM or PM 2.5) from operation of the research center on Unit 5. Particulate emissions in the test stream will be controlled with 2 cold side ESPs.

3) A Project Test Matrix: The following is a list of proposed mercury research test programs:

Optimization of process parameters for TOXECON
TOXECON is the EPRI patented technology that captures Hg by injected activated carbon into the flue gas downstream of an existing ESP into a high-ratio fabric filter (baghouse). This approach allows operators to preserve ash sales and minimize the effect of ACI on the existing ESP, while effectively reducing Hg emissions due to long residence times and effective mass transfer between flue gas and AC at the bag surface. To date, several evaluations of TOXECON's performance have funded through the DOE. However, little work to optimize baghouse design and carbon injection control schemes has been undertaken.

This test program will investigate different baghouse sizes (air to cloth ratios) as well as different schemes for activated carbon injection. Typically, Hg in flue gas will be measured along with appropriate process parameters to evaluate an optimum operating condition. Following parametric testing, a long term test will be performed to evaluate balance of plant issues with the chosen optimum.

Effects of selective catalytic reduction (SCR) on Hg chemistry
It is well known that SCR systems can significantly affect Hg chemistry in flue gas, thereby affecting overall system Hg control performance. However, little is understood about the fundamental chemistry that drives this effect, or how this affect changes as SCR catalysts age. These issues will significantly affect how SCR catalyst management programs are implemented in the future.

In order to better understand the chemistry, a program to parametrically investigate different catalyst designs and flue gas conditions will be performed. This program will investigate the affects of NH_3 injection, SCR temperature, space-velocity, catalyst formulation, along with other process parameters to identify optimum design for both NO_x and Hg control.

Effects of flue gas chemistry on Hg control in FGD systems
Because flue gas desulphurization (FGD) systems will be widely used to achieve necessary Hg emission reductions, it is imperative that the mechanisms driving absorption into the scrubber slurry are understood. The effect of scrubber chemistry on Hg control will be investigated in the 1 MW FGD with various configurations of the upstream process equipment (SCR, ESP, and BH).

A test program of this nature is most likely a long term parametric investigation, with mostly shift work due to the nature of the pilot FGD (they are difficult to run for extended periods of time uninterrupted). This is also the most cost effective approach to investigate the multitude of scrubber chemistries that could be encountered.

Optimization of Hg control efficiency for typical units with SCR/ESP/FGD combinations
The utility industry will rely heavily on the co-benefits realized from previously installed NO_x, Particulate, and SO_2 control equipment. The lowest cost overall compliance strategy will require that these combinations of systems be optimized for all Hg control, as well as the other pollutants. Because of the MerRC's unique combination of equipment, it will allow for parametric testing of each system to achieve this goal.

This test program requires a long term test plan, designed to parametrically evaluate each piece of equipment, while developing a process design that optimizes the combination. A long term program where any number of operating conditions are analyzed is foreseeable.

Development of Sulfuric Acid control technologies
As the utility industry begins to install its second fleet of scrubbers, the cost competitiveness of high sulfur coals will begin to improve. The higher sulfur coal will influence the level of sulfuric acid emissions from these facilities, particularly the plants with SCR installations. Currently, there are few demonstrated control technologies that achieve meaningful reductions in acid emissions. Alkaline injection systems are currently the state of the art in sulfuric acid control, but a thorough test program to understand the performance and balance of plant impacts is warranted.

A test program of this nature is likely to be a series of parametric evaluations followed by long term testing to evaluate optimum conditions and any balance of plant problems generated by the technology candidates. For a given alkaline injection technology, a 1 week parametric test program followed by a long term evaluation is probable.

Hg Sorbent development
Activated carbon injection is currently the state of the art in Hg control technology. Once the base injection systems are installed, the choice of sorbent is based on the cost/performance curve of the material in question. For that reason, it is necessary to develop and evaluate the latest developments in sorbent technologies. As these new and improved sorbents come to market, test programs to demonstrate their effectiveness are required.

Any number of test programs in this model could be envisioned and proposed by control equipment vendors and 3rd party researchers. A typical evaluation would consist of 1-2 weeks of parametric testing, followed by a of long term evaluation to understand balance of plant impacts. Typical process parameters to be optimized include: injection concentration, Hg control efficiency, ESP/Baghouse performance during injection, and possible implications to ash sales.

Please let me know if you have any questions on the proposed mercury research test center.

Sincerely,

G. Dwain Waters, Q.E.P.
Air Quality Programs Supervisor

cc: Jim Vick, Gulf Power Company
Greg Terry, Gulf Power Company
Terry Wright, Gulf Power Company
John Dominey, Southern Company
Nick Irvin, Southern Company Services

CRIST MERCURY RESEACH CENTER
EMISSIONS ESTIMATE & PROJECT DESCRIPTION
CERTIFICATION BY PROFESSIONAL ENGINEER

"I, the undersigned, am a registered professional engineer in the State of Florida and hereby certify to the best of my knowledge that all information being submitted to revise the construction permit application for the Crist Mercury Research Center is true, accurate and complete."

Professional Engineer Signature:

Gregory N. Terry

2-3-2005

Gregory N. Terry
Registration Number: 52786

Date

Memorandum

Florida Department of Environmental Protection

TO: Trina Vielhauer

THRU: ~~J. K. Pennington~~

FROM: M. P. Halpin

DATE: February 11, 2005

SUBJECT: Gulf Power Company
Crist Unit 5 Mercury Research Center (MerRC)
DEP File No. 0330045-011-AC

Attached is the public notice package for the Crist Electric Generating Plant Mercury Research Center to be located at Crist Unit 5. This is an existing coal-fired facility located in Pensacola, Escambia County.

As indicated in the application, research has shown that pollution control technologies designed to control NO_x, SO_2, and PM can affect overall Hg performance. In order to investigate these relationships, Gulf Power is planning a 5 MW equivalent slip-stream facility equipped with a complete system of flue gas cleanup technologies at Crist Unit 5, located in Escambia County, Florida. The proposed slip-stream facility will incorporate a Selective Catalytic Reduction (SCR) system, a rotary air-heater, an electrostatic precipitator (ESP), a baghouse (BH), and a wet flue gas desulphurization (FGD) system.

The applicant anticipates that the facility will be in operation for up to five years. According to the application, no increase of pollutants above PSD thresholds is anticipated. Given that this is a "research" facility, I have allowed a fair amount of flexibility for the permittee, requiring only advance notice of testing and disclosure of test results.

I recommend your approval.

JKP/mph

Attachments

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

February 11, 2005

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Gene L. Ussery
V.P. Power Generation
Gulf Power Company
One Energy Place
Pensacola, Florida 32520-0110

Re: Crist Mercury Research Center (MerRC)
TDF Test Burn
AIRS ID No. 0330045-011-AC

Dear Mr. Ussery:

Enclosed is one copy of the Draft Air Construction Permit relative to the request from Gulf Power Company to construct and operate a temporary research center for evaluating mercury (Hg) emission reduction techniques on Crist Unit 5. The subject facility is located in Pensacola, Escambia County.

The Public Notice of Intent to Issue Air Construction Permit must be published one time only, as soon as possible, in the legal advertisement section of a newspaper of general circulation in the area affected, pursuant to the requirements Chapter 50, Florida Statutes. Proof of publication, i.e., newspaper affidavit, must be provided to the Department's Bureau of Air Regulation office within seven days of publication. Failure to publish the notice and provide proof of publication may result in the denial of the permit.

Please submit any written comments you wish to have considered concerning the Department's proposed action to J. K. Pennington, P.E., Administrator, North Permitting Section at the above letterhead address. If you have any other questions, please contact Michael P. Halpin, P.E. at 850/921-9519.

Sincerely,

Trina L Vielhauer

Trina Vielhauer, Chief
Bureau of Air Regulation

TV/mph

Enclosures

In the Matter of an
Application for Permit by:

Mr. Gene L. Ussery, V.P. Power Generation
Gulf Power Company
One Energy Place
Pensacola, Florida 32520-0110

DEP File No. 0330045-011-AC

INTENT TO ISSUE AIR CONSTRUCTION PERMIT

The Department of Environmental Protection (Department) gives notice of its intent to issue an Air Construction Permit (copy of Draft permit attached) for the proposed project, detailed in the application specified above and for the reasons stated below.

The applicant, Gene Ussery, Vice President of Power Generation – Gulf Power Company, applied on January 25, 2005, to the Department for an Air Construction Permit at its Crist Electric Generating Plant, located on Pate Road, off 10 Mile Road (on Governors Bayou) in Pensacola, Escambia County. The request is to construct and operate a temporary 5 MW equivalent slip-stream facility equipped with a complete system of flue gas cleanup technologies at Crist Unit 5. The proposed slip-stream facility will incorporate a Selective Catalytic Reduction (SCR) system, a rotary air-heater, an electrostatic precipitator (ESP), a baghouse (BH), and a wet flue gas desulphurization (FGD) system. According to the application, no increase of pollutants above PSD thresholds is anticipated.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, 62-212 and 40 CFR 52.21. The above actions are not exempt from permitting procedures. The Department has determined that an Air Construction Permit is required relative to temporary installations such as the one described herein.

