

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

In the matter of an
Application for Permit by:

DER File No. AC53-211670
PSD-FL-187
Polk County

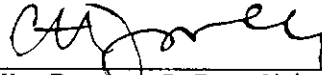
Mr. William R. Malenius
Polk Power Partners
23293 South Pointe Drive
Laguna Hills, CA 92653

Enclosed is Permit Number AC53-211670 to construct a cogeneration and CO₂ recovery facility at County Road 555 approximately 3.7 miles southwest of Baftow, Polk County, Florida, issued pursuant to Section(s) 403, Florida Statutes.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; 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 of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E., Chief
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on 11-24-92 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED,
on this date, pursuant to
§120.52(11), Florida Statutes,
with the designated Department
Clerk, receipt of which is hereby
acknowledged:


(Clerk)

11-24-92
(Date)

Copies furnished to:

W. Thomas, SWD
D. Martin, Polk Co.
J. Harper, EPA
C. Shaver, NPS
K. Kosky, KBN

Final Determination

Polk Power Partners
Cogeneration/CO₂ Recovery Project
Polk County, Florida

Permit No. AC 53-211670
PSD-FL-187

Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

November 19, 1992

Final Determination

The Technical Evaluation and Preliminary Determination for the permit to construct a cogeneration and CO₂ recovery facility approximately 3.7 miles southwest of Bartow in Polk County, Florida, was distributed on September 22, 1992. The Notice of Intent to Issue was published in the Polk County Democrat on October 8, 1992. Copies of the evaluation were available for public inspection at the Department's Tallahassee and Tampa offices.

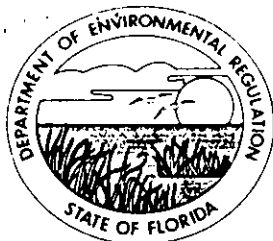
On October 26, 1992, a letter was received from the EPA concurring with the Department's proposed action. Comments were received from the applicant on October 13 and November 4, 1992, requesting minor modifications of certain specific conditions. The Department made the following changes in response to those comments:

Specific Condition No. 2 - The emission limits were modified to show fuel oil use as backup after the first three years of operation. Oil use is limited to 30 days per year after December 31, 1997.

Specific Condition No. 3 - Fuel consumption rates and hours of operation were modified to show fuel oil use as backup after the first three years of operation and limited use (30 days per year) after December 31, 1997.

BACT Determination - Minor revisions were made to the last paragraph of the NO_x section to clarify that SCR may be required if the emission limits are not achieved by April 30, 1997.

The final action of the Department will be to issue construction permit AC53-211670 (PSD-FL-187) as modified.



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:

Polk Power Partners, L.P.
23293 South Pointe Drive
Laguna Hills, CA 92653

Permit Number: AC 53-211670
PSD-FL-187

Expiration Date: December 31, 1994

County: Polk

Latitude/Longitude: 27°50'56"N
81°52'39"W

Project: Mulberry Cogeneration
Project

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the construction of a 126 Megawatt cogeneration unit along with a 150 ton per day CO₂ recovery plant. The facility will be located off County Road 555 approximately 3.7 miles southwest of Bartow in Polk County, Florida. UTM coordinates of the site are: Zone 17, 413.6 km E and 3080.6 km N.

Particulate emissions shall be controlled by using clean fuels and good combustion practices. CO emissions shall be controlled by proper combustion techniques. NO_x emissions shall be initially controlled by water injection and Low NO_x Burners. Future control technology for NO_x (SCR) will depend on whether the Low NO_x Burners can achieve the levels specified by this permit.

The source shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. DER letter dated May 5, 1992.
2. KBN letter dated April 15, 1992.
3. KBN letter dated June 2, 1992.
4. EPA letter dated July 1, 1992.
5. KBN submittal dated July 8, 1992.
6. KBN letter dated July 29, 1992.
7. KBN letter dated August 12, 1992.
8. DER letter dated August 13, 1992.
9. KBN letter dated August 26, 1992.
10. KBN letter dated October 12, 1992.
11. KBN letter dated November 2, 1992.

