LAKELAND ELECTRIC

Farzie Shelton, chE; REM

Manager of Environmental Affairs

October 11, 2001

RECEIVED

OCT 12 2001

BUREAU OF AIR REGULATION

Mr. C.H. Fancy, P.E.
Chief Bureau of Air Regulation
Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road, Mail Station #5505
Tallahassee, Florida 32399-2400

RE: DEP File No. 1050004-004-AC (PSD-FL-245) – Certification PA 74-06SR2
McIntosh Unit No. 5 Combustion Turbine Combined Cycle

Dear Mr. Fancy:

We are in receipt of your letter dated August 21, 2001 in response to our letter of July 20, 2001. In our letter, Lakeland Electric (Lakeland) had requested the Department to modify the conditions of the above referenced permit to allow for excess emissions during the commissioning of the combined cycle phase of its united No. 5 at McIntosh Power Plant. Accordingly, we requested Mr. Steve Marshall (Unit No. 5 combined cycle project manager) to address the Department's questions and requested information.

Therefore, enclosed please find Mr. Marshall's response (signed and sealed) together with the necessary supporting document. As you will note Mr. Marshall is of the opinion that a minimum of 1,440 operating hours is necessary for starting and commissioning this unit commencing early November 2001.

Therefore, we appreciate if you would process our request at your earliest convenience. As always your cooperation and help in this matter is greatly appreciated. If you should have any questions, please do not hesitate to contact me.

Sincerely

Farzie Shelton

Enc.

Cc: Mr. Hamilton Oven P.E.
J. Hanson ✓
B. Thomas, SWD ✓
D. Worley, EPA ✓
D. Buhmid, NPS ✓

City of Lakeland ● Department of Electric Utilities

501 East Lemon Street ● Lakeland, Fl 33801-5050 ● (863) 834-6603 ● Fax (863) 834-8187 ● Message System 834-6592

farzie.shelton@lakelandgov.net

LAKELAND ELECTRIC

October 9, 2001

Farzie Shelton, Manager of Environmental Affairs
Lakeland Electric
Larsen Power Plant
2002 E. Hwy. 92
Lakeland, FL 33801

Subject: DEP File No. 1050004 (PSD-FL-245)
McIntosh Unit No. 5 Combined Cycle Conversion

Dear Farzie:

In response to the Florida Department of Environmental Protection Agency's letter (Exhibit 1) dated August 21, 2001 requesting additional information, the city of Lakeland submits following information. The numbers shown below correspond to the questions in the referenced letter and numbers that are skipped do not require a specific response.

(2) Please see Exhibit 2. Steam turbine-generator (STG) output will "follow" the combustion turbine (CT) and the corresponding amount of steam that is sent to the STG versus being directed straight to the condenser thus bypassing the STG. This enables the STG to "trip" without the CT also tripping. The plant operators can then correct the problem and bring the STG back on line sooner.

(3) Please see Exhibit 3. Lakeland has contacted Siemens-Westinghouse Power Corporation (SWPC) to obtain the requested information pertaining to the 20% load case. SWPC has indicated in its letter dated September 28, 2001 that it currently does not have the requested startup data for a 501G combustion turbine (CT). However, similar data from a 501F CT is included for reference and SWPC speculates that the 501G CT will have lower emissions than a 501F CT due to its more advanced design.

In lieu of the requested information that is unavailable from SWPC, please consider this additional explanation in order to address the department's concerns.

The SWPC 501G CT utilizes "steam cooling" in order to achieve its higher operating efficiency and this is the significant difference (other than size) between a 501G and 501F. The heat recovery steam generator (HRSG) in combined cycle configuration will produce cooling steam for the CT and it must be extremely pure.

When the 501G CT first starts, it utilizes "air" for cooling instead of "steam" and it switches from air to steam when the CT output is in the 10% to 20% range and the steam being produced meets the specified purity requirements. If the steam

501 E. Lemon St. ✦ Lakeland, Florida 33801
Phone: 941.499.6300 ✦ Fax: 941.499.6344

does not meet the purity requirements, then the combined cycle would continue to operate in the 10% to 20% output range and be continuously "blowing down" steam to remove contaminants from the system until the continuously monitored steam purity measurements indicate that the steam purity is now within acceptable limits. As soon as the steam purity is acceptable, then the 501G "switches" to steam cooling and then moves into its "design operating range." The SWPC "ramp rate curves" and attachments indicate the exact sequence of events and expected time durations.

