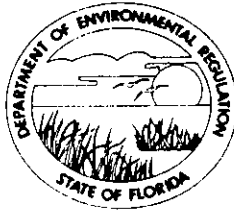


STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

AC 49-74856

April 3, 1984

CERTIFIED MAIL-RETURN RECEIPT REQUESTED


Mr. James C. Welsh
Utilities Director
Kissimmee Utilities
Post Office