PERMITTEE:
Polk Power Partners, L.P.

Permit Number: AC 53-211670
PSD-FL-187
Expiration Date: December 31, 1994

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

PERMITTEE:
Polk Power Partners, L.P.

Permit Number: AC 53-211670
PSD-FL-187
Expiration Date: December 31, 1994

GENERAL CONDITIONS:

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

PERMITTEE:
Polk Power Partners, L.P.

Permit Number: AC 53-211670
PSD-FL-187
Expiration Date: December 31, 1994

GENERAL CONDITIONS:

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

- (x) Determination of Best Available Control Technology (BACT)
- (x) Determination of Prevention of Significant Deterioration (PSD)
- (x) Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
- b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. ~~These materials shall be retained at least~~ three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
- c. Records of monitoring information shall include:
 - the date, exact place, and time of sampling or measurements;

PERMITTEE:
Polk Power Partners, L.P.

Permit Number: AC 53-211670
PSD-FL-187
Expiration Date: December 31, 1994

GENERAL CONDITIONS:

- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. Unless otherwise indicated, the construction and operation of the subject facilities shall be in accordance with the capacities and specifications stated in the application.

2. Emissions from these facilities shall not exceed the limits listed below (based on operation at 59°F):

Pollutant	Source	Fuel	Through 12/31/97		After 12/31/87 (See notes)	
			lbs/hr	tons/yr	lbs/hr	tons/yr
NOx	HRSO Stack	Gas	87.8	384.5	52.7	230.7
	CO ₂ Plant Stack	Gas	19.9	87.1	18.3	80.0
	HRSO Stack	Oil	164.0	718.2	164.0	59.0
	CO ₂ Plant Stack	Oil	23.4	102.4	23.4	8.4
SO ₂	HRSO Stack	Oil	0.1% Sulfur Max.		0.1% Sulfur Max.	
	CO ₂ Plant Stack	Oil	0.1% Sulfur Max.		0.1% Sulfur Max.	
VE	HRSO Stack	Gas	10% Opacity		10% Opacity	
	CO ₂ Plant Stack	Gas	10% Opacity		10% Opacity	
	HRSO Stack	Oil	20% Opacity		20% Opacity	
	CO ₂ Plant Stack	Oil	20% Opacity		20% Opacity	
VOC	CO ₂ Plant Stack	--	18.2	79.6	17.7	77.6
CO	HRSO Stack	Gas	42.9	187.8	42.9	187.8
	CO ₂ Plant Stack	Gas	11.9	52.0	11.9	52.0
	HRSO Stack	Oil	75.3	329.9	75.3	27.1
	CO ₂ Plant Stack	Oil	13.4	58.5	13.4	4.8

- Notes: (1) Oil may be used as backup fuel for up to 30 days per year.
 (2) NO_x limits after 12/31/97 based on 15 ppmvd.
 (3) Opacity limit will allow one 6-minute period per hour of not more than 27% opacity.

PERMITTEE:
Polk Power Partners, L.P.

Permit Number: AC 53-211670
PSD-FL-187
Expiration Date: December 31, 1994

SPECIFIC CONDITIONS:

3. The cogeneration facility shall be permitted to fire natural gas and No. 2 fuel oil until December 31, 1997, after which the primary fuel will be natural gas. Fuel consumption rates (based on operation at 20°F) and hours of operation for the turbine and duct burner shall not exceed those listed below:

	<u>Natural Gas</u>			<u>No. 2 Fuel Oil</u>		
	<u>M ft3/hr</u>	<u>MM ft3/yr</u>	<u>hrs/yr</u>	<u>M lb/hr</u>	<u>M lb/yr</u>	<u>hrs/yr</u>
Turbine	1013.4	8877.4	8760	55.6	379.9	6833 ⁽¹⁾
Duct Burner	104.2	912.8	8760	0	0	0

(1) After December 31, 1997, fuel oil can be used permanently as backup fuel for no more than 720 hours per year.