The Department intends to issue this Air Construction Permit based on the belief that reasonable assurances have been provided to indicate that operation of these emission units will not adversely impact air quality, and the emission units will comply with all appropriate provisions of Chapters 62-4, 62-204, 62-210, 62-212, 62-296, and 62-297, F.A.C. and 40 CFR 52.21.

Pursuant to Section 403.815, F.S., and Rule 62-110.106(7)(a)1., F.A.C., you (the applicant) are required to publish at your own expense the enclosed Public Notice of Intent to Issue Air Construction Permit. The notice shall be published one time only in the legal advertisement section of a newspaper of general circulation in the area affected. Rule 62-110.106(7)(b), F.A.C., requires that the applicant cause the notice to be published as soon as possible after notification by the Department of its intended action. For the purpose of these rules, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. If you are uncertain that a newspaper meets these requirements, please contact the Department at the address or telephone number listed below. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400 (Telephone: 850/488-0114; Fax 850/ 922-6979). You must provide proof of publication within seven days of publication, pursuant to Rule 62-110.106(5), F.A.C. No permitting action for which published notice is required shall be granted until proof of publication of notice is made by furnishing a uniform affidavit in substantially the form prescribed in section 50.051, F.S. to the office of the Department issuing the permit. Failure to publish the notice and provide proof of publication may result in the denial of the permit pursuant to Rules 62-110.106(9) & (11), F.A.C.

The Department will issue the final permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of 14 (fourteen) days from the date of publication of Public Notice of Intent to Issue Air Construction Permit. Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action; and (g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation is not available in this proceeding.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under Section 120.542 F.S. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. The petition must specify the following information: (a) The name, address, and telephone number of the petitioner; (b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any; (c) Each rule or portion of a rule from which a variance or waiver is requested; (d) The citation to the statute underlying (implemented by) the rule identified in (c) above; (e) The type of action requested; (f) The specific facts that would justify a variance or waiver for the petitioner; (g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented

by the rule); and (h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in Section 120.542(2) F.S., and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.

Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully enforceable by the Administrator of the EPA and by any person under the Clean Air Act unless and until the Administrator separately approves any variance or waiver in accordance with the procedures of the federal program.

Executed in Tallahassee, Florida.

Trina Vielhauer, Chief
Bureau of Air Regulation

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this Intent to Issue Air Construction Permit (including the Public Notice of Intent to Issue Air Construction Permit and the Draft Air Construction Permit) was sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 2/14/05 to the person(s) listed:

Gene L. Ussery, Gulf Power *
G. Dwain Waters, Gulf Power
Gregory N. Terry, P.E., Gulf Power
Gregg Worley, EPA
John Bunyak, NPS
Sandra Veazey, NWD

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

(Clerk) 2/14/05 (Date)

PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No. 0330045-011-AC

Gulf Power Company
Crist Electrical Generating Plant
Escambia County

The Department of Environmental Protection (Department) gives notice of its intent to issue an Air Construction Permit for Crist Electrical Generating Plant, located on Pate Road, off 10 Mile Road, on Governors Bayou, Pensacola, Escambia County. The permit is to allow the construction and operation of a temporary 5 MW equivalent slip-stream facility equipped with a complete system of flue gas cleanup technologies at Crist Unit 5. The proposed slip-stream facility will incorporate a Selective Catalytic Reduction (SCR) system, a rotary air-heater, an electrostatic precipitator (ESP), a baghouse (BH), and a wet flue gas desulphurization (FGD) system. According to the applicant, no increase of pollutants above PSD thresholds is anticipated. As such, a Determination of Best Available Control Technology (BACT) was not required, since there will be no significant increases in criteria pollutants as defined by Table 62-212.400-2 of the Florida Administrative Code. The applicant's mailing address is: One Energy Place, Pensacola FL 32520-0110.

An air quality impact analysis was not required. The Department will issue the Final Permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of 14 (fourteen) days from the date of publication of this Public Notice of Intent to Issue Air Construction Permit. Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the

NOTICE TO BE PUBLISHED IN THE NEWSPAPER

proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action; and (g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Florida Department of
Environmental Protection
Bureau of Air Regulation
111 S. Magnolia Drive, Suite 4
Tallahassee, Florida, 32301
Telephone: (850) 488-1344
Fax: (850) 922-6979

Florida Department of
Environmental Protection
Northwest District Office
160 Governmental Center
Pensacola, Florida 32502-5794
Telephone: (850) 595-8300
Fax: (850) 595-4417

The complete project file includes the application, Draft permit, and the information submitted by the Responsible Official, exclusive of confidential records under Section 403.111, F.S. Interested persons may review specific details of this project by contacting the Administrator, North Permitting Section, at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

NOTICE TO BE PUBLISHED IN THE NEWSPAPER

DRAFT

February 11, 2005

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Gene L. Ussery
V.P. Power Generation
Gulf Power Company
One Energy Place
Pensacola, Florida 32520-0110

File No. 0330045-011-AC
SIC No. 4911
Expires: April 1, 2010

Re: Crist Mercury Research Center (MerRC)

Dear Mr. Ussery:

The Department has reviewed the request from Gulf Power received on January 25, 2005 concerning the construction of a temporary research center for evaluating mercury (Hg) emission reduction techniques. As indicated in the application, research has shown that pollution control technologies designed to control NO_x, SO_2, and PM can affect overall Hg performance. In order to investigate these relationships, Gulf Power is planning a 5 MW equivalent slip-stream facility equipped with a complete system of flue gas cleanup technologies at Crist Unit 5, located in Escambia County, Florida. The proposed slip-stream facility will incorporate a Selective Catalytic Reduction (SCR) system, a rotary air-heater, an electrostatic precipitator (ESP), a baghouse (BH), and a wet flue gas desulphurization (FGD) system. According to the application, no increase of pollutants above PSD thresholds is anticipated.

You are hereby authorized to construct the aforementioned slipstream, and conduct performance tests in accordance with the included conditions. All conditions of existing permits related to air pollution emission limits and control equipment remain in force.

The project shall be subject to the following conditions:

1. The permittee shall notify the DEP Northwest District and the Bureau of Air Regulation, in writing, at least seven days prior to beginning construction. Notification shall also occur within seven days, in writing, of completion of construction activities. Within this notification, shall be included specific details of the first 120 days of planned testing (exclusive of equipment start-up and shake-down testing) which the applicant proposes to conduct. An "as-built" drawing, including all actual equipment specifications shall also be provided.
2. For the duration of the project, the permittee shall notify the DEP Northwest District at least 7 days prior to commencing any emission testing, such that the Department may witness such tests. A weekly summary of daily emission testing activities (for the upcoming week), sent by fax to the DEP Northwest District Office shall suffice for this notification.
3. At the end of each 90 day period (quarterly), the permittee shall submit to the DEP Northwest District Office and the Bureau of Air Regulation a written summary of all test results during the prior 90 day period, as well as specific details of the next 90 days of planned testing.

DRAFT

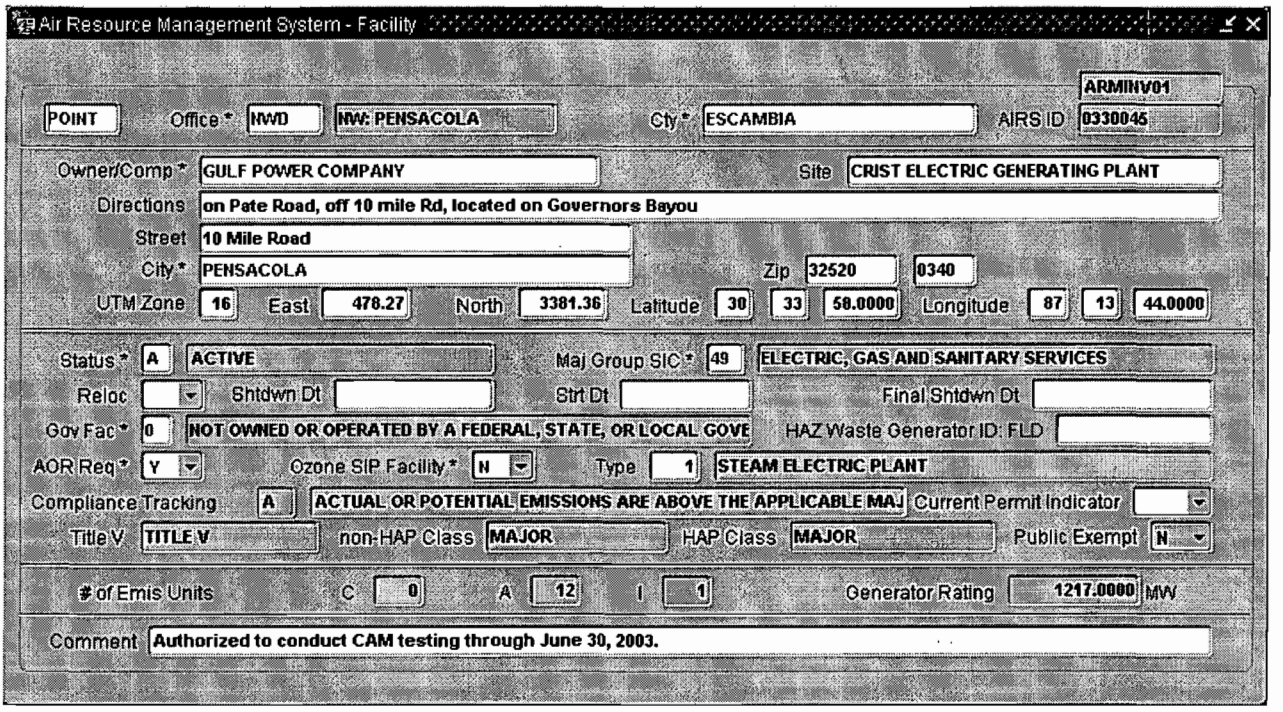
4. At the end of each calendar year, the permittee shall include on the Annual Operating Report (AOR) a calculation of Crist Unit 5 emission increases/decreases as a result of the slipstream. Any deviation from the permittee's original estimates (that no PSD Significant Emission Rate thresholds will be crossed) shall be brought to the Department's attention immediately.
5. Stack emissions shall not exceed any limit within existing permits.
6. Performance tests shall be conducted using EPA Reference Methods, as contained in 40 CFR 60 (Standards of Performance for New Stationary Sources), 40 CFR 61 (National Emission Standards for Hazardous Air Pollutants), and 40 CFR 266, Appendix IX (Multi-metals), or any other method approved by the Department, in writing, in accordance with Chapter 62-297, F.A.C.
7. Daily records of the slipstream operation (i.e. insertion of and/or removal of equipment from service as well as records of tests performed) shall be maintained on site and available for Department inspection.
8. The project shall not result in the release of objectionable odors pursuant to Rule 62-296.320(2). F.A.C.
9. Performance testing shall cease as soon as possible if the boiler operations are not in accordance with the conditions within existing permits, or this authorization protocol. Performance testing shall not resume until appropriate measures to correct the problem(s) have been implemented.
10. This Department action is only to authorize the MerRC construction and operation. Notification shall.occur within 5 days, in writing, upon completion of the final test. Prior to December 31, 2009 the permittee shall provide the DEP Northwest District Office and the Bureau of Air Regulation with its plans to disassemble and remove all slipstream components, returning the unit back to its original condition. Such plans shall be completely executed by April 1, 2010.
11. Unless otherwise specified herein, the preliminary test matrix submitted by the applicant, and received by FDEP via e-mail on February 3, 2005, is acceptable and incorporated herein as Attachment "A".