It should be understood that the SWPC ramp rate curves represent a "normal" starting sequence that logically assumes:

(1) The HRSG is clean and will quickly produce the high purity steam required, and

(2) All of the plant controls are properly functioning.

Commissioning a new unit following at the end of construction involves a different and more challenging set of circumstances that Lakeland must contend with:

(1) The HRSG has just been assembled, chemically cleaned, and air blown (using large rented compressors) through its steam lines to remove debris. However, the combined cycle plant has not been operated yet and no steam blown down to remove any remaining contaminants.

(2) The combined cycle controls have been installed and some control loops verified. However, many of the control loops cannot be tuned unless the combined cycle plant is operating. This will involve the combined cycle plant starting and stopping many times as Lakeland and its contractor (S&B Engineers & Constructors, Ltd.), works through the various problems that arise until safe and reliable control of the plant is ultimately attained.

Lakeland and S&B are currently targeting November 15, 2001 for the "first attempt" to test run the newly constructed combined cycle unit. It is typical in the industry to combine the activities of "debugging" and tuning the plant controls with the initial operation of the combined cycle power plant. In fact, the

combined cycle power plant will probably see many "starts" and "stops" as part of the commissioning process.

It is also unknown and impossible to predict how long the combined cycle power plant will have to operate with the CT on "air cooling" and the HRSG continuously blowing down steam in order to remove contaminants and attain the specified cooling steam purity. However, experience at a couple of other 501G combined cycle plants elsewhere in the United States has indicated that this can be expected to take two (2) or more days until steam purity is attained. During this time of unavoidable sustained "low load operation" (<20%), the 501G CT is expected to produce higher emissions than the air permit currently allows. Lakeland must again emphasize that this is an unavoidable operating scenario that is a vital part of the commissioning process.

(4) Regarding a protocol to minimize emissions, both Lakeland and S&B are very motivated to complete all commissioning activities as rapidly as is possible, thereby minimizing emissions.

Lakeland's contractor (S&B) is contractually obligated to complete all commissioning activities such that the combined cycle power plant can be declared available for commercial operation by December 15, 2001. Commissioning will take place on a daily round-the-clock schedule and concludes with successfully demonstrating combined cycle operation on both natural gas and distillate fuel and meeting plant performance and emissions requirements.

Lakeland is motivated to complete all commissioning activities as rapidly as possible for several reasons. Since September 15, 2001, the conversion from simple to combined cycle has caused Lakeland to lose the ability to operate and dispatch its 249 MW simple cycle 501G CT due to construction activities. Lakeland must now replace that power when needed by either operating less efficient units in its fleet or purchasing replacement power from other utilities.

It is also very costly for Lakeland to operate the 501G (> $5,000/hour) during commissioning activities. Lakeland will therefore strive to minimize the amount of time that the 501G CT is operated and to maximize the benefit obtained when it is run. For example, steam will be blown down to remove contaminants at the same time that some of the control loops are being debugged. As many activities as is possible will be completed simultaneously in order to meet schedule deadlines, performance specifications, and emissions requirements.

Please request that the department modify the conditions in the subject permit to grant a total of 1,440 operating hours to commission the newly constructed combined cycle power plant during which excess emissions may occur. Currently, it is my belief that the requested 1,440 operating hours represent a conservative estimate within which the commissioning of the combined cycle unit can be completed. It is clearly understood by Lakeland that excess emissions shall be kept to an absolute minimum and under no circumstances will Lakeland exceed the requested 1,440 operating hour allotment without the department's prior approval.

Please advise at your earliest convenience regarding the status of this request or if any additional information is required.

Sincerely,

Steven D. Marshall

Steven D. Marshall, P.E. (FL #44733)
Project Manager
Unit 5 Combined Cycle Conversion Project

Steven D. Marshall
10/9/01

EXHIBIT 1

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

August 21, 2001

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

RECEIVED
AUG 24 2001

Ms. Farzie Shelton, Manager
Environmental Affairs
City of Lakeland
Department of Electric Utilities
501 East Lemon Street
Lakeland, Florida 33801-5050

Re: DEP File No. 1050004 (PSD-FL-245)
McIntosh Unit No. 5 Combustion Turbine

Dear Ms. Shelton:

The Department reviewed your letter dated July 20, 2001 requesting confirmation that a 100 day period of excess emissions is allowed during the commissioning of the combined cycle phase of the project.

