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ORIGINAL

RECEIVED-FPSC  
02 JUL 15 PM 4:16  
COMMISSION  
CLERK

July 15, 2002

HAND DELIVERED

Ms. Blanca S. Bayo, Director  
Division of Commission Clerk  
and Administrative Services  
Florida Public Service Commission  
2540 Shumard Oak Boulevard  
Tallahassee, Florida 32399-0850

020726-EI

Re: Petition of Tampa Electric Company for Approval of a New Environmental Program for Cost Recovery through the Environmental Cost Recovery Clause

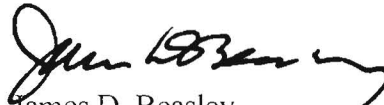
Dear Ms. Bayo:

Enclosed for filing in the above-styled matter are the original and fifteen (15) copies of a Petition of Tampa Electric Company for Approval of a New Environmental Program for Cost Recovery through the Environmental Cost Recovery Clause.

Please acknowledge receipt and filing of the above by stamping the duplicate copy of this letter and returning same to this writer.

Thank you for your assistance in connection with this matter.

Sincerely,

  
James D. Beasley

JDB/pp  
Enclosures

RECEIVED & FILED  
  
FPSC-BUREAU OF RECORDS

DOCUMENT NUMBER-DATE  
07328 JUL 15 02  
FPSC-COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ORIGINAL

In re: Petition of Tampa Electric Company )  
for approval of a new environmental )  
program for cost recovery through )  
the Environmental Cost Recovery Clause. )  
\_\_\_\_\_ )

DOCKET NO. 020726-EI  
FILED: July 15, 2002

**PETITION OF TAMPA ELECTRIC COMPANY FOR APPROVAL OF  
A NEW ENVIRONMENTAL PROGRAM FOR COST RECOVERY  
THROUGH THE ENVIRONMENTAL COST RECOVERY CLAUSE**

Tampa Electric Company ("Tampa Electric" or "the company"), by and through its undersigned counsel, and pursuant to Section 366.8255, Florida Statutes, and Florida Public Service Commission ("Commission") Order Nos. PSC-94-0044-FOF-EI and PSC-94-1207-FOF-EI, hereby petitions this Commission for approval of the company's new environmental compliance program – Polk NO<sub>x</sub> Emissions Reduction – for cost recovery through the Environmental Cost Recovery Clause ("ECRC").

1. Tampa Electric is an investor-owned electric utility subject to the Commission's jurisdiction pursuant to Chapter 366, Florida Statutes. Tampa Electric serves retail customers in Hillsborough and portions of Polk, Pinellas and Pasco Counties in Florida. The company's principal offices are located at 702 North Franklin Street, Tampa, Florida 33602.

2. The persons to whom all notices and other documents should be sent in connection with this docket are:

Lee L. Willis  
James D. Beasley  
Ausley & McMullen  
Post Office Box 391  
Tallahassee, FL 32302  
(850) 224-9115  
(850) 222-7952 (fax)

Angela Llewellyn  
Administrator, Regulatory Coordination  
Tampa Electric Company  
Post Office Box 111  
Tampa, FL 33601  
(813) 228-1752  
(813) 228-1770 (fax)

DOCUMENT NUMBER-DATE

07328 JUL 15 02

FPSC-COMMISSION CLERK

3. This Petition seeks approval of recovery through the ECRC the costs to comply with recently established NO<sub>x</sub> emission limits required as a prerequisite to Tampa Electric obtaining a permit from the Florida Department of Environmental Protection (“FDEP”) to continue operating Polk Unit 1.

4. In the original air construction permit application for Polk Unit 1, a Best Available Control Technology (“BACT”) analysis for NO<sub>x</sub> emissions was included. Based on that analysis, when the permit was issued, the BACT for NO<sub>x</sub> emissions was determined to be diluent nitrogen injection coupled with a multi-nozzle quiet combustor (“MNQC”) for operation using the primary fuel, syngas. The associated NO<sub>x</sub> emissions limit was 25 parts per million by volume dry basis (“ppmvd”) at 15 percent oxygen (“O<sub>2</sub>”). In addition, the NO<sub>x</sub> emissions BACT for the back up fuel, distillate oil, was determined to be water injection with an associated NO<sub>x</sub> emissions limit of 42 ppmvd at 15 percent O<sub>2</sub>. These emissions limits were based on the equipment supplier’s guaranteed performance for the type of equipment being installed.

5. At the time of the original BACT determination, the Polk Unit 1 turbine was unique in that it was fired by syngas using a revised MNQC design that had yet to be placed in commercial operation. Due to the lack of commercial operation, the air construction and Title V permits included the requirement of a 12 to 18 month demonstration period during which the NO<sub>x</sub> emissions performance on syngas would be tested bi-monthly. On November 17, 2000, at the conclusion of testing period, Tampa Electric submitted a revised NO<sub>x</sub> emissions BACT determination to the FDEP. The company proposed to retain the original BACT limit of 25 ppmvd at 15 percent O<sub>2</sub>.