4. Before this construction permit expires, the cogeneration facility and CO₂ Recovery Plant stacks shall be sampled or tested as applicable according to the emission limits in Specific Condition No. 2. Annual compliance tests shall be conducted each year thereafter. Compliance tests shall be run at 96% to 100% of the maximum capacity achievable for the average ambient temperature during the compliance tests. The turbine manufacturer's capacity vs. temperature (ambient) curve shall be included with the compliance test results. Tests shall be conducted using the following reference methods:

NO_x: EPA Method 20
SO₂: Fuel supplier's sulfur analysis
VE: EPA Method 9
CO: EPA Method 10
VOC: EPA Method 25A

5. The DER Southwest District office shall be notified at least 30 days prior to the compliance tests. Compliance test results shall be submitted to the DER Southwest District office in Tampa and the DER Bureau of Air Regulation office in Tallahassee (third annual compliance test only) within 45 days after completion of the tests. Sampling facilities, methods, and reporting shall be in accordance with F.A.C. Rule 17-2.700 and 40 CFR 60, Appendix A.

6. A continuous operations monitoring system shall be installed, operated, and maintained in accordance with 40 CFR 60.334. The natural gas, fuel oil and water injection flows to the cogeneration turbine along with the power output of the generators shall be metered and continuously recorded. The data shall be logged daily and maintained so that it can be provided to DER upon request.

7. The permittee shall have the option of including, in the initial construction, adequate modules and other provisions

PERMITTEE:
Polk Power Partners, L.P.

Permit Number: AC 53-211670
PSD-FL-187
Expiration Date: December 31, 1994

SPECIFIC CONDITIONS:

necessary for future installation of state-of-the-art catalytic abatement or equivalent NO_x control systems. Within 90 days of receipt of the third annual compliance test results, the Bureau of Air Regulation shall, if NO_x emission limits are not met, review the need for making a revised determination of Best Available Control Technology. If test results show that it is unlikely that NO_x limits can be met, a revised BACT determination shall be made. The Department may revise the BACT determination to require installation of such technology if so indicated by the revised BACT cost/benefit analysis. The retrofit costs associated with not making provisions for such technology initially shall not be considered by the Department in the retrofit cost analysis.

8. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

9. An application for an operation permit must be submitted to the Southwest District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rules 17-4.055 and 17-4.220).

Issued this 20th day
of November, 1992

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



Carol M. Browner, Secretary

Best Available Control Technology (BACT) Determination
 Mulberry Cogeneration Project
 Polk County

The applicant proposes to install a 126 MW combined cycle cogeneration unit along with a 150 TPD carbon dioxide plant that will recover CO₂ from the power plant flue gas. The Polk County facility will consist of a General Electric PG7111EA Gas Turbine Generator exhausting through a primary heat recovery steam generator which will produce steam for the steam-electric cycle. Initially, the turbine will be fired by natural gas and No. 2 fuel oil, with natural gas becoming the permanent fuel after the first three years of operation. A secondary heat recovery steam generator will be auxiliary-fired by natural gas to provide a CO₂-enriched flue gas feed to the CO₂ recovery plant.

Date of Receipt of a Complete Application

August 14, 1992

BACT Determination Requested by Applicant

- NO_x - Dry Low NO_x Combustion
- CO - Combustion Design
- H₂SO₄/SO₂ - Low Sulfur Fuel Oil (0.1%S)
- VOC - Combustion Design for CT
 Scrubber for CO₂ Absorber Exhaust
- PM/PM₁₀ - Combustion Design/Clean Fuel

BACT Determination by the Department

- NO_x - Dry Low NO_x Combustion with potential future SCR capability
- CO - Combustion Design
- H₂SO₄/SO₂ - Low Sulfur Fuel Oil (0.1%S)
- VOC - Combustion Design for CT
 Scrubber for CO₂ Absorber Exhaust
- PM/PM₁₀ - Combustion Design/Clean Fuel

Proposed Emission Limits (tons per year)