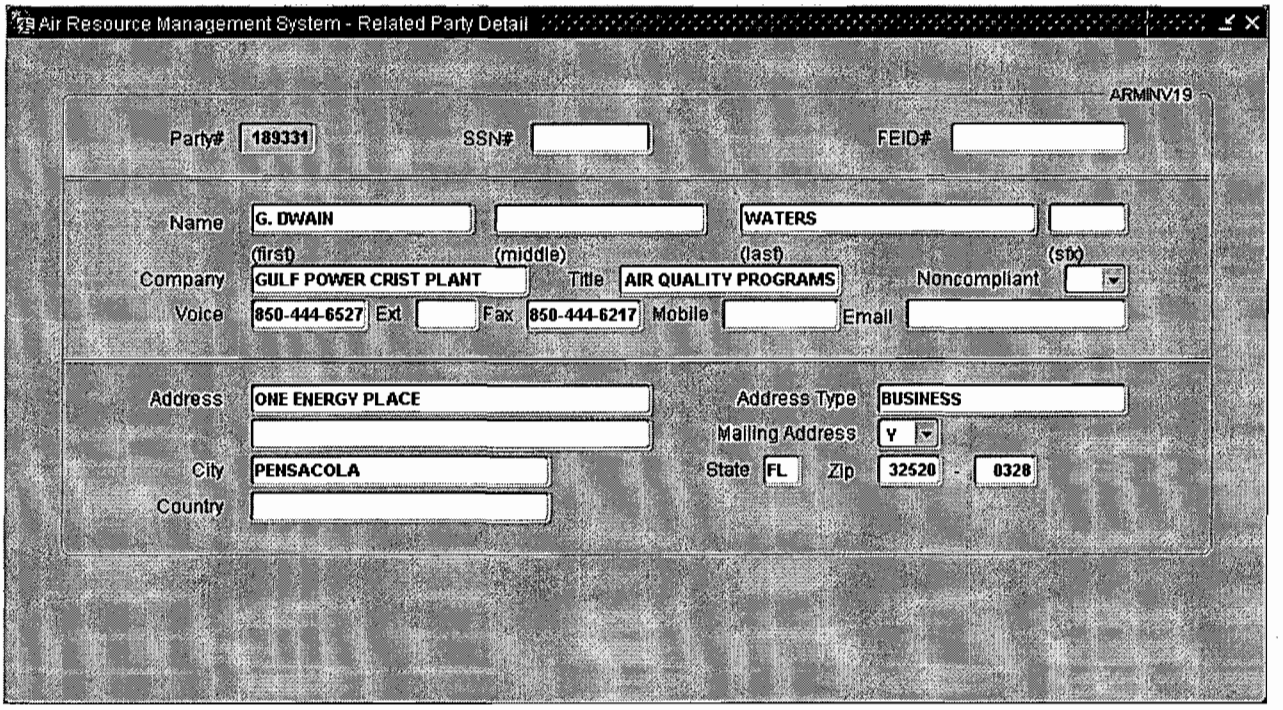
This letter must be attached to permit No. 0440045-009-AV and shall become a part of the permit.