6. The FDEP did not concur with Tampa Electric’s NO<sub>x</sub> emissions BACT determination. On May 11, 2001 the FDEP issued a NO<sub>x</sub> emissions BACT determination

requiring a NO<sub>x</sub> emissions limit of five (5) ppmvd at 15 percent O<sub>2</sub> and the installation of a Selective Catalytic Reduction (“SCR”) system. After careful consideration, Tampa Electric was unable to accept the FDEP’s findings and the company filed for an Administrative Hearing contesting the FDEP’s BACT determination.

7. After extensive negotiations with the FDEP, a settlement was reached that included a new NO<sub>x</sub> emissions BACT limit of 15 ppmvd at 15 percent O<sub>2</sub> and the elimination of the requirement to install an SCR. The elimination of the SCR requirement was predicated on the company’s commitment to equip and expand the gasification process to include biomass as a renewable fuel source. On February 5, 2002 the FDEP issued a final permit under the provisions of Chapter 403, Florida Statutes, and applicable rules of the Florida Administrative Code which constituted authorization for the company’s Polk Power Station to operate Polk Unit 1 with the aforementioned requirements. The compliance deadline for the new emission limit is July 1, 2003. Attached hereto as Exhibit A is the FDEP Permit No. PSD-FL-194F.

8. In order to comply with the new NO<sub>x</sub> emissions limitation for Polk Unit 1, Tampa Electric will implement the Polk NO<sub>x</sub> Emissions Reduction Program. The technical aspects of this three phase program are described in detail in Exhibit B to this Petition.

**Qualifications and Estimated Expenditures for ECRC Recovery**

9. Tampa Electric will incur costs for the Polk NO<sub>x</sub> Emissions Reduction Program in order to meet the compliance requirement related to the FDEP permit. The new program meets the criteria established by this Commission in Docket No. 930613-EI, Order No. PSC-94-0044-FOF-EI in that:

- (a) all expenditures will be prudently incurred after April 13, 1993;

- (b) the activities are legally required to comply with a governmentally imposed environmental regulation enacted, became effective, or whose effect was triggered after the company's last test year upon which rates are based; and
- (c) none of the expenditures are being recovered through some other cost recovery mechanism or through base rates.

10. The costs for which Tampa Electric is seeking ECRC recovery are for operation & maintenance ("O&M") and capital expenditures associated with the development and implementation of the Polk NO<sub>x</sub> Emissions Reduction Program. The O&M projection is \$150,000 per year. The capital projection is \$1,805,000 for 2002 and \$673,000 for 2003. Exhibit C summarizes the company's forecast of capital expenditures in 2002 and 2003 for activities required to achieve the NO<sub>x</sub> emissions reduction specified in the FDEP permit.

11. Tampa Electric expects to begin incurring costs associated with this program in July 2002. Tampa Electric is not requesting a change in its ECRC factors that have been approved for calendar year 2002. Instead, the company proposes to include in its true up filing for 2002 all program costs incurred subsequent to the filing of this Petition through the end of 2002. The company would then include program costs projected for 2003 in its 2003 projection filing. All of this would be subject to audit by the Commission.

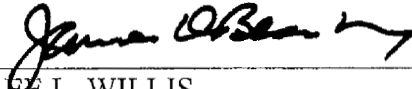
12. This program is a compliance activity associated with the Clean Air Act that should be allocated to rate classes on an energy basis.

13. Tampa Electric is not aware of any disputed issues of material fact relative to the matters set forth in this Petition.

WHEREFORE, Tampa Electric respectfully requests the Commission to approve the company's proposed Polk NO<sub>x</sub> Emissions Reduction Program and recovery of the costs of this program through the ECRC in the manner described herein.

DATED this 15<sup>th</sup> day of July 2002.

Respectfully submitted,



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LEE L. WILLIS  
JAMES D. BEASLEY  
Ausley & McMullen  
Post Office Box 391  
Tallahassee, FL 32302  
(850) 224-9115

ATTORNEYS FOR TAMPA ELECTRIC COMPANY

**Tampa Electric Company**  
**Exhibit A**  
**DEP Permit No. PSD-FL-194F**

RECEIVED

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NOTICE OF FINAL PERMIT

In the Matter of an  
Application for Permit by:


Mr. Mark J. Hornick  
General Manager, Polk Power Station  
Tampa Electric Company  
P.O. Box 111  
Tampa, Florida 33601-0111

Facility I.D. No. 0530233  
DEP Permit No. PSD-FL-194F  
Polk Power Station  
Polk County

Enclosed is Final Permit Number 1050233-007-AC for the Polk Power Station IGCC unit, Emission Unit 001. This permit requires Tampa Electric Company to comply with a NO<sub>x</sub> emission limit of 15 ppmvd @ 15% O<sub>2</sub> on a 30-day rolling average effective July 1, 2003. This permit is issued pursuant to Chapter 403, Florida Statutes.

Any party to this order has the right to seek judicial review of it under section 120.68 of the Florida Statutes, by filing a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel, Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice must be filed within thirty days after this order is filed with the clerk of the Department.

Executed in Tallahassee, Florida.