	<u>First 3 yrs (22% Gas/78% Oil)</u>			<u>After First 3 yrs (100% Gas)</u>			<u>PSD</u>
	<u>HRSG</u>	<u>CO₂ Plant</u>	<u>Total</u>	<u>HRSG</u>	<u>CO₂ Plant</u>	<u>Total</u>	
NO _x	644.8	99.1	743.9	230.7	80.0	310.7	40.0
SO ₂	327.4	16.4	343.8	11.4	1.8	13.2	40.0
PM/PM ₁₀	58.0	28.9	86.9	30.7	27.7	58.4	25/15
CO	298.6	57.1	355.7	187.8	52.0	239.8	100.0
VOC	37.7	79.3	117.0	28.2	78.8	107.0	40.0
H ₂ SO ₄	26.4	1.3	27.7	0.9	0.1	1.0	7.0
Be	.008	--	.008	--	--	--	0.0004
As	.013	--	.013	--	--	--	0.0

These limits assume that 4.6% of the turbine exhaust mass flow is diverted to the CO₂ plant. Emissions for the first three years are based on firing 22% gas - 78% oil in the turbine for 8,760 hours/yr at 1016 MMBtu/hr and natural gas in the duct burner for 8,760 hours/yr at 99 MMBtu/hr. Emissions after the first three years are based on firing only natural gas at 868.8 MMBtu/hr. Turbine performance under natural gas firing is based on NO_x emissions of 25 ppm (corrected to 15 percent O₂) for the first three years and 15 ppm thereafter. Performance on oil firing is based on NO_x emissions of 42 ppmvd (corrected to 15 percent O₂). SO₂ emissions are based on 0.1 percent sulfur.

BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that in making the BACT determination the Department shall give consideration to:

- (a) Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).
- (b) All scientific, engineering, and technical material and other information available to the Department.
- (c) The emission limiting standards or BACT determinations of any other state.
- (d) The social and economic impact of the application of such technology.

~~The EPA currently stresses that BACT should be determined using the "top-down" approach.~~ The first step in this approach is to determine for the emission source in question the most stringent control available for a similar or identical source or source category. If it is shown that this level of control is technically or economically infeasible for the source in question, than the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

BACT Determination Rationale

Particulate Matter (PM/PM₁₀)

Particulate emissions will be minimized by combustion control and the use of clean fuels. The particulate emissions from the combustion turbine when burning natural gas and fuel oil will not cause visible emissions to exceed 10% and 20% opacity, respectively.

Arsenic and Beryllium (As, Be)

The Department agrees that there are no feasible methods to control beryllium and arsenic except by specifying the quality of the fuel.

Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

The majority of BACT emissions limitations have been based on controlling carbon monoxide and volatile organic compounds through efficient combustion. Advanced control is achievable through the use of catalytic oxidation. Catalytic oxidation is a postcombustion control that has been employed in CO nonattainment areas where regulations have required CO emission levels to be less than those associated with wet injection. These installations have been required to use LAER technology and typically have CO limits in the 10-ppm range (corrected to dry conditions).

In an oxidation catalyst control system, CO emissions are reduced by allowing unburned CO to react with oxygen at the surface of a precious metal catalyst such as platinum. Combustion of CO starts at about 300°F, with efficiencies above 90 percent occurring at temperatures above 600°F. Catalytic oxidation occurs at temperatures 50 percent lower than that of thermal oxidation, which reduces the amount of thermal energy required. For CT/HRSG combinations, the oxidation catalyst can be located directly after the CT or in the HRSG. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency.

Due to the oxidation of sulfur compounds and excessive formation of H₂SO₄ mist emissions, oxidation catalyst systems are not considered to be technically feasible for gas turbines fired with fuel oil. Catalytic oxidation has not been demonstrated on a continuous basis when using fuel oil.

Use of oxidation catalyst technology would be feasible for a natural gas-fired unit; however, the cost effectiveness of over \$6,000 per ton of CO removed will have a significant economic impact on this project. Therefore, efficient combustion will be the control method for CO and VOC.