When the initial permit was issued, the City submitted comments to the effect that "shakedown" has no regulatory meaning and 100 days seems arbitrary. In our response in the Final Determination, we explained our rationale. The 100 day period was not related to commissioning of combined cycle, but rather to insure that tests were conducted within a reasonable time after installation of control equipment to meet BACT emissions limits set forth in the permit. For example, a complete change out of combustors to meet the 9 ppm NOx limit by Dry Low NOx technology would trigger a 100 day period to conduct the BACT test. It would not trigger 100 days of excess emissions, especially with relation to the applicable New Source Performance Standard, Subpart GG.

We consider the letter, therefore to be a request to modify the conditions to allow for excess emissions during the commissioning of the combined cycle phase. The application is incomplete and the following information is required to process it:

1. The request needs to be signed by a professional engineer.
2. We need the startup characteristic curves that will show gas turbine speed and load with respect to time during a startup as well as steam turbine speed and load with respect to time.
3. We need the steady-state emissions characteristics such as NOx and CO concentrations with respect to load. We are particularly interested in the 20 percent load case during which contaminants will be purged.

4. Please submit a protocol describing the measures to be taken to minimize emissions during the low load conditions described.

If you have any questions regarding this matter, please contact Teresa Heron at 850/921-9529 or Al Linero at 850/921-9523.

Sincerely,

for C. H. Fancy, Chief, P.E.
Bureau of Air Regulation

CHF/th

Attachment

cc: Gregg Worley, EPA
John Bunyak, NPS
Bill Thomas, SWD

LAKELAND ELECTRIC

ENVIRONMENTAL AFFAIRS
FAX COVER PAGE

Please deliver the following page(s)

To: Steve Marshall

Company: Energy Supply

Telephone number:

Fax number: 6488

From: Farzie Shelton – Manager of Environmental Affairs

Telephone number: (863) 834-6603

Fax number: (863) 834-8187

Date: 8/27/01 Time: 9:45 a.m. /

Number of pages (including cover page): 3

For information or problems regarding this fax, please call Jeanette Otto at (863) 834-8191.

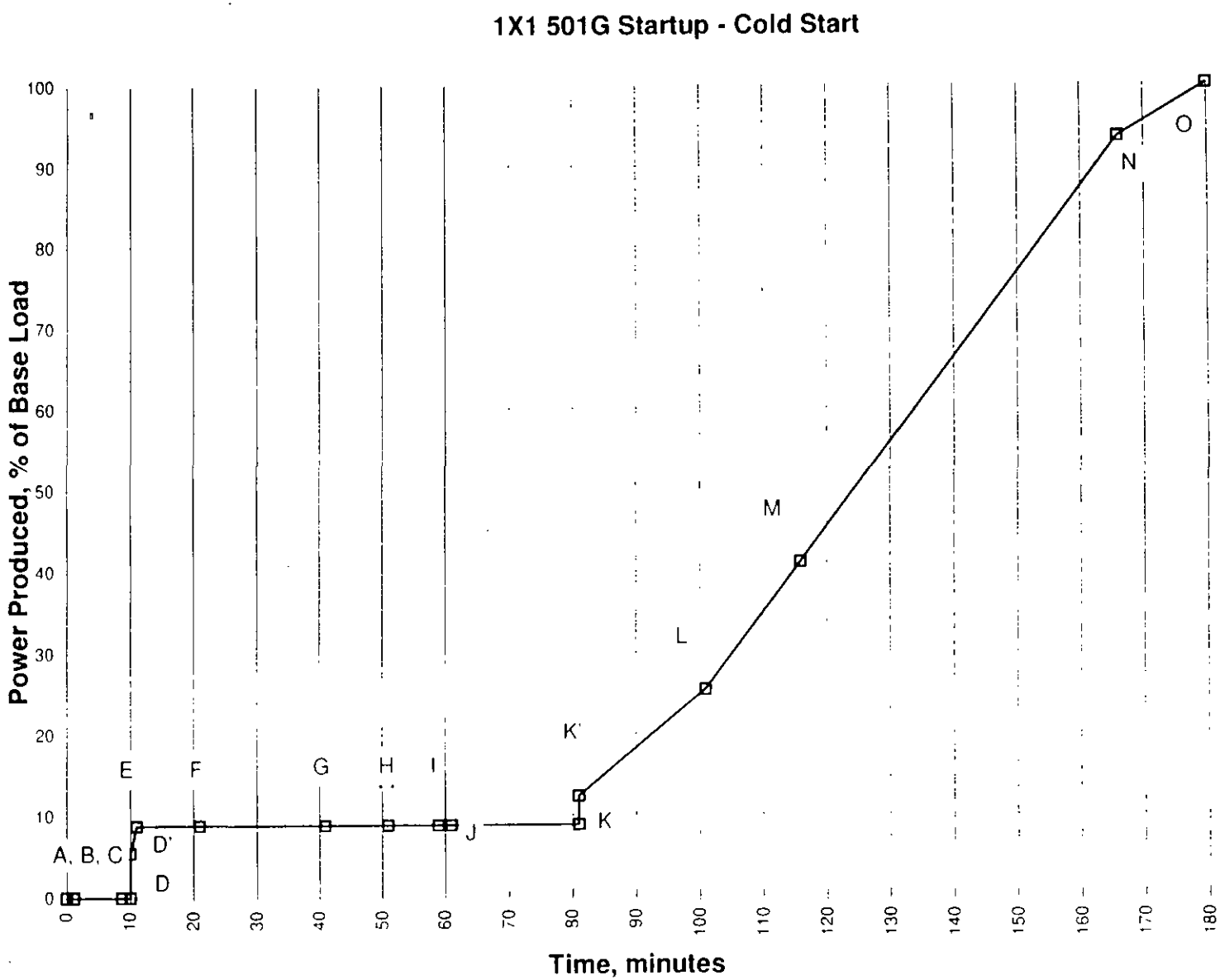
Comments:

EXHIBIT 2

Ramp Rates

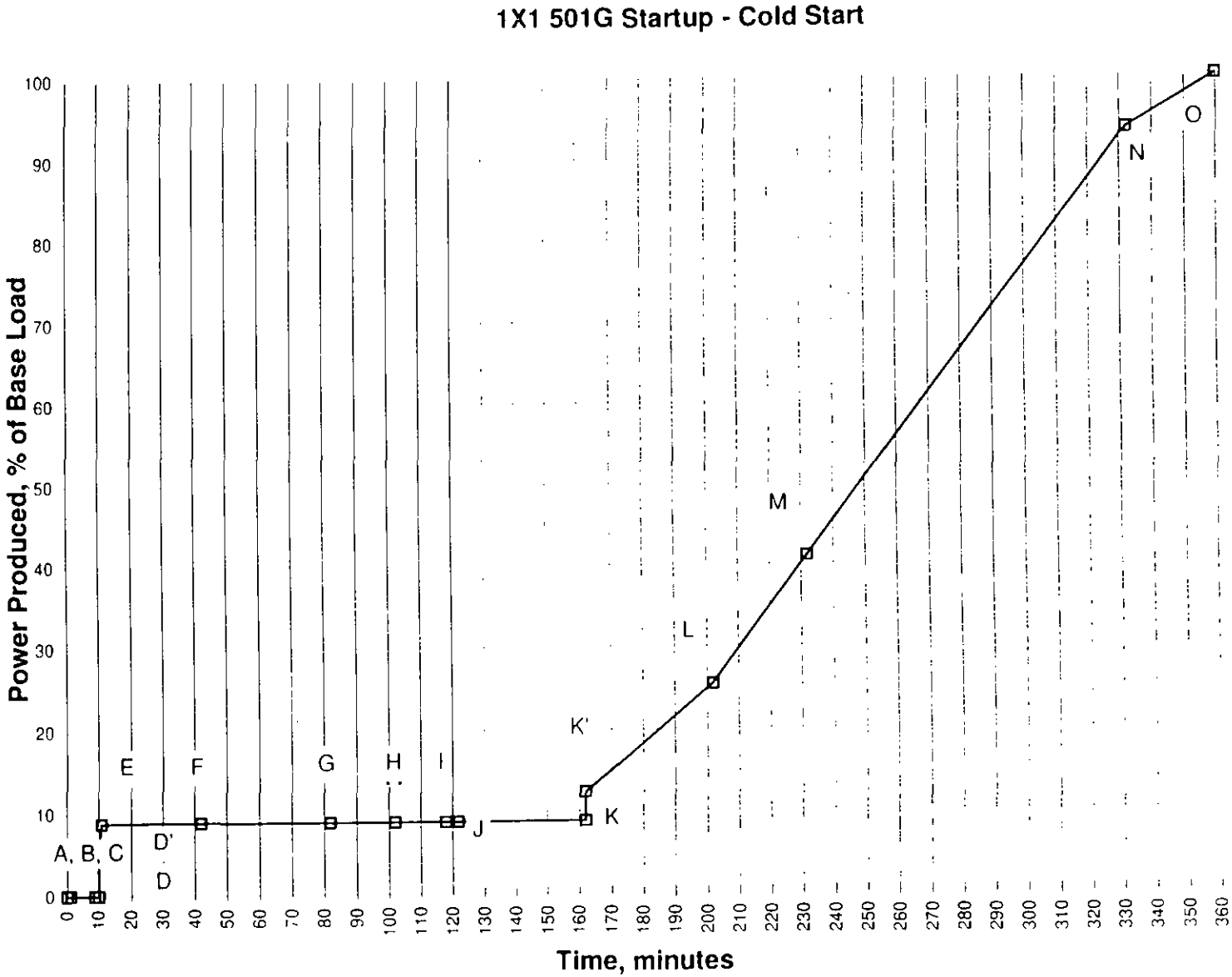
DIVIDER PAGE

Unit Design Parameters


1X1 501G Startup - Cold Start
Power Produced, % of Base Load
Time, minutes
A, B, C
D'
D
E
F
G
H
I
J
K'
K
L
M
N
O

Point	Description
A	Start CT
B	Ignite Combustors, CT
C	Disengage CT Starting Motor
D	Synchronize CT
D'	CT at min Load point
E	CT at 15% Load, Hold
F	Gland seal steam to ST, Start Hogger
G	Open IP to CRH bypass / close IP Startup vent
H	Condenser Vacuum at 10" HgA, Bypass steam to condenser
I	Initiate stm cooling of CT transitions
J	Cond. Vacuum at 5" HgA, Start ST roll
K	Synchronize ST
K'	ST at 10% Load, Hold
L	CT at 35% load, Hold, begin ST Loading
M	CT at 50% Load
N	CT Base Loaded
O	ST Base Loaded

Unit Operating Parameters


1X1 501G Startup - Cold Start
Power Produced, % of Base Load
Time, minutes
A, B, C
D
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J
K
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N
O

Point	Description
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K'	ST at 10% Load, Hold
L	CT at 35% load, Hold, begin ST Loading
M	CT at 50% Load
N	CT Base Loaded
O	ST Base Loaded