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


CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this Notice of Final Permit (including the Final permit) was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on 2/5/02 to the person(s) listed:

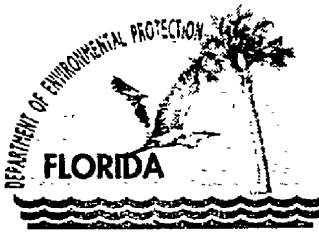
Mark J. Hornick, TEC\*  
Gregg Worley, EPA  
John Bunyak, NPS  
Bill Thomas, DEP SWD  
Mr. Jeff Spence, Polk County ESD  
Buck Oven, DEP PPSO  
Thomas W. Davis, P.E, ECT

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) February 5, 2002  
(Date)





Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

## PERMITTEE

Tampa Electric Company  
Post Office Box 111  
Tampa, Florida 33601-0111

### *Authorized Representative:*

Mark J. Hornick, General Manager  
Polk Power Station

DEP File No. 1050233-007-AC Permit No. PSD-FL-194F Emission Unit 001 NO <sub>x</sub> Emissions Reduction SIC No. 4911
---

## PROJECT AND LOCATION

As per the original PSD permit: "One month after the test period ends (estimated to be by June 1, 2001), the Permittee will submit to the Department a NO<sub>x</sub> recommended BACT Determination as if it were a new source using the data gathered on this facility, other similar facilities and the manufacturer's research. The Department will make a determination on the BACT for NO<sub>x</sub> only and adjust the NO<sub>x</sub> emission limits accordingly." Based upon the Department's review of the permittee's submittals, the Department has determined that the NO<sub>x</sub> emission limits for Emission Unit 001 should be reduced.

The emission unit is located at the Polk Power Station, 9895 State Road 37 South, Mulberry, Polk County. The UTM coordinates are Zone 17, 402.45 km E and 3067.35 km N.

## STATEMENT OF BASIS

This construction permit is issued under the provisions of Chapter 403 of the Florida Statutes (F.S.), and Chapters 62-4, 62-204, 62-210, 62-212, 62-296, and 62-297 of the Florida Administrative Code (F.A.C.). The above named permittee is authorized to modify the facility in accordance with the conditions of this permit and as described in the application, approved drawings, plans, and other documents on file with the Department of Environmental Protection (Department).

## ATTACHED APPENDIX MADE A PART OF THIS PERMIT

Appendix BD-2001

Howard L. Rhodes, Director  
Division of Air Resources Management

## **FACILITY DESCRIPTION**

Tampa Electric Company (TEC) Polk Power Station (PPS) Unit 1 located in Polk County, Florida is a nominal 260-megawatt (MW) electric generation facility. Major components of PPS Unit 1 include solid fuel handling and gasification systems, a sulfuric acid plant for processing of the solid fuel gasification system gas cleanup stream, an auxiliary boiler fired with No. 2 distillate fuel oil, and one integrated gasification combined cycle (IGCC) General Electric (GE) 7F combustion turbine (CT) fired with synthetic natural gas (syngas) or No. 2 distillate fuel oil. The unit is additionally authorized to burn syngas produced from the gasification of fuel blends of up to 60 percent petroleum coke.

## **REGULATORY CLASSIFICATION**

This facility, TEC Polk Power Station, is classified as a Major or Title V Source of air pollution because emissions of at least one regulated air pollutant, such as particulate matter (PM/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 TPY for at least one criteria pollutant, the facility is also a Major Facility with respect to Rule 62-212.400, Prevention of Significant Deterioration (PSD).

## **PERMIT SCHEDULE**

- 05/23/01 Department published the Public Notice in the Tampa Tribune.
- 05/10/01 Department distributed initial Intent to Issue Permit.
- 02/15/01 Department received additional information; application deemed complete.
- 12/04/00 Department requested additional information.
- 11/17/00 Department received applicant's BACT submittal

## **RELEVANT DOCUMENTS**

The documents listed below are the basis of the permit. They are specifically related to this permitting action. These documents are on file with the Department.

- Application received on November 17, 2000;
- Department's incompleteness letter dated December 4, 2000;
- TEC's response to Department's incompleteness letter received on February 15, 2001;
- Draft BACT Determination issued by the Department dated May 10, 2001;
- Department's Intent to Issue and Public Notice Package dated May 10, 2001;
- Additional submittals provided by TEC to Department subsequent to May 10, 2001;
- Permits PSD-FL-194, PSD-FL-194B, PSD-FL-194C, PSD-FL-194D and PSD-FL-194E.

**PERMIT SPECIFIC CONDITIONS**

This permit addresses the following emissions unit:

**E.U. ID No.    Brief Description**

-001      Integrated Gasification Combined Cycle Unit No. 1

1. The provisions of the Title V Operating Permit 1050233-001-AV remain in effect. However, an application shall be submitted to revise that permit consistent with the emission limit changes herein.
2. The provisions of air construction permits PSD-FL-194, PSD-FL-194A, PSD-FL-194C, PSD-FL-194D and PSD-FL-194E are incorporated into this air construction permit except for the changes to the NO<sub>x</sub> emission limit while firing syngas in the affected portions of Specific Condition H below.