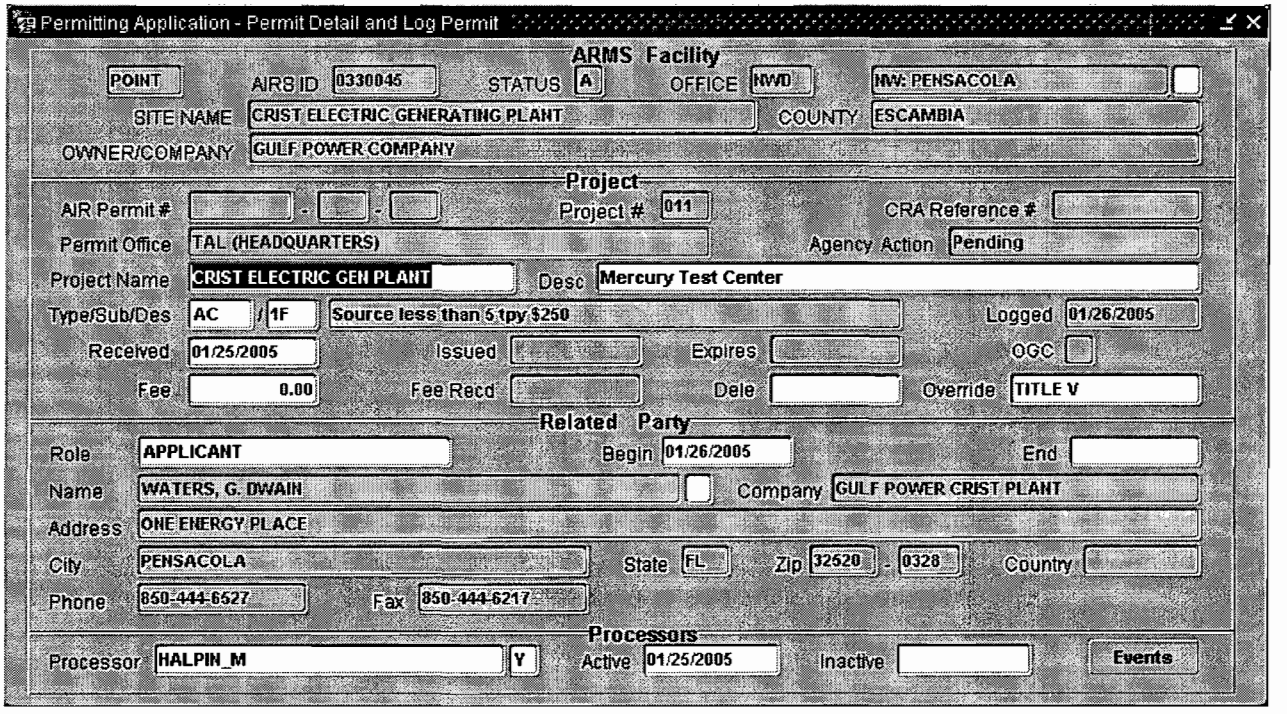
Sincerely,

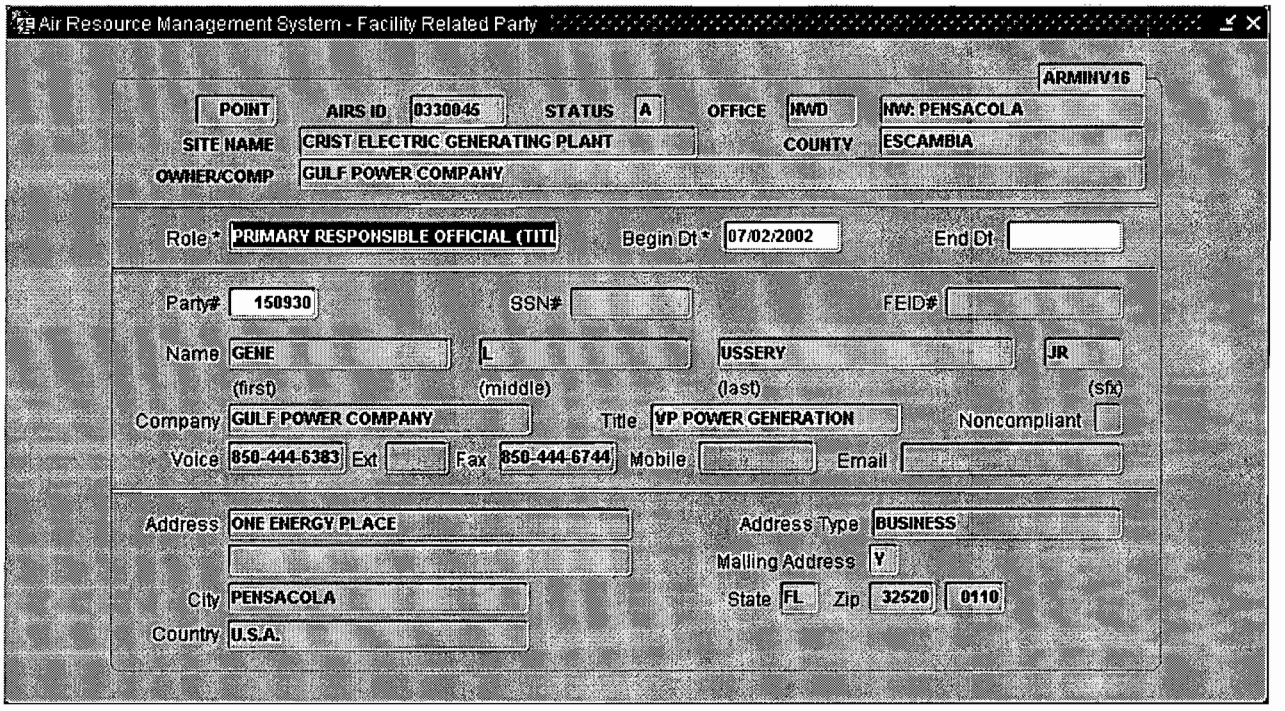
Michael G. Cooke, Director
Division of Air Resource
Management

TV/mh


Air Resource Management System - Facility
ARMINV01
POINT
Office * NWD NW: PENSACOLA
Cty * ESCAMBIA
AIRS ID 0330045
Owner/Comp * GULF POWER COMPANY
Site CRIST ELECTRIC GENERATING PLANT
Directions on Pate Road, off 10 mile Rd, located on Governors Bayou
Street 10 Mile Road
City * PENSACOLA
Zip 32520 0340
UTM Zone 16 East 478.27 North 3381.36 Latitude 30 33 58.0000 Longitude 87 13 44.0000
Status * A ACTIVE
Maj Group SIC * 49 ELECTRIC, GAS AND SANITARY SERVICES
Reloc
Shtdwn Dt
Strt Dt
Final Shtdwn Dt
Gov Fac * 0 NOT OWNED OR OPERATED BY A FEDERAL, STATE, OR LOCAL GOVE
HAZ Waste Generator ID: FLD
AOR Req * Y
Ozone SIP Facility * N
Type 1 STEAM ELECTRIC PLANT
Compliance Tracking A ACTUAL OR POTENTIAL EMISSIONS ARE ABOVE THE APPLICABLE MAJ
Current Permit Indicator
Title V TITLE V
non-HAP Class MAJOR
HAP Class MAJOR
Public Exempt N
# of Emis Units C 0 A 12 I 1
Generator Rating 1217.0000 MW
Comment Authorized to conduct CAM testing through June 30, 2003.


Air Resource Management System - Related Party Detail
ARMINV19
Party# 189331
SSN#
FEID#
Name G. DWAIN (first) (middle) WATERS (last) (sfx)
Company GULF POWER CRIST PLANT
Title AIR QUALITY PROGRAMS
Noncompliant
Voice 850-444-6527 Ext Fax 850-444-6217 Mobile Email
Address ONE ENERGY PLACE
Address Type BUSINESS
Mailing Address Y
City PENSACOLA
State FL Zip 32520 - 0328
Country


Permitting Application - Permit Detail and Log Permit
ARMS Facility
POINT
AIRS ID 0330045
STATUS A
OFFICE NWD
NW: PENSACOLA
SITE NAME CRIST ELECTRIC GENERATING PLANT
COUNTY ESCAMBIA
OWNER/COMPANY GULF POWER COMPANY
Project
AIR Permit #
Project # 011
CRA Reference #
Permit Office TAL (HEADQUARTERS)
Agency Action Pending
Project Name CRIST ELECTRIC GEN PLANT
Desc Mercury Test Center
Type/Sub/Des AC / 1F Source less than 5 tpy $250
Logged 01/26/2005
Received 01/25/2005
Issued
Expires
OGC
Fee 0.00
Fee Recd
Dele
Override TITLE V
Related Party
Role APPLICANT
Begin 01/26/2005
End
Name WATERS, G. DWAIN
Company GULF POWER CRIST PLANT
Address ONE ENERGY PLACE
City PENSACOLA
State FL
Zip 32520 - 0328
Country
Phone 850-444-6527
Fax 850-444-6217
Processors
Processor HALPIN_M
Y
Active 01/25/2005
Inactive
Events


Air Resource Management System - Facility Related Party
ARMINV16
POINT
AIRS ID 0330045
STATUS A
OFFICE HWD
NW: PENSACOLA
SITE NAME CRIST ELECTRIC GENERATING PLANT
COUNTY ESCAMBIA
OWNER/COMP GULF POWER COMPANY
Role * PRIMARY RESPONSIBLE OFFICIAL (TITL
Begin Dt * 07/02/2002
End Dt
Party# 150930
SSN#
FEID#
Name GENE L USSERY JR
(first) (middle) (last) (sfx)
Company GULF POWER COMPANY
Title VP POWER GENERATION
Noncompliant
Voice 850-444-6383 Ext Fax 850-444-6744 Mobile Email
Address ONE ENERGY PLACE
Address Type BUSINESS
Mailing Address Y
City PENSACOLA
State FL Zip 32520 0110
Country U.S.A.

One Energy Place
Pensacola, Florida 32520

Tel 850.444.6111

0330045-011-AC

rec'd 2/25/05

GULF POWER
A SOUTHERN COMPANY

Certified Mail

February 2, 2005

Mr. Mike Halpin, P.E.
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Mail Station #5510
Tallahassee, Florida 32399-2400

Dear Mr. Halpin:

RE: CRIST MERCURY RESEARCH CENTER CONSTRUCTION PERMIT
ADDITIONAL INFORMATION REQUEST RESPONSE
TITLE V PERMIT NO: 0330045-009-AV

Thanks for the quick response to our request for a construction permit to build and operate a mercury research center at Plant Crist. Gulf Power hereby submits additional information as outlined in our telephone discussion on January 25, 2005. There were three (3) items noted in your request.

1) **What is the projected term of the project?**
Gulf Power believes the project will last approximately 5 years. However, we would request that the construction permit be renewable to allow the project to be extended if requested.

2) **A letter containing a PE Statement certifying emission estimates from the project.**
Attached is a certification statement by Greg N. Terry certifying emission estimates based on the following plant design data assuming a 100% capacity factor which would over estimate the emissions on an annual basis:

Total Flow: 25000 acfm @ 700F (~50,000 lb/hr)
Flue gas constituents
N2 72%
CO2 13.4%
SO2 500 ppm
NOx 460 ppm
Ash 2.7 gr/wscf
H2O 11%
O2 3.5%

NOX
For NOx reductions, the SCR is will be designed to a nominal 90% reduction. This leads to a reduction of 22 lbs/hr, or 99 tons/yr.

Ammonia
Ammonia slip, estimated using 5 ppm slip from the SCR, generates 0.153 lbs/hr of ammonia from the SCR. Using TRI estimates, the total vapor phase emissions from the unit is estimated at 15 lbs/yr.

Activated Carbon
Activated carbon injection concentrations typically average around 15 lbs/mmacf for ESP injection and 1.5 lbs/mmacf for baghouse injection. However, we have seen injections as high as 30 lbs/mmacf. Because we have tested that high, we used 30 lb/mmacf as the upper estimate for activated carbon. At 30, the total activated carbon injected is 131 tons/yr. We expect virtually no increase in particulate emissions, since as a worst case the carbon will have to slip through 2 cold ESPs (ours in the research facility and Unit 5 cold side), and a baghouse.

SO2
The center will have an operational FGD that will treat approximately 1 MW of flue gas, or about 20% of the total research facility flow. In this case, the SO2 feed to the FGD is 12 lb/hr. Assuming an average of 90% control, a 45 ton/yr of SO2 reduction expected. The 45 tons/yr of SO2 should generate approximately 96 tons/yr of gypsum.

Sulfuric Acid Mist
Sulfuric acid mist will be produced as a by product of the research center control equipment. Using TRI emission factors, annual emissions of H2SO4 is estimated to be approximately 1000 lbs per year.

Particulate
There will be no change in particulate emissions (PM or PM 2.5) from operation of the research center on Unit 5. Particulate emissions in the test stream will be controlled with 2 cold side ESPs.