501G STARTUP PROFILE

FIGURE 1

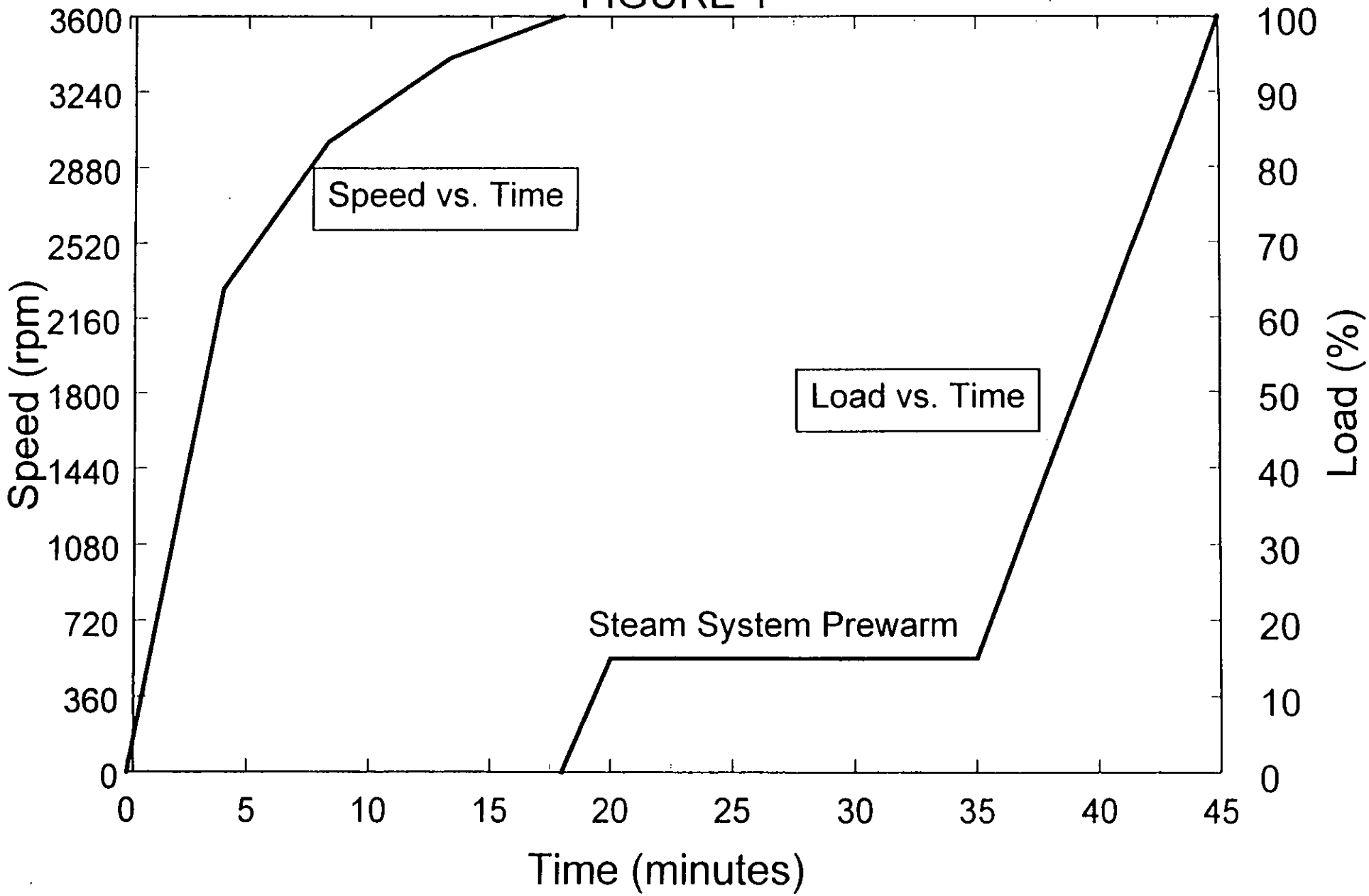


EXHIBIT 3
STEVE MARSHALL

SIEMENS
Westinghouse

September 28, 2001

SW-LCC-0112
File: 042

Mr. Steve Marshall
City of Lakeland, Florida
Department of Electric & Water Utilities
501 East Lemon Street
Lakeland, Florida 33801-5069

Subject: City of Lakeland - McIntosh #5 Combined Cycle Project
Part Load Emissions Estimates during Combined Cycle Commissioning

Dear Steve:

This is in response to the e-mail request (Mr. Tom Trickey dated 9/14/01) for part load (20%) emissions data for W501G Combustion Turbine at the McIntosh #5 facility.

At this time, we do not have good start-up emissions data for a W501G. However, we can provide part load (20%) emission data (estimated) on a W501 F as follows:

Parameter	Concentration, ppmvd @ 15% O_2
NOx	45
CO	4000
VOC	665
Particulate Matter	Not available

Please note that this data is estimated and is not guaranteed and we are unable to determine if the data is directly applicable for a W501G installation. However, the data provided is higher and more reliable than the data we do have from the Lakeland SC where the NOX meter pegged at 1,000 at the lower load points.

We are hopeful, however, that the data provided will allow you to proceed with your emissions variance request to the FDEP.

Please feel free to call us if additional discussion is required.

Regards,

Andy Mould
Project Manager

Siemens Westinghouse Power Corporation
A Siemens Company

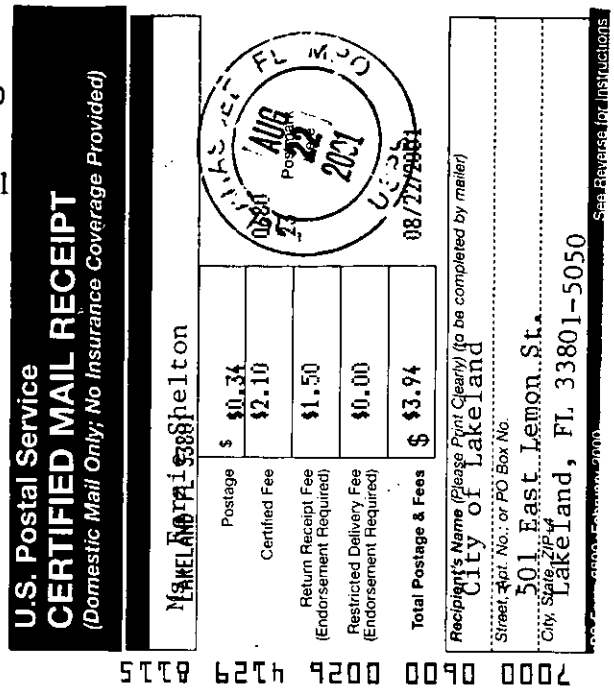
4400 Alafaya Trail
Orlando, FL 32826-2399