H. Emission Limits

1. The maximum allowable emissions from the IGCC combustion turbine, when firing syngas and low sulfur fuel oil, in accordance with the BACT determination, shall not exceed the following:

**EMISSIONS LIMITATIONS - 7F CT POST DEMONSTRATION PERIOD**

POLLUTANT	FUEL	BASIS <sup>a</sup>	LB/HR*	TPY <sup>b</sup>
NO <sub>x</sub>	Oil	42 ppmvd**	311	N/A
	Syngas	<del>25</del> 15 ppmvd	<del>222.5</del> 132	<del>1,044</del> 620

(\*) Emission limitations in lbs/hr are 30-day rolling averages, except for NO<sub>x</sub> while firing syngas, which as of July 1, 2003 is limited in ppmvd (at 15% oxygen) and complied with on a 30-day rolling average via CEMS. Pollutant emission rates may vary depending on ambient conditions and the CT characteristics. Manufacturer's curves for the emission rate correction to other temperatures at different loads shall be provided to DEP for review 120 days after the Siting Board approval of the site certification. Subject to approval by the Department, the manufacturer's curves may be used to establish pollutant emission rates over a range of temperatures for the purpose of compliance determination.

5. After the demonstration period, permittee shall operate the combustion turbine to achieve the lowest possible NO<sub>x</sub> emission limit but shall not exceed 25 ppmvd corrected to 15 percent oxygen and ISO conditions. Effective July 1, 2003, permittee shall operate the combustion turbine to achieve the lowest possible NO<sub>x</sub> emission limit but shall not exceed 15 ppmvd corrected to 15 percent oxygen and ISO conditions.

## APPENDIX BD - 2001

Tampa Electric Company  
Polk Power Station  
PSD-FL-194 and PA92-32  
Polk County, Florida

### BACKGROUND

The applicant, Tampa Electric Company (TEC) is responsible for the operation of an existing facility known as the Polk Power Station. This facility is located at 9995 State Route 37 South, Mulberry, Polk County; UTM Coordinates: Zone 17, 402.45 km East and 3067.35 km North; Latitude: 27° 43' 43" North and Longitude: 81° 59' 23" West. The regulated emissions units at the coal gasification facility include a 260 megawatt (electric) combined cycle combustion turbine which fires syngas or No. 2 fuel oil; an auxiliary boiler which fires No. 2 fuel oil; a sulfuric acid plant; a solid fuel handling system; and a solid fuel gasification system.

As per the original PSD permit, (as well as the Site Certification and Title V permit) the combined cycle combustion turbine is now required to undergo an analysis for NO<sub>x</sub> only. Specific Condition H.7. of the Site Certification document reads as follows: "One month after the test period ends (estimated to be by June 1, 2001), the Permittee will submit to the Department a NO<sub>x</sub> recommended BACT Determination as if it were a new source using the data gathered on this facility, other similar facilities and the manufacturer's research. The Department will make a determination on the BACT for NO<sub>x</sub> only and adjust the NO<sub>x</sub> emission limits accordingly." Based upon existing permit conditions, the test period ended during November 2000.

### PROPOSAL SUBMITTED BY APPLICANT:

TEC submitted a revised proposal on January 30, 2002 recommending an emission limits as follows:

POLLUTANT	CONTROL TECHNOLOGY	TEC PROPOSAL
NO <sub>x</sub>	Syngas firing - N <sub>2</sub> diluent	15 ppmvd @ 15% O <sub>2</sub>

This proposal would provide for a 40% reduction in the current (temporary) emission limit while firing syngas.

### STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES:

The minimum basis for a BACT determination is 40 CFR 60, Subpart GG, Standards of Performance for Stationary Gas Turbines (NSPS). The Department adopted subpart GG by reference in Rule 62-204.800, F.A.C. The key emission limits required by Subpart GG are 75 ppmvd NO<sub>x</sub> @ 15% O<sub>2</sub>. (assuming 25 percent efficiency) and 150 ppmvd SO<sub>2</sub> @ 15% O<sub>2</sub> (or <0.8% sulfur in fuel). Although this determination is required for NO<sub>x</sub> only, the applicant's proposal is consistent with the NSPS, which allows NO<sub>x</sub> emissions in the range of 110 ppmvd for the unit.

### DETERMINATIONS BY EPA AND STATES:

The following table is a sample of information on some recent determinations by states for combined cycle stationary gas turbine projects. This particular review has been limited to gas turbines in the United States which are permitted to combust coal or pet-coke produced syngas. The applicant's proposal is included for reference.

## APPENDIX BD - 2001

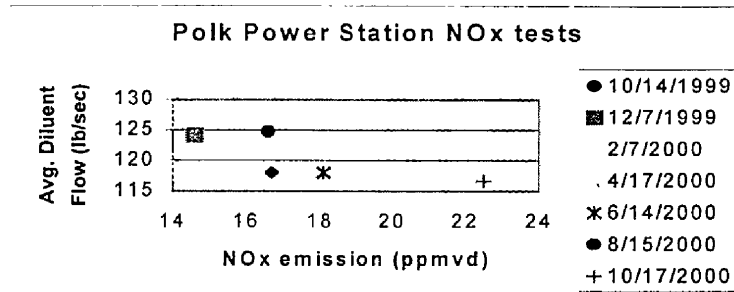
### TABLE 1

#### RECENT LIMITS FOR NITROGEN OXIDES FOR LARGE STATIONARY GAS TURBINE COMBINED CYCLE PROJECTS WHICH COMBUST SYNGAS

Project Location	Power Output Megawatts	NO <sub>x</sub> Emission Rate	Gasification Technology	Comments
Pinon Pine; Sierra Pacific, NV	100	0.07 lb/MMBtu	KRW air-blown pressurized fluidized bed	95% SO <sub>2</sub> removal
Wabash River; Terre Haute, IN	262	0.096 lb/MMBtu	Destec two-stage pressurized oxygen-blown entrained flow	
Kentucky Pioneer (proposed)	580	0.07 lb/MMBtu	British Gas / Lurgi slagging fixed bed	99% SO <sub>2</sub> removal
Motiva; Delaware City, DE	240	16 ppmvd	Texaco pressurized oxygen-blown entrained-flow	
TECO POLK; Polk County FL)	260	15 ppmvd (approx. equiv. 0.076 lb/MMBtu)	Texaco pressurized oxygen-blown entrained-flow	96% SO <sub>2</sub> removal