3) A Project Test Matrix: The following is a list of proposed mercury research test programs:

This test program will investigate different baghouse sizes (air to cl
different schemes for activated carbon injection. Typically, Hg in fl
measured along with appropriate process parameters to evaluate an
condition. Following parametric testing, a long term test will be pe
balance of plant issues with the chosen optimum.

Effects of selective catalytic reduction (SCR) on Hg chemistry
It is well known that SCR systems can significantly affect Hg chem
thereby affecting overall system Hg control performance. However
about the fundamental chemistry that drives this effect, or how this
SCR catalysts age. These issues will significantly affect how SCR
programs are implemented in the future.

In order to better understand the chemistry, a program to parametric
different catalyst designs and flue gas conditions will be performed.
investigate the affects of NH_3 injection, SCR temperature, space-ve
formulation, along with other process parameters to identify optimu
NO_x and Hg control.

Effects of flue gas chemistry on Hg control in FGD systems
Because flue gas desulphurization (FGD) systems will be widely us
necessary Hg emission reductions, it is imperative that the mechani
absorption into the scrubber slurry are understood. The effect of sc
Hg control will be investigated in the 1 MW FGD with various con
upstream process equipment (SCR, ESP, and BH).

A test program of this nature is most likely a long term parametric i
mostly shift work due to the nature of the pilot FGD (they are diffic
extended periods of time uninterrupted). This is also the most cost
investigate the multitude of scrubber chemistries that could be enco

**Optimization of Hg control efficiency for typical units with SCI
combinations**
The utility industry will rely heavily on the co-benefits realized fro
NO_x, Particulate, and SO_2 control equipment. The lowest cost over
strategy will require that these combinations of systems be optimize
as well as the other pollutants. Because of the MerRC's unique con
equipment, it will allow for parametric testing of each system to ach

BEST AVAILABLE COPY

One Energy Place
Pensacola, Florida 32520

Tel 850.444.6111

Mr. L C

GULF POWER
A SOUTHERN COMPANY

Certified Mail

January 18, 2005

RECEIVED
JAN 2005
BUREAU OF AIR REGULATION

Jonathan Holtom
Florida Department of Environmental Protection
Division of Air Resources Management
2600 Blair Stone Road
Mail Station #5510
Tallahassee, Florida 32399-2400

Dear Mr. Holtom:

RE: CRIST ELECTRIC GENERATING PLANT
CONSTRUCTION PERMIT APPLICATION
SNCR, Cooling Tower Replacement, Biomass, Mercury Test Center
Permit No: 0330045-009-AV

Please find enclosed Gulf Power's application for construction permit for several projects currently in planning at the Crist Electric Generating Plant located in Pensacola, Florida. Included in the application are the required certifications by the Responsible Official and Professional Engineer registered in Florida.

As you may be aware, Gulf Power's schedule to begin construction on these projects is critical pursuant to damages sustained by Hurricane Ivan and due to engineering & design delays due to the hurricane's impact on planning. Please advise Gulf Power as soon as possible any delay to the construction schedules due to permitting processes.

We appreciate your efforts to work with us regarding the startup of these emission control and research control systems. Please call me regarding any additional questions or concerns.

Sincerely,

Dwain Waters, Q.E.P.

G. Dwain Waters, Q.E.P.
Air Quality Programs Supervisor

cc: w/att: Trina Vielhauer, FDEP – Tallahassee Office
Jim Vick, Gulf Power Company
Wright, Terry, Gulf Power Company
John Dominey, Gulf Power Company
Ms. Sandra Veazey, FDEP Northwest District Office, Pensacola, Florida
Mr. Richard Fancher, FDEP Northwest District Office, Pensacola, Florida

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 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
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

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 & Revised/Renewal 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: Gulf Power Company	
2. Site Name: Crist Electric Generating Plant	
3. Facility Identification Number: 0330045	
4. Facility Location...: Street Address or Other Locator: Pate Road (Off of 10 Mile Road) City: Pensacola County: Escambia Zip Code: 32520-0340	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: G. Dwain Waters
2. Application Contact Mailing Address... Organization/Firm: Gulf Power Company Street Address: One Energy Place City: Pensacola State: Florida Zip Code: 32520-0328
3. Application Contact Telephone Numbers... Telephone: (850) 444-6527 ext. Fax: (850) 444-6217
4. Application Contact Email Address: gdwaters@southernco.com

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	1-25-05
2. Project Number(s):	0330045-011-AC
3. PSD Number (if applicable):	

APPLICATION INFORMATION

4. Siting Number (if applicable):	

APPLICATION INFORMATION

Purpose of Application

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

Air Construction Permit

☒ Air construction permit.

Air Operation Permit

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

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

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

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

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

Application Comment

The purpose of this application is to request a construction permit for several projects at Plant Crist located in Pensacola, Florida. These projects include: 1) Construction of a Selective Non-Catalytic Reduction (SNCR) System on Crist Unit 6 to support the facility wide NOx emission limitation as outlined under the Gulf-FDEP Ozone Reduction Agreement. 2) Re-construction of the damaged Unit 6 cooling tower from Hurricane Ivan. 3) Continuation of the previously issued biomass use permit for Units 4 and 5 and incorporation of long term use of biomass fuel in the Title V permit. 4) Construction of a Mercury Test Center on Unit 5.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
004	Unit 4 Electric Utility Boiler - 1096.7 MMBtu/hr		
005	Unit 5 Electric Utility Boiler - 1096.7 MMBtu/hr		
006	Unit 6 Electic Utility Boiler - 3704.8 MMBtu/hr		
012	Cooling Towers (3)		

Application Processing Fee

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

APPLICATION INFORMATION

Owner/Authorized Representative Statement

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

1. Owner/Authorized Representative Name :

2. Owner/Authorized Representative Mailing Address...
   Organization/Firm:
   Street Address:
   City: State: Zip Code:

3. Owner/Authorized Representative Telephone Numbers...
   Telephone: ( ) - ext. Fax: ( ) -

4. Owner/Authorized Representative Email Address:

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 Date

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:
   Gene L. Ussery, Jr.

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.

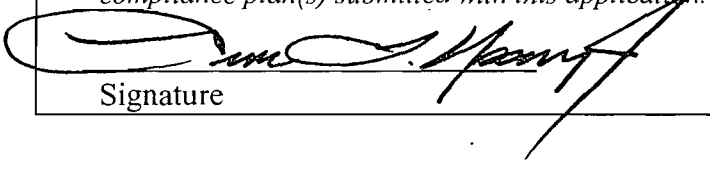
3. Application Responsible Official Mailing Address...
   Organization/Firm: Gulf Power Company
   Street Address: One Energy Place
   City: Pensacola State: Fl Zip Code: 32520-0100

4. Application Responsible Official Telephone Numbers...
   Telephone: (850) 444-6383 ext. Fax: (850) 444-6744

5. Application Responsible Official Email Address: GLUSSERY@southernco.com

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

1-18-05
Date

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: Gregory N. Terry
   Registration Number: 52786
2. Professional Engineer Mailing Address...
   Organization/Firm: Gulf Power Company
   Street Address: One Energy Place
   City: Pensacola State: Fl Zip Code: 32520-0340
3. Professional Engineer Telephone Numbers...
   Telephone: (850) 429-2381 ext. Fax: (850) 429-2246
4. Professional Engineer Email Address: GNTERRY@southernco.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.

Gregory N Terry
Signature

1-14-2005
Date

(seal)

* Attach any exception to certification statement.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone 16 East (km) 478.27 North (km) 3381.36		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) 30 33 58 Longitude (DD/MM/SS) 87 13 44	
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: G. Dwain Waters
2. Facility Contact Mailing Address... Organization/Firm: Gulf Power Company Street Address: One Energy Place City: Pensacola State: FL Zip Code: 32520-0329
3. Facility Contact Telephone Numbers: Telephone: (850) 444-6527 ext. Fax: (850) 444-6217
4. Facility Contact Email Address: gdwaters@southernco.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 Email Address:

FACILITY INFORMATION

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:		

FACILITY INFORMATION

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
No Change from previous Title V application		

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 No.s Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap
NOx					

7. Facility-Wide or Multi-Unit Emissions Cap Comment:
Units 4, 5,6 & 7 are is subject to a NOx emissions cap of 0.20 lb/mmbtu (30 day rolling average) as outlined in the Gulf - FDEP Ozone Reduction Agreement.

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:06/22/2004
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:06/22/2004
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:06/22/2004

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 or Modification:
   ☒ Attached, Document ID:_____
3. Rule Applicability Analysis:
   ☐ Attached, Document ID:_____
4. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.):
   ☐ Attached, Document ID:_____ ☒ Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.):
   ☐ Attached, Document ID:_____ ☒ Not Applicable
6. Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.):
   ☐ Attached, Document ID:_____ ☒ Not Applicable
7. Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.):
   ☐ Attached, Document ID:_____ ☒ Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.):
   ☐ Attached, Document ID:_____ ☒ Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(5)(e)1. 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

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.):
   ☐ Attached, Document ID: ☐ Not Applicable (no exempt units at facility)

Additional Requirements for Title V Air Operation Permit Applications

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

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

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

4. List of Equipment/Activities Regulated under Title VI (If applicable, required for initial/renewal applications only):
   ☐ Attached, Document ID:_____
   ☐ Equipment/Activities On site 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

Additional Requirements Comment

Crist Electric Generating Plant
Unit 6 Cooling Tower Project

Due to damage sustained during Hurricane Ivan in September, 2004, Gulf Power has elected to re-build the Crist Unit 6 Cooling Tower. The structure will be re-constructed as a like kind replacement with the exception that the drift and evaluation percent of flow will be reduced from 2.4% to 2.1%. This change will slightly reduce volatile organic matter and particulate matter. Attached is a comparison of the new emission estimates for the Crist Unit 6 Cooling Tower and a replacement sheet for Plant Crist Emissions Unit #12 as previously submitted for Title V permitting.