Nitrogen Oxides (NO_x)

The applicant requested that BACT for nitrogen oxides during the first three years be water injection and Low NO_x Burners. This would limit emissions to 25 ppmvd when burning natural gas and 42 ppmvd when burning fuel oil.

A review of the EPA's BACT/LAER Clearinghouse indicates that the lowest NO_x emission limit established to date for a combustion turbine is 4.5 ppmvd (corrected to 15% O₂). This level of control was accomplished through the use of water injection and a selective catalytic reduction (SCR) system.

Selective catalytic reduction is a post-combustion method for control of NO_x emissions. The SCR process combines vaporized ammonia with NO_x in the presence of a catalyst to form nitrogen and water. The vaporized ammonia is injected into the exhaust gases prior to passage through the catalyst bed. The SCR process can achieve up to 90% reduction of NO_x with a new catalyst. As the catalyst ages, the maximum NO_x reduction will decrease to approximately 86 percent.

Although feasible, the applicant rejected using SCR because of economic, energy, and environmental impacts. The following factors were considered in the decision not to propose SCR:

- a) Disposal of hazardous waste generated (spent catalyst).
- b) An energy penalty of \$0.05/KWH due to back pressure from the catalyst bed.
- c) A power loss penalty based on lost capacity.
- d) Potential for public exposure to high concentrations from ammonia storage and handling leaks and ammonia slip.
- e) Ammonium bisulfate and ammonium sulfate particulate emissions (ammonium salts) due to the reaction of NH₃ with SO₃ present in the exhaust gases.
- f) Cost effectiveness for SCR technology was determined to be in the range of \$6,000 per ton of NO_x removed.

A concern associated with the use of SCR on combined cycle projects is the formation of ammonium bisulfate which can be formed by reaction of sulfur in the fuel and the ammonia injected. The ammonium bisulfate has a tendency to plug the tubes of the heat recovery steam generator leading to operational problems. The latest information available indicates that SCR can be used for oil firing provided that adjustments are made in the ammonia to NO_x injection ratio. For natural gas firing, NO_x emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater injection ratio. By lowering the injection ratio for oil firing, testing has indicated that NO_x can be controlled with efficiencies ranging from 60 to 75 percent. When the injection

ratio is lowered there is not a problem with ammonium bisulfate formation since essentially all of the ammonia is able to react with the nitrogen oxides present in the combustion gases. SCR has been established as BACT for oil fired combined cycle facilities with NO_x emission limits ranging from 11.7 to 25 ppmvd depending on the efficiency of control.

The applicant determined that the total annual cost of SCR for this project is \$1,957,700 with an average cost effectiveness in the range of \$6,000 to \$7,000 per ton of NO_x removed. The maximum annual NO_x emissions using water injection and Low NO_x combustor design will be 744 tons/year for the first three years. Assuming that SCR would reduce the NO_x emissions by 65%, about 484 tons/year of NO_x would be removed initially followed by 200 tons/year thereafter. When this reduction is factored into the total annual cost, the cost per ton of controlling NO_x is in the range of \$6,000 to \$6,500. This calculated cost is higher than has previously been approved as BACT.

The latest DER BACT determinations have a NO_x limit of 15 ppmvd (natural gas) using Low-NO_x burner technology. Although the turbine manufacturer does not presently guarantee this limit, they have agreed to lower NO_x to 15 ppm by 4/30/97. This lower NO_x limit will be achieved by application of low-NO_x burners or SCR. Therefore, the Department accepts water injection and Low NO_x Burner design as BACT for a limited time (up to 4/30/97).

The calculations that the applicant presented and Department findings indicate that the cost of controlling NO_x is high compared to other BACT determinations which require SCR. Based on the information presented by the applicant, the Department believes that the use of SCR for NO_x control is not justifiable as BACT at this time.

The Department will revise the allowable BACT limit for this project if necessary no later than 4/30/97. It is the Department's understanding that the turbine manufacturer will be able to achieve 15 ppmvd NO_x emission limits within this period. If the 15 (gas)/42 (oil) ppmvd emission rates cannot be met, SCR or another technology will be required no later than December 31, 1997.