#### EVALUATION BY DEPARTMENT:

An analysis of the data gathered from the facility was conducted. Two sets of data exist: one which represents seven "full load tests" which were completed between October 1999 and October 2000, and the other is comprised of data from continuous emission monitoring systems (CEMS). Regarding the former, the data is represented on the chart below:



TEC has cautioned against an analysis of NO<sub>x</sub> emissions as compared to diluent flow, noting that "although the diluent flow is an important parameter for controlling NO<sub>x</sub> emissions, a more appropriate measure is the ratio of diluent flow to syngas flow. On an overall basis, this ratio represents the proportional flows of NO<sub>x</sub> controlling diluent and the syngas flow. Additional complicating factors that prevent a straightforward linear analysis of diluent flow rate or ratio and the NO<sub>x</sub> emissions rate include the varying composition of the syngas, and the heating value of the fuel. Although these data are presented, TEC recommends against using these data to establish firm operating ranges due to the variability in other factors that significantly contribute to NO<sub>x</sub> emissions from this combustion turbine." Since diluent flow will likely increase with generating load (up to some load point) and since syngas flow is directly proportional to unit load, it is likely that a measure of diluent flow to syngas flow (which the applicant purports is more appropriate) makes some sense, as in the case of reviewing the entire load range of a combustion turbine. However, the Department wishes to better understand the impact of diluent flow on NO<sub>x</sub> emissions, given that the diluent is the control media for NO<sub>x</sub>. Since the tests are at a similar load point, the syngas flow and its associated variability can be effectively ignored. This yields a chart similar to the one above, indicating some level of correlation (albeit with 7 data points) between the diluent flow

## APPENDIX BD - 2001

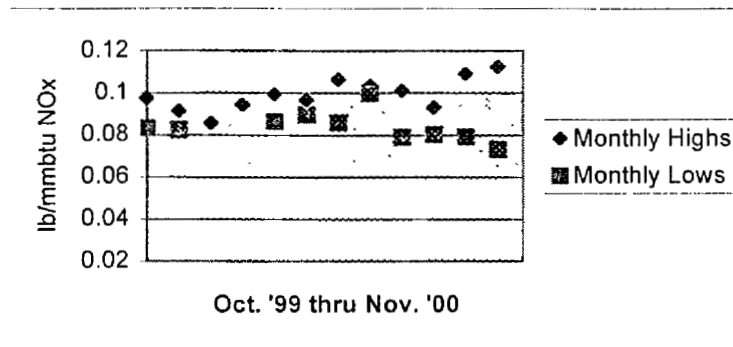
and NO<sub>x</sub> emissions. Given the very limited amount of tests, one initial conclusion which might be drawn is that NO<sub>x</sub> emissions are likely to be less than 19 ppmvd if the diluent flow is held to 120 lb/sec or higher.

Regarding the latter set of data (from the CEMS), 14 months of data was reviewed, with the month of March 2000 ignored due to low operating time. In order to understand the range of data with respect to syngas NO<sub>x</sub> emissions, only days where daily hours of operation firing syngas equaled 24 (all day) were analyzed. From this data set, the 5 highest and lowest daily average NO<sub>x</sub> emission rates (in lb/MMBtu) were computed. This led to the chart below, with the lowest values during the months of December 1999 and January 2000 excluded due to calculated values around 0.01 lb/MMBtu. The following preliminary conclusions are drawn from this analysis:

- 1) There seems to be an increasing variability over the latter months, with highs increasing and lows decreasing.
- 2) The average of the monthly highs is just under 0.10 lb/MMBtu and the average of the monthly lows is just under 0.085 lb/MMBtu.
- 3) The facility should be able to easily comply with its current limit of 25 ppmvd (approximately 0.126 lb/MMBtu) and likely will operate closer to 0.09 lb/MMBtu (approximately 18 ppmvd) on a monthly average basis.

Each analysis of the facility data referred to herein suggests that a NO<sub>x</sub> limit of 0.09 lb/MMBtu (approximately 18 ppmvd) would likely be reasonable, given that certain changes may be required.

### CEMS DATA



### DEPARTMENT DETERMINATION:

Although little incentive existed to maintain a NO<sub>x</sub> limit below 25 ppm, the data shows that emissions can be maintained at much lower levels with minor changes.