Cooling Tower Information

	Cr 1-5	Crist 6	Crist 7	Total
GPM Design		150960	165000	
Evaporation Loss Design		2.10%	3.10%	
Dift Loss Design		0.0005%	0.20%	
Max Cu Ft/sec Flow (EIA 767)	426	310	344	
GPM	191444.4	139314	154593.6	
Cu Ft/sec Consumption (Eia 767)	0	7.3	9.9	
GPM	0	3280.62	4449.06	
Note: Consumption is Makeup less Blowdown				
Emission Calculations:				
Based on Circulating Flow & Apparent Factor				
Flow (GPM)	191444.4	150960	165000	
Flow (Annual Gallons)	1.00623E+11	7.9345E+10	86724000000	
PM10 Tons (=.019 lb/1000 gal/2000 lb/lb))	955.9	753.8	823.9	2,533.6
Based on Design Drift & Drift Factor				
Drift & Evaporation % of Flow	2.1%	2.1%	3.3%	
Drift & Evap (GPM)	4021.3	3170.9	5445.0	
Drift (Annual Gallons)	2113589825	1666632819	2861892000	
PM 10 Tons (=1.7 lb/1000 gal/(2000 lb/ton))	**1796.6**	**1416.6**	**2432.6**	**5,645.8**
Based on Estimated Drift & Drift Factor				
Drift & Evaporation % of Flow	2.0%	0.005%	2.0%	
Drift (GPM)	3828.9	7.5	3300.0	
Drift (Annual Gallons)	2012463533	3967228.8	1734480000	
PM 10 Tons (=1.7 lb/1000 gal/(2000 lb/ton))	1710.6	3.4	1474.3	3,188.3
Based on Consumption & Drift Factor				
Drift (GPM)	unknown	3280.62	4449.06	
Drift (Annual Gallons)		1724293872	2338425936	
PM 10 Tons (=1.7 lb/1000 gal/(2000 lb/ton))		1465.6	1987.7	3,453.3
Maximum Annual PM10 Tons	**1796.6**	**1465.6**	**2432.6**	**5,694.8**
Based on Design Drift & Drift Factor				
Drift (Annual Gallons)	2113589825	1666632819	2861892000	
VOC's Tons (=6.0 lb/10^6 gallons/(2000 lb/ton))	**6.34**	**5.00**	**8.59**	**19.93**
Based on Estimated Drift & Drift Factor				
Drift (Annual Gallons)	2012463533	3967228.8	1734480000	
VOC's Tons (=6.0 lb/10^6 gallons/(2000 lb/ton))	6.04	0.01	5.20	11.25
Based on Consumption & Drift Factor	0	1724293872	2338425936	
Drift (Annual Gallons)	0.00	5.17	7.02	12.19
VOC's Tons (=6.0 lb/10^6 gallons/(2000 lb/ton))				
Maximum Annual VOC Tons	**6.34**	**5.17**	**8.59**	**20.10**

Cooling Tower Information

		Old **Crist 6**	New **Crist 6**
GPM Design		150960	150960
Evaporation Loss Design		2.20%	2.10%
Dift Loss Design		0.20%	0.0005%
Max Cu Ft/sec Flow (EIA 767)		310	310
GPM		139314	139314
Cu Ft/sec Consumption (Eia 767)		7.3	7.3
GPM		3280.62	3280.62
Note: Consumption is Makeup less Blowdown			
Emission Calculations:			
Based on Circulating Flow & Apparent Factor			
Flow (GPM)		150960	150960
Flow (Annual Gallons)		7.9345E+10	79344576000
PM10 Tons (=.019 lb/1000 gal/2000 lb/lb))		753.8	753.8
Based on Design Drift & Drift Factor			
Drift & Evaporation % of Flow		2.4%	2.1005%
Drift & Evap (GPM)		3623.0	3170.9
Drift (Annual Gallons)		1904269824	1666632819
PM 10 Tons (=1.7 lb/1000 gal/(2000 lb/ton))		**1618.6**	**1416.6**
Based on Estimated Drift & Drift Factor			
Drift & Evaporation % of Flow		2.0%	0.005%
Drift (GPM)		3019.2	7.5
Drift (Annual Gallons)		1586891520	3.967E+06
PM 10 Tons (=1.7 lb/1000 gal/(2000 lb/ton))		1348.9	3.4
Based on Consumption & Drift Factor			
Drift (GPM)		3280.62	3280.62
Drift (Annual Gallons)		1724293872	1724293872
PM 10 Tons (=1.7 lb/1000 gal/(2000 lb/ton))		1465.6	1465.6
Maximum Annual PM10 Tons		**1618.6**	**1465.6**
Based on Design Drift & Drift Factor			
Drift (Annual Gallons)		1904269824	1666632819
VOC's Tons (=6.0 lb/10^6 gallons/(2000 lb/ton))		**5.71**	**5.00**
Based on Estimated Drift & Drift Factor			
Drift (Annual Gallons)		1586891520	3967228.8
VOC's Tons (=6.0 lb/10^6 gallons/(2000 lb/ton))		4.76	0.01
Based on Consumption & Drift Factor		1724293872	1724293872
Drift (Annual Gallons)		5.17	5.17
VOC's Tons (=6.0 lb/10^6 gallons/(2000 lb/ton))			
Maximum Annual VOC Tons		**5.71**	**5.17**

GDW 01/10/05

Plant Crist, Unit 6
Selective Non-Catalytic Reduction Retrofit
System Description

Gulf Power Company is making application to install selective non-catalytic reduction, or "SNCR," technology on the Plant Crist Unit 6 boiler. The SNCR systems will be designed to provide approximately 25% removal of nitrogen oxides (NO_x) when operating.

SNCR is a post-combustion technology for reducing NO_x emissions from flue gases by chemical conversion. This chemical reaction requires the injection of urea into the hot flue gas stream in the upper regions of the furnace to reduce the nitrogen oxides to nitrogen, water, and small quantities of carbon dioxide. The reduction is normally expressed by the following equations:

(1) $4NO + 2CO(NH_2)_2 + O_2 \Rightarrow 4N_2 + 4H_2O + 2CO_2$

(2) $2NO_2 + 2CO(NH_2)_2 + O_2 \Rightarrow 3N_2 + 4H_2O + 2CO_2$

N_2O is also a by-product of the SNCR process and is typically in the range of 10-20% of the NO_x reduced. Small amounts of CO emissions can also be expected from the process. There are no other known organic emissions from the SNCR process beyond CO and CO_2.

The SNCR process takes place in a temperature range between 1600°F to 2200°F, which normally occurs in the convective sections of the boiler. Urea is delivered and stored on-site at a concentration of ~40%. Prior to injection into the boiler, the urea is further diluted to a concentration somewhat less than 30%. Dilution is required to improve the mixing characteristics of the urea stream with the flue gas stream. The urea/water mixture is injected into the boiler via air atomizing wall lances.

The SNCR equipment to be installed at Crist Unit 6 is fabricated by Fuel Tech, Inc.

The SNCR system will be tuned to achieve the maximum level of NO_x reduction while limiting average ammonia slip across the duct to 5 ppmvd corrected to 3% O2 (24 hour basis). Ammonia slip can react with small quantities of sulfur trioxide (SO_3) present in the flue gas to form ammonium bisulfate (NH_4HSO_4), which can foul and corrode downstream equipment (especially the air preheater).

The components of the SNCR system include a reagent unloading station, reagent storage tanks, reagent circulation module, reagent metering modules, reagent distribution modules, and air atomized injectors.

Below is a list of information previously requested by FDEP for the Crist Unit 6 SCR.

1. SNCR System Design Information:

	Crist 6
Heat Input, MBtu/hr	3704.8
Current NO_x, lbs/MBtu	0.578
SNCR Inlet NO_x, lbs/Mbtu	0.35
SNCR Inlet NO_x, lbs/hr	1296.68
NO_x Emissions (SNCR Outlet), lbs/MBtu	0.28
NO_x Emissions (SNCR Outlet), lbs/hr	1037.34
NH_3 slip, ppmvd @ 3% O_2	5
SNCR Design NOx removal, %	25%
SNCR Guaranteed NOx removal, %	20%

2. Flow Diagram:
See attachment flow diagram.

3. Narrative of the SNCR process:
See introduction

4. Reagent Circulation and Distribution Loop:
Urea is delivered and stored as a 40% aqueous solution that is maintained at a temperature of approximately 40° by circulating through the SNCR system piping loop and heating module. Using plant service water or other dilution water source, the metering module further dilutes the reagent to a predetermined concentration and precisely controls the flow of diluted reagent to distribution modules located near the boiler injection point. The distribution modules provide the final control of diluted reagent and atomizing/cooling (plant) air being delivered to each injector. The diluted reagent is injected into the boiler via wall-mounted air atomizing lances.