Department of Environmental Protection

Jeb Bush
Governor

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

August 21, 2001



CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Ms. Farzie Shelton, Manager
Environmental Affairs
City of Lakeland
Department of Electric Utilities
501 East Lemon Street
Lakeland, Florida 33801-5050

Re: DEP File No. 1050004 (PSD-FL-245)
McIntosh Unit No. 5 Combustion Turbine

Dear Ms. Shelton:

The Department reviewed your letter dated July 20, 2001 requesting confirmation that a 100 day period of excess emissions is allowed during the commissioning of the combined cycle phase of the project.

When the initial permit was issued, the City submitted comments to the effect that "shakedown" has no regulatory meaning and 100 days seems arbitrary. In our response in the Final Determination, we explained our rationale. The 100 day period was not related to commissioning of combined cycle, but rather to insure that tests were conducted within a reasonable time after installation of control equipment to meet BACT emissions limits set forth in the permit. For example, a complete change out of combustors to meet the 9 ppm NOx limit by Dry Low NOx technology would trigger a 100 day period to conduct the BACT test. It would not trigger 100 days of excess emissions, especially with relation to the applicable New Source Performance Standard, Subpart GG.

We consider the letter, therefore to be a request to modify the conditions to allow for excess emissions during the commissioning of the combined cycle phase. The application is incomplete and the following information is required to process it:

1. The request needs to be signed by a professional engineer.
2. We need the startup characteristic curves that will show gas turbine speed and load with respect to time during a startup as well as steam turbine speed and load with respect to time.
3. We need the steady-state emissions characteristics such as NOx and CO concentrations with respect to load. We are particularly interested in the 20 percent load case during which contaminants will be purged.

4. Please submit a protocol describing the measures to be taken to minimize emissions during the low load conditions described.

If you have any questions regarding this matter, please contact Teresa Heron at 850/921-9529 or Al Linero at 850/921-9523.

Sincerely,

A A Linero P.E.

for C. H. Fancy, Chief, P.E.
Bureau of Air Regulation

CHF/th

Attachment

cc: Gregg Worley, EPA
John Bunyak, NPS
Bill Thomas, SWD

LAKELAND ELECTRIC

FAX COVER PAGE

Please deliver the following page (s)

To: Teresa Heron

Company: DEP

Fax Number: 850-922-6979

From: Terzie Shelton

Telephone Number: 863-834-6603

Date: 8/13/01 Time: 10:20 (a.m.)/ p.m.

Number of Pages (including cover page): 4

For information or problems regarding this fax, please call (863) 834-8191.

Comments:

501 East Lemon Street ~ Lakeland, FL 33801-5079 ~ (836) 834-6300 ~ Fax 834-6362 ~ Message System 834-6590

FAXED: July 20, 2001 Letter
July 10, 2001 memo

LAKELAND ELECTRIC

Farzie Shelton, chE; REM

Manager of Environmental Affairs

RECEIVED

JUL 23 2001

BUREAU OF AIR REGULATION

July 20, 2001

Mr. A.A. Linero P.E.
Administrator
New Source Review Section
Florida Department of Environmental Protection
111 S. Magnolia, Suite 4
Tallahassee, Fl 32301

RE: DEP File No. 1050004-004-AC (PSD-FL-245) – Certification PA 74-06SR2
McIntosh Unit No. 5 Combustion Turbine Combined Cycle

Dear Al:

In accordance with our application and PSD permit condition, Lakeland Electric (Lakeland) is proceeding with the construction of the heat recovery steam generator for the above referenced unit. Lakeland anticipates conversion to the combined cycle to be completed sometimes in November/December 2001. Therefore, Lakeland anticipates start-up of this unit and shake down period to commence around November/December 2001 for which Lakeland will provide the Department with necessary notification in accordance with the Section II Emission Unit(s) General Requirements condition No. 5 of our permit.