POLLUTANT	DETERMINATION
NO <sub>x</sub> (syngas - all operating modes)	15.0 ppmvd – 30-day rolling average via CEMS

The rationale is:

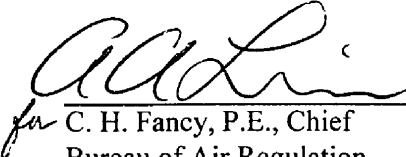
- 1) Polk IGCC is not a green-field unit, and additional controls effectively result in a retrofit
- 2) Other (similar) domestic IGCC units are able to comply with an emission limit of 15 ppmvd and
- 3) The process of gasification is likely to expand to renewable fuels, possibly complicating the application of more stringent controls.

APPENDIX BD - 2001

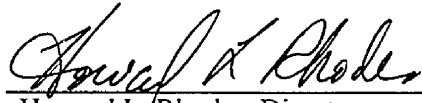
DETAILS OF THE ANALYSIS MAY BE OBTAINED BY CONTACTING:

Michael P. Halpin, P.E. Review Engineer  
Department of Environmental Protection  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Recommended By:

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

Approved By:

  
Howard L. Rhodes, Director  
Division of Air Resources Management

2/4/02  
Date:

2/4/02  
Date:

**Tampa Electric Company**  
**Exhibit B**  
**Technical Aspects of the Polk NO<sub>x</sub> Emissions Reduction Program**



## **Polk NO<sub>x</sub> Emissions Reduction Program**

1. In order to ensure compliance with the newly established NO<sub>x</sub> emissions requirement of 15 ppmvd at 15 percent O<sub>2</sub>, Tampa Electric will undertake the Polk NO<sub>x</sub> Emissions Reduction Program in the three phases listed below.

- (a) The humidification of the syngas through the installation of a syngas saturator.
- (b) An increased airflow to the air separation unit ("ASU") by adding guide vanes to the main air compressor ("MAC") and upgrading the compressors (which supply refrigeration to the plant) and the associated piping. This will increase diluent nitrogen ("N<sub>2</sub>") availability.
- (c) The modification of the controls and the installation of additional guide vanes to the diluent N<sub>2</sub> compressor which will provide more diluent gaseous nitrogen ("DGAN") to the turbine.

2. Phase one of the overall project is the humidification of the syngas through the installation of a syngas saturator which is depicted in Document No. 1 of Exhibit B. Figure 1a of Document No. 1 of Exhibit B shows the current configuration of the low temperature gas cooling section of the plant and Figure 1b shows the future configuration. An existing column, the water wash column, will be modified to become the syngas saturator. In the current configuration, syngas flows from the coolers through the water wash column and into the methyl diethanol amine ("MDEA") absorber, where sulfur species are removed. In the future configuration, the flow path will be modified whereby the syngas will first flow through the MDEA absorber and then to the saturator column. In the saturator, the syngas will be contacted with a counter-current flowing stream of hot water. As the syngas passes from the bottom to the top of the column, it

will be warmed and humidified by the warm water flowing downward. The syngas will leave the column with approximately five percent water vapor which will reduce NO<sub>x</sub> emissions by three to five ppmvd. The saturator will add the equivalent of about 50 gallons per minute (“gpm”) of water to the syngas. This additional water will come from the existing plant water wells; therefore, no additional water will be withdrawn from the water table. However, additional water treatment facilities will be included to purify the water for the saturator.

3. Phase one of the overall project will be executed according to the following timetable. Beginning in late summer 2002, piping will be fabricated to reroute the syngas around the current water wash column. This bypass piping will be installed during the fall 2002 planned outage. Next, between the fall 2002 planned outage and the spring 2003 planned outage, modifications will be made to the water wash column internals and other key equipment (heat exchanger, pump, and water treatment equipment) will be procured and put in place. Finally, in the spring 2003 planned outage, the last piping spool modifications will be made to place the new saturator in the syngas flow path. The system will be commissioned during subsequent operation between the spring 2003 planned outage and the required in-service date of July 1, 2003.

4. The second phase of the overall project is to increase the airflow to the ASU thereby making more diluent N<sub>2</sub> available. Currently, all diluent N<sub>2</sub> is provided by the ASU and the compander system to provide refrigeration for the cryogenic separation of the air into its components, N<sub>2</sub> and O<sub>2</sub>. This second phase will increase the capability of the MAC within the ASU to provide additional air and increase the refrigeration capability of the companders such that more diluent N<sub>2</sub> will be available. The scope of this second phase is to:

- (a) install guide vanes in stages two through four on the MAC;

- (b) upgrade the MAC motor components as required to ensure that it meets the additional horsepower requirements; and
- (c) modify the companders and associated piping to ensure adequate column refrigeration.

Document No. 2 of Exhibit B is a flow diagram of the ASU and depicts the new aspects of this second phase of the overall project.

5. The installation of additional guide vanes in the MAC will increase the compressor flow capacity by approximately five percent. This additional air supply from the MAC will be delivered to the ASU's cryogenic column thus providing additional N<sub>2</sub> for injection into the combustion turbine via the diluent N<sub>2</sub> compressor. There will be minor modifications to the MAC's motor to ensure that motor components are capable of sustaining the higher power requirements. The companders, which supply most of the refrigeration to the column, will require upgrading to ensure that the column can liquefy the additional airflow from the MAC.

6. The MAC guide vanes and compander upgrades must be purchased with a sufficient lead time such that their installation will occur during the fall 2002 planned outage.