5. Plant Equipment Modifications:
The only anticipated change to the Unit 6 boiler is an adaptation of the boiler tube panels to accommodate the installation of wall-mounted injection lances. The Unit 6 SNCR will be designed with 6 wall-mounted injectors.

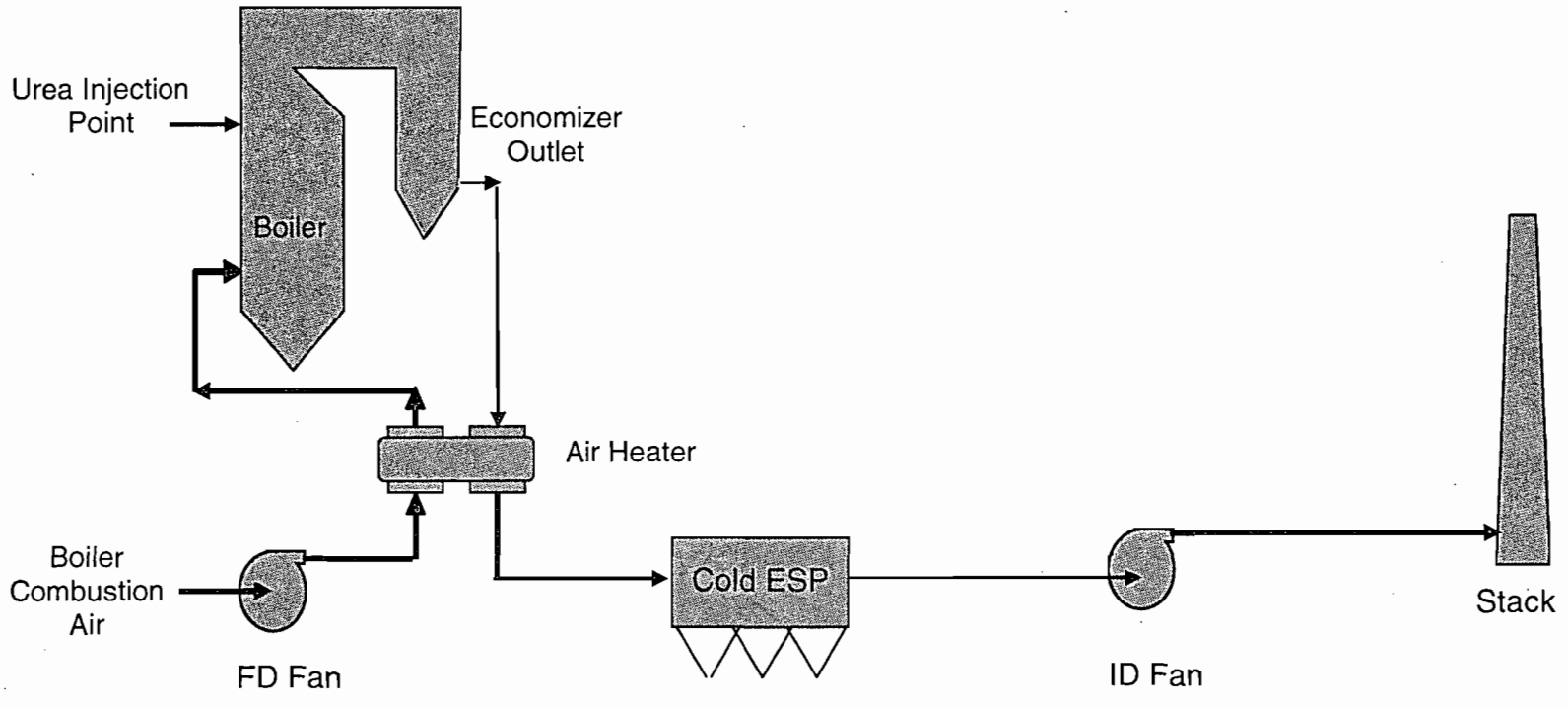
6. Peak Urea Injection Rate:
At peak load for Crist Unit 6, with 0.35 lbs./MBtu inlet NO_x and 20% reduction, urea injection would be 741 lb/hr on a dry basis. This translates to an ammonia flow of 333.8 lb/hr.

7. Ammonia Tank Sizes:
Liquid urea at a concentration of 40% will be stored in 1 tank with capacity to store 45,000 gallons of solution. This arrangement will provide a minimum of 7 days operating inventory.

8. Peak Ammonia Slip:
The SNCR is designed and guaranteed to have an ammonia slip concentration of 5 ppm by volume (dry basis) corrected to 3% O_2 as averaged over a 24 hour period in the duct cross sectional area for all boiler operating loads.

9. Construction Schedule:

- Mobilize Construction – June 27, 2005
- Equipment Deliveries – June 28, 2005 – July 1, 2005
- Pre-Outage Construction - June 28, 2005 – September 9, 2005
- Unit 6 Outage – September 10, 2005 – November 20, 2005
- Optimized System – May 1, 2006



Gulf Power Company
Plant Crist, Unit 6
SNCR Process Flow Diagram

Crist Electric Generating Plant
Biomass Fuels for Units 4 & 5

Gulf Power is making application to include the following fuel for use in at Plant Crist Units 4 and 5 as previously outlined in the 2004 Title V Renewal Application. Use of this fuel was not incorporated in the recently finalized Crist Title V permit. Gulf Power successfully demonstrated Crist 4 and 5 as units being "capable of accommodating" biomass fuels under a construction permit issued in 2003. Below is the information previously submitted in the 2004 Title V renewal application.

SCC Code: 10100903
Units: Tons Wood Burned
Description 1: External Combustion Boiler
Description 2: Electric Generation
Description 3: Wood/Bark Waste
Description 4: Wood-fired Boiler - Wet Wood (>= 20% moisture)
Is this a valid segment? Yes
Segment Description: Biomass (wood, switchgrass, sawdust, and sander dust)

Segment comment: Permit allows up to 97.7 equivalent mmbtu/hr of biomass (wood, switchgrass, sawdust, and sander dust) with TPH limits for each biomass fuel.

Gulf Power Proposed Mercury Research Center (MerRC)

In March 2005, the U.S. EPA is scheduled to promulgate rules that will require utilities to significantly reduce their Hg emissions. Currently, there are no commercially available Hg control technologies with documented long term performance on coal flue gas. Because of the lack of experience, Hg chemistry in flue gas is not very well understood. However, research performed over the past couple of years has shown that pollution control technologies designed to control NO_x, SO_2, and PM can significantly affect overall Hg performance. In order to investigate these relationships, Gulf Power is planning a 5 MW equivalent slip-stream facility equipped with a complete system of flue gas cleanup technologies.

System Description

The proposed slip-stream facility will incorporate a Selective Catalytic Reduction (SCR) system, rotary air-preheater, Electrostatic Precipitator (ESP), baghouse (BH), and wet Flue Gas Desulphurization (wFGD). Each system will be designed with the appropriate level of functionality so that a large number of existing plants can be represented. Because of the complex interactions of Hg with various surfaces in flue gas, it is difficult to generate representative data for full scale installations at the pilot scale. However, the 5 MW scale is sufficiently large enough to provide the appropriate surface to volume ratios to gather representative data. Figure 1 shows a schematic for the proposed system.

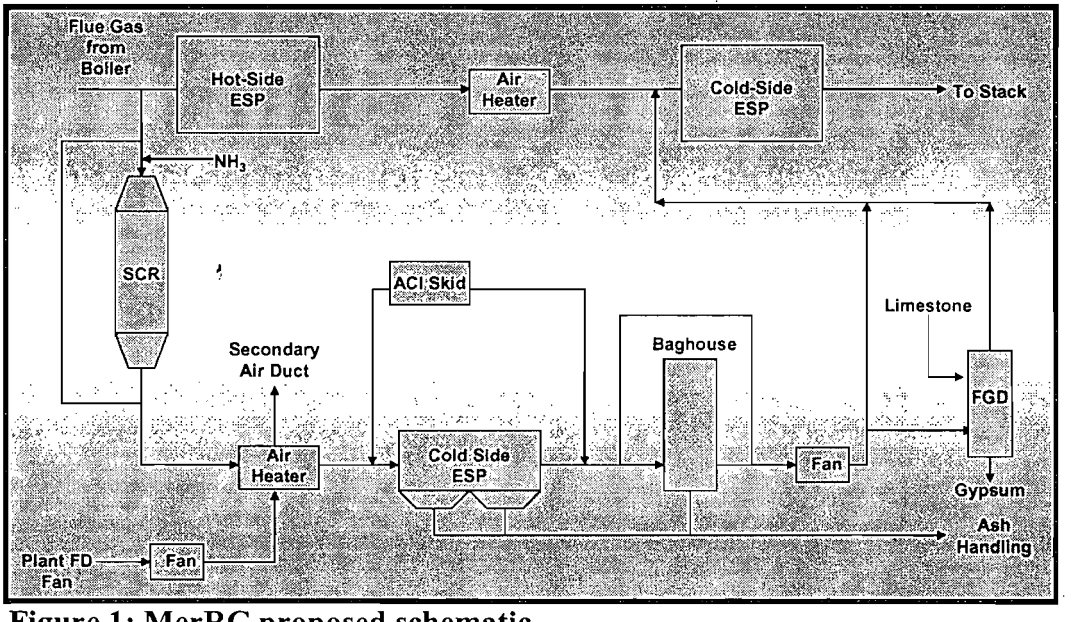


Figure 1: MerRC proposed schematic.