Today, we are writing to confirm our understanding of our permit condition in connection with the start-up of this combined cycle. In accordance with Section III Emission Unit(s) Specific Conditions, condition No. 30, Lakeland will have a period not to exceed 100 days for shake down period (start up period) for which time excess emission is permissible prior to performing initial compliance tests. Additionally, during this 100 days Lakeland intend to relocate the Continuous Emission Monitoring (CEM) equipment on the new stack and perform the necessary certification of these equipment in accordance with the 40 CFR Part 75 of the Clean Air Act.

Therefore, we appreciate if you would confirm that condition No. 30 does provide us with the 100 days start-up period. However, if you should decide otherwise, Lakeland with this letter, is requesting modification of Unit No. 5 PSD permit to allow the necessary start-up period for commissioning of this combined cycle.

As always your cooperation and help in this matter is greatly appreciated. If you should have any questions, please do not hesitate to contact me.

Sincerely

Farzie Shelton

Cc: Mr. Hamilton Oven P.E.

City of Lakeland ● Department of Electric Utilities

501 East Lemon Street ● Lakeland, Fl 33801-5050 ● (863) 834-6603 ● Fax (863) 834-8187 ● Message System 834-6592

farzie.shelton@lakelandgov.net

To: Farzie Shelton

From: Steve Marshall
Tom Trickey

Date: July 10, 2001

Subject: Request for permit variance - for commissioning of combined-cycle conversion
McIntosh Unit 5, PA 741-06SR2, Permit No. PSD-FL-245

McIntosh Unit 5 is a 501G 250 MW combustion turbine that was manufactured by Siemens-Westinghouse Power Corporation (SWPC) and is currently operating in simple cycle configuration. In this configuration, the combustion turbine currently meets all air permit requirements.

Unit 5 will be converted to combined cycle operation in 2001. The simple cycle combustion turbine will be rendered inoperable on September 15, 2001 in order to complete the conversion to combined cycle configuration. The unit will be "mechanically complete" on or about November 8, 2001 at which time the commissioning phase of the project will begin. The unit will not be returned to commercial operation until commissioning is complete.

The 501G-Series uses steam, instead of air, to cool the metal of the transition pieces between the combustors and the first-row turbine blades at operating loads above 20% of maximum capacity; air is used for cooling when operating below 20%. Steam cooling is new combustion turbine technology that improves performance. However, the steam purity requirement for transition cooling steam is much greater than the purity requirement of steam for powering a steam turbine. This purity requirement presents some significant problems during the initial startup of the 501G combined-cycle unit.

During first-start of any new steam cycle system, time is needed to check-out the equipment, get control of the systems enough to run, and then tune the controls. This period is recognized as the shakedown period in the permit, for which 100 days was originally allowed. Also, metals and other contaminants from the surfaces of tubes, piping, and vessels in contact with the water and steam are either dissolved or picked up in suspension.

This is much worse during a first start. It takes time to blow-down the system in order to purge those contaminants. The 501G combustion turbine can not operate above 20% load until the purity of the steam needed for transition cooling is achieved. During initial startup phase, we anticipate several intermittent days of no-load operation followed by two or more weeks of non-continuous combustion turbine operation at 20% load before achieving steam purity requirements allowing transfer to steam cooling and ramping up load. These expected events may cause the combustion turbine to produce emission levels that unavoidably exceed allowable limits.

Realizing that 501G combustion turbines are tuned for full-load operation and usually have excess emissions during startup/shutdown cycles, the permit appropriately allows for excess emissions during normal startups and shutdowns. However, the permit limits the duration of those startup excess emissions to 4 hours. This limit is acceptable for a commissioned unit, but not for the first-start of a new combined cycle unit.

It is estimated that the startup, shakedown, and commissioning phases will last no longer than 100 days. It is also estimated that the initial startup phase, during which the combustion turbine will operate at 20% load or less, will take an estimated continuous maximum duration of 21 days to purge contaminants. The stack-gas emissions will probably exceed our permit limitations for most of the entire duration of running in the initial startup phase. There may also be periods of excess emissions that last longer than our permitted 4 hour duration during the shakedown and commissioning phases. Commissioning of the combined cycle unit can not be completed without exceeding the allowable emission limits.

Please confirm that a second commissioning period for the combined cycle conversion that allows for excess emissions has not been provided in the existing permit. If you concur that a second commissioning period has not been provided, then please take whatever steps are necessary to obtain as soon as possible a 100 day time frame that will allow commissioning the combined cycle unit.

Time is of the essence so please consider this request to be of very high priority and keep us informed of your progress. Thank you for your support and assistance.