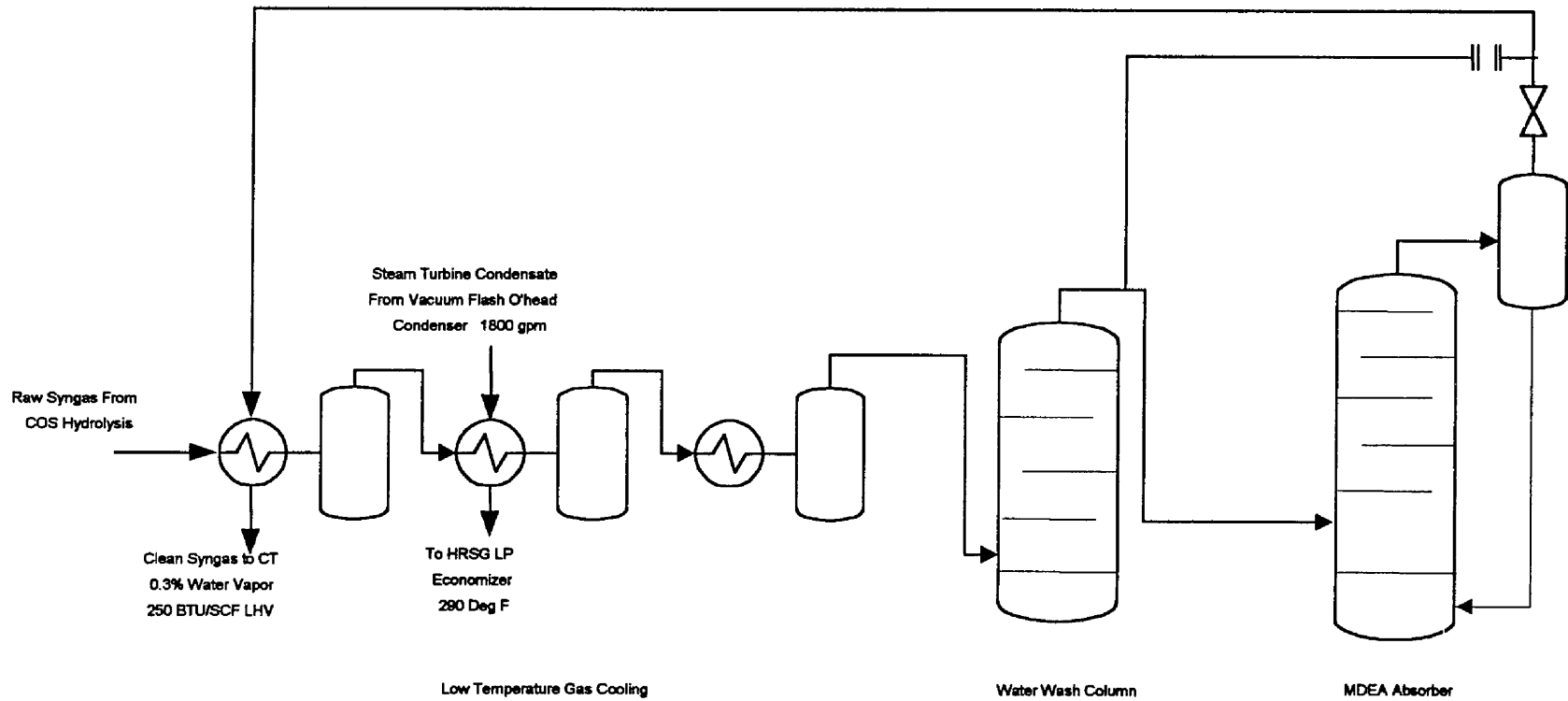
7. The third phase of the overall project is the modification of the controls and the installation of additional guide vanes to the diluent N<sub>2</sub> compressor. The result of phase two of the overall project will make additional DGAN available for injection into the turbine. However, the DGAN is only available at 35 pounds per square inch gauge ("psig") from the cryogenic separation section of the ASU. Therefore, compression is needed and the diluent N<sub>2</sub> compressor in the current configuration will not be able to handle the additional load of more diluent N<sub>2</sub> flow. Phase three of the overall project is designed to remedy the circumstance. This phase will require the installation of additional guide vanes in the diluent N<sub>2</sub> compressor in order to achieve

the increased capacity necessary to sustain the greater flow of DGAN. This modification is similar to that which will occur to the MAC in phase two of the project and is also depicted in Document No. 2 of Exhibit B. The diluent N<sub>2</sub> compressor modification is scheduled to occur no later than the spring 2003 planned outage. In addition, control system modifications will be made in late 2002 to assure stability of control in order to deliver maximum DGAN to the turbine while maintaining overall plant control stability during load changes.

8. Due to the competitive bidding process and material procurement lead time, the three phases of the Polk NO<sub>x</sub> Emissions Reduction Program described above will commence in July 2002. However, the evaluation and engineering for the expansion of the gasification process to include biomass fuel is currently in progress. Tampa Electric will address this aspect of the overall NO<sub>x</sub> abatement project with the Commission at a later date while still allowing the company to meet the July 1, 2003 FDEP compliance date.