Host Facility

Because of its history with research facilities of this magnitude, Plant Crist Unit 5 was chosen as the host plant for the slip-stream facility. Crist Unit 5 is a wall fired PC boiler

burning low-sulfur bituminous coals and is equipped with hot and cold side ESPs arranged in series. The process gas supplied to the MerRC will be drawn from the inlet of the hot-ESP. The typical flue gas characteristics for this gas stream are presented in Table 1.

Table 1: Typical flue gas characteristics for MerRC inlet.

	Value	Units
Temperature	600	°F
Pressure	-6	inches H_2O
N_2	80	%
CO_2	15	%
O_2	3	%
SO_2	0.6-2.4	lb/mmBtu
NO_x	0.5-0.7	lb/mmBtu
Particulate	7	lb/mmBtu
Hg	6	lb/tBtu
MerRC System Flow	25,000	wacfm

Flue Gas Temperature Control

Because Hg chemistry has been shown to be temperature dependent, temperature control at the inlet of the research facility is crucial. This will be accomplished by using a combination of an economizer bypass line, providing ~ 900°F gas to the facility, or a flue gas heater. The heater will be sized to allow for a wide range of operating temperatures, up to and including 750°F. The heaters will be simple resistance type and will not introduce any additional compounds to the process gas. Typical heater characteristics are presented in Table 2.

Table 2: Flue gas heater parameters.

Heater Type	Electric Resistance heater	
Inlet Temp	600	°F
Max Outlet Temp	750	°F
Heat Input Requirement	3.5	mmBtu/hr
Power Requirement	600	kW

Selective Catalytic Reduction (SCR) system

SCR for NO_x control has been widely incorporated throughout the world and is well understood. However, there is little known on the details of Hg chemistry in the SCR. The SCR designed for MerRC will resemble a typical full scale system installed at any number of plants. The scale of MerRC will allow for the use of full scale catalyst modules, with the cross section designed to achieve representative space velocities for the system. Typical SCR design points are shown in Table 3. The SCR will be equipped with 3 catalyst layers, which will allow for greater than 80% control of NO_x and a maximum pressure drop of 6 in. H_2O.

Table 3: Typical SCR system design points.

SCR System Inlet NO_x	0.7 lb/mmBtu
Expected SCR Performance	90%
Typical SCR Outlet	0.07 lb/mmBtu
Number of Catalyst Layers	3
Typical Maximum NH_3 slip	5 ppm_{vd} @ 3% O_2

The research facility will also incorporate a SCR reactor by-pass to allow for testing of alternate designs. Although research has shown that SCRs do not control Hg, data has shown it can significantly affect the chemistry of downstream devices, which could significantly change the performance of those systems. The ability to operate with and without SCR in service is a necessary requirement in order to investigate seasonal operation as well as alternate plant configurations.

In order to achieve NO_x reductions within the SCR, ammonia must be fed as a reagent to react with NO and NO_2 per the following equations.

$$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$$
$$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$$

Typically 95% of NO_x in the flue gas stream is NO, with the remainder NO_2. At these ratios, an ammonia flow rate of ~25 lb/hr to the SCR can be expected in order to achieve the stated NO_x reduction goals. At these rates, an ammonia slip of less than 5 ppm (0.065 lb/hr) is expected. However, during some research programs, this value could be exceeded for short periods of time.

Air Pre-heater (APH)

In order to mimic the time-temperature profile of a full scale system, the MerRC will incorporate a rotary type APH for flue gas cooling. The APH will cool the flue gas from ~700°F to 300°F before sending it to the downstream air pollution control equipment. In order to reject the heat transferred from the flue gas, a cooling air fan will be installed. The cooling air fan will provide ambient air supplied from the plant forced draft fan to the APH and, after heating, will force the air back into the plant secondary air duct in order to minimize the efficiency impacts of the MerRC. Table 5 presents pertinent APH design information.

Table 5: APH typical design criteria.

APH Type	Rotary (Lungstrom)
Heat load	5.5 mmBtu/hr
Flue Gas inlet Temp	700 °F
Air inlet Temp	72 °F
Flue Gas outlet	300 °F
Air Outlet	550 °F

Electrostatic Precipitator (ESP)

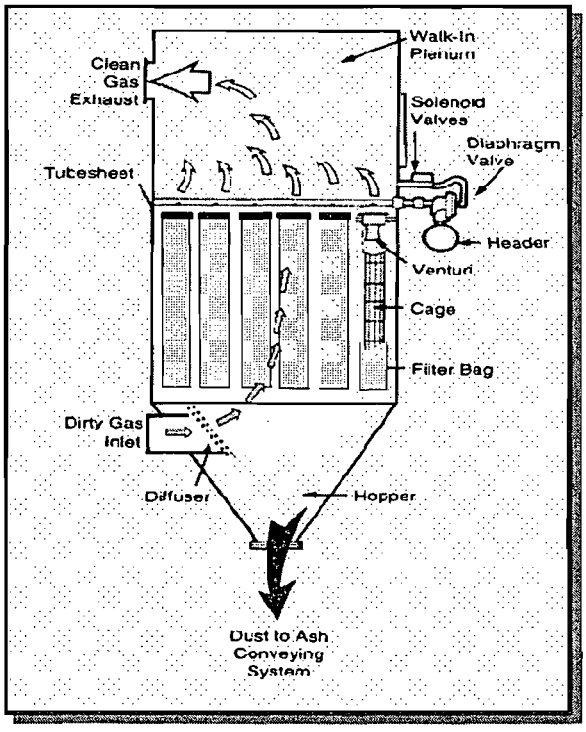
The utility industry has operated ESPs for several decades. However, in the future, more stringent particulate emission requirements will force operators to make incremental improvements in performance. Additionally, the co-benefit of Hg removal in these ESPs could play a significant role in achieving least cost compliance. The ESP installed in the MerRC will be designed as a single casing 4 field unit, able to achieve >99% removal efficiency of particulate matter. Typical design data are listed in Table 6.

Table 6: Typical ESP design data.

Number of fields	4
Field Length	5 ft
Field Height	12 ft
SCA (ft^2/1000acfm)	225
Efficiency	>99%

Baghouse

Currently, the most mature Hg control technology is TOXECON™ . TOXECON™ is an EPRI patented technology that incorporates a high (air to cloth) ratio fabric filter downstream of an ESP, with activated carbon injection (ACI) between. The high ratio baghouse, or COHPAC baghouse, is designed to minimize conserve footprint while weighing increased pressure drop due to higher bag face velocities. There are only a handful of installations of this technology in the industry, and 2 of them are located at Alabama Power's Plant Gaston near Birmingham, AL. Southern Company has significantly contributed to the development, and would be able to continue this development at the MerRC. The baghouse will be designed to allow for multiple bag configurations, bag types, and inlet loadings so that critical parameters for long term performance of these systems can be investigated. Figure 2 shows a schematic for a typical COHPAC baghouse.



Activated Carbon Injection (ACI)

As stated above, the most mature Hg control technology is TOXECON (ACI into COHPAC baghouse). Significant work has been performed by Southern Company and others to investigate ACI into existing ESPs. Although results from these programs show promising Hg control results, there is concern that the additional solids loading to the ESP will degrade the particulate removal performance. In order to understand long term performance and BOP issues of both of these control concepts, the MerRC will

incorporate a carbon injection skid. The skid will be designed with enough variability to allow for both injection schemes. Typical injection rates for ACI into ESPs vary from 5-20 lbs Carbon/mmacf (5-20 lbs/hr) of flue gas, and for TOXECON from 0.5-2 lbs/mmacf (0.5-2 lbs/hr). As the art of ACI matures over time, the MerRC will also provide a testing ground for the latest innovation in sorbents. Assuming an annual capacity factor of 10% for ESP injection, you could expect ~7.5 tons of activated carbon, and ~0.5 tons of activated carbon for the TOXECON injection case.

Wet Flue-gas Desulphurization

Over the next decade, Southern Company will be installing a large number of FGD systems throughout its fleet, including some of Gulf Power's units. In order to achieve the lowest cost Hg compliance, it will be paramount that these systems be optimized for Hg removal efficiency. Tests have shown that wet FGD systems can efficiently capture oxidized Hg. However, little about Hg chemistry in the FGD is understood. Research to uncover the critical factors affecting these chemical processes is needed.

Southern Company currently owns a 1 MW scale pilot wet FGD system. This system will be incorporated into the MerRC to study the effects described above. The FGD will require a limestone feed for SO_2 control, and will produce a gypsum byproduct. Typical process flows are presented in Table 7. Applying an annual capacity factor of 20% to the FGD projects an annual gypsum production of ~45 tons.

Table 7: Typical stream flows for FGD pilot.

System Flow	3000 acfm @ 300°F
SO_2 Concentration	1100 ppm_v
SO_2 Feed (lb/hr)	24
Limestone Feed (lb/hr)	37.5
Gypsum Draw off (lb/hr)	51

Crist Mercury Research Center