Sulfur Dioxide(SO₂) and Sulfuric Acid Mist (H₂SO₄)

In accordance with "top down" BACT review, only two alternatives exist that would result in stringent SO₂ emissions; using low sulfur content fuel oil or flue gas desulfurization (FGD). EPA has recognized that FGD technology is inappropriate to apply to these combustion units due to negative environmental, economic and energy impacts. Sludge would be generated that would have to be disposed of properly, and there would be increased utility (electricity and

water) costs associated with the operation of a FGD system. Finally, there is no information in the literature to indicate that FGD has ever been applied to stationary gas turbines burning distillate oil.

This leaves the use of low sulfur fuel oil as the best option. The Department accepts the use of No. 2 fuel oil with a 0.1% sulfur by weight as BACT for this project.

Details of the Analysis May be Obtained by Contacting:

Preston Lewis, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400


Recommended by:



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

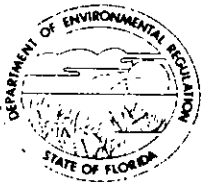
November 18, 1992
Date

Approved by:



Carol M. Browner, Secretary
Dept. of Environmental Regulation

November 20, 1992 1992
Date



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To: _____	Location: _____
To: _____	Location: _____
To: _____	Location: _____
From: _____	Date: _____

Interoffice Memorandum

TO: Carol M. Browner
 FROM: Howard L. Rhodes *HLR*
 DATE: November 19, 1992
 SUBJ: Approval of Construction Permit AC53-211670 (PSD-FL-187)
 Polk Power Partners

Attached for your approval and signature is a permit prepared by the Bureau of Air Regulation for the above mentioned company to construct a cogeneration and CO₂ recovery facility near Bartow.

This facility is not controversial and consists of a 126 MW combined cycle cogeneration power plant along with a 150 ton per day carbon dioxide (CO₂) plant that will recover CO₂ from the power plant flue gas. The permanent fuel for the power plant will be natural gas although the plant will not have a firm contract for natural gas until the fourth year of operation. During the first three years, natural gas will provide a minimum of 22 percent of fuel requirements with the balance supplied by distillate fuel oil.

The facility is required to meet Best Available Control Technology for NO_x using low NO_x burner and water injection. If this technique does not meet the necessary emission limits, then DER is requiring the use of Selective Catalytic Reduction (SCR).

Comments were received from the applicant requesting minor clarification to indicate use of fuel oil as backup after the first three years of operation.

I recommend your approval and signature.

HLR/JR/plm

Attachments

8-5

Patry:
 ALTHOUGH WE DID NOT SEND THIS 2nd INCOMPLETENESS LETTER, CAN WE CLAIM THE CLOCK WAS TOLLED BECAUSE THE APPLICANT WAS AWARE OF THE INCOMPLETENESS?

PS Form 3811, July 1983 / 47-845

DOMESTIC RETURN RECEIPT

SENDER: Complete items 1, 2, 3 and 4.
 Put your address in the "RETURN TO" space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for service(s) requested.

1. Show to whom, date and address of delivery.
 2. Restricted Delivery.

3. Article Addressed to:
 William R. Malenius
 Peck Power Partners
 23293 5 Pointe Dr
 Laguna Hills, CA 92653

4. Type of Service:	Article Number
<input type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Express Mail	<input type="checkbox"/> Insured <input type="checkbox"/> COD P062921927

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature - Addressee
 X

6. Signature - Agent
 X *W. Malenius*

7. Date of Delivery
 12-1-92

8. Addressee's Address (ONLY if requested and fee paid)

P 062 921 927



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sender	
<i>William Malenius</i>	
<i>Peck Power Partners</i>	
D.O. City and ZIP Code	
<i>Laguna Hills, CA</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, to, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	<i>11-24-92</i>
<i>AC 53-211670</i>	
<i>PSD-F1-187</i>	

PS Form 3800, June 1991