**Tampa Electric Company**  
**Exhibit B**  
**Document No. 1**  
**Installation of Syngas Saturator**

**Figure 1A: Current Low Temperature Gas Cooling, Water Wash Column and MDEA Configuration**

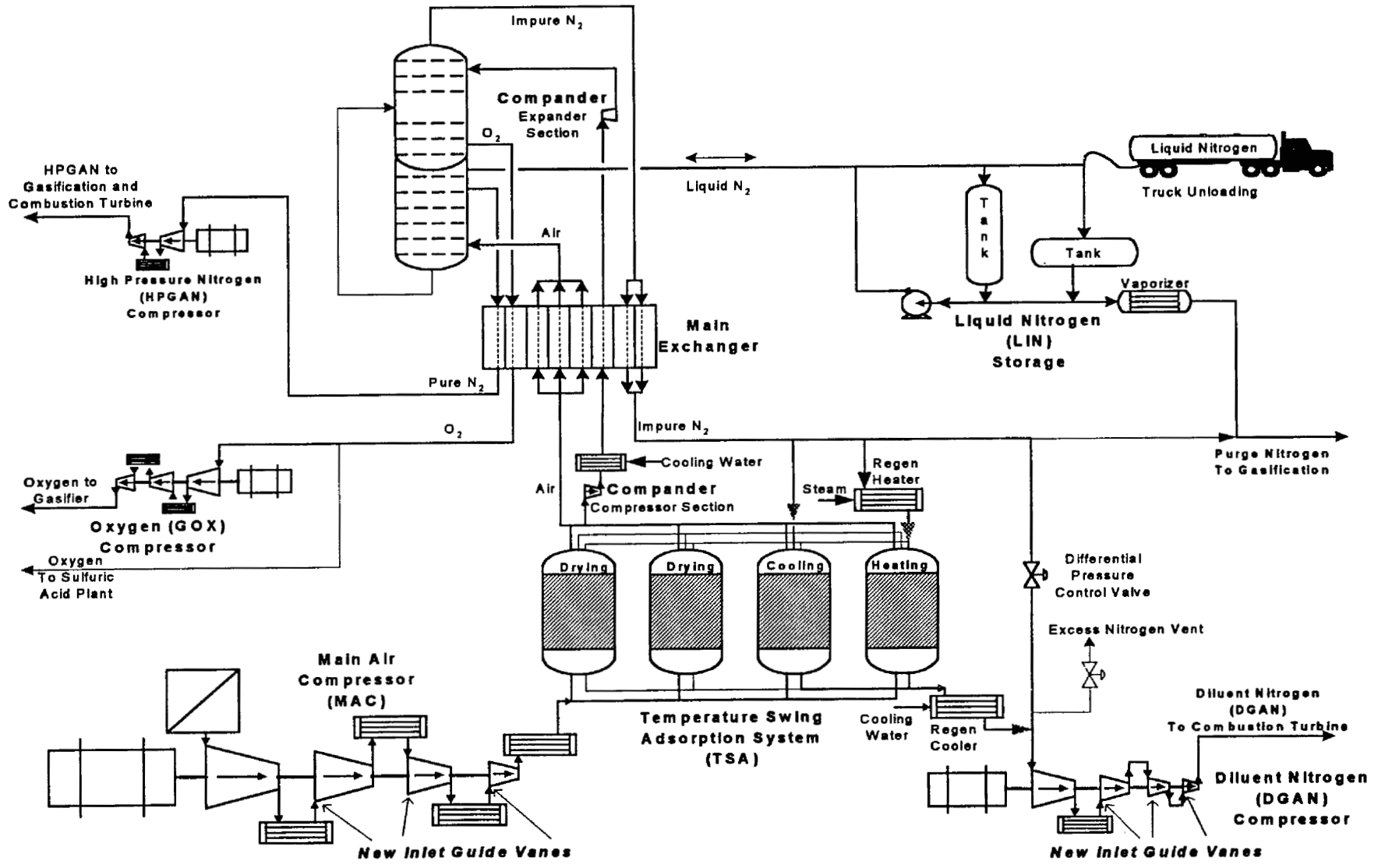




**Tampa Electric Company**  
**Exhibit B**  
**Document No. 2**  
**Modifications to the Air Separation Unit**



# Air Separation Unit



**Tampa Electric Company**  
**Exhibit C**  
**Forecast of Expenditures for NO<sub>x</sub> Emissions Reduction**

## Forecast of Capital Expenditures for Polk NO<sub>x</sub> Emissions Reduction Program

2002 Activity	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02	Total
1. Saturator Purchases, Installation	\$58,000	\$68,000	\$89,000	\$112,000	\$379,000	\$347,000	\$1,053,000
2. MAC Purchases, Installation	\$97,000	\$97,000	\$158,000	\$158,000	\$97,000	\$97,000	\$704,000
3. DGAN & Control Purchases, Installation					\$24,000	\$24,000	\$48,000

2003 Activity	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Total
4. Saturator Purchases, Installation	\$90,000	\$86,000	\$130,000	\$152,000	\$84,000	\$35,000	\$577,000
5. DGAN & Control Purchases, Installation	\$36,000	\$36,000	\$24,000				\$96,000

**Total for 2003**

**\$673,000**

Activity Summary	Total
Saturator Purchases, Installation (1+4)	\$1,630,000
MAC Purchases, Installation (2)	\$704,000
DGAN & Control Purchases, Installation (3+5)	\$144,000

**Project Total**

**\$2,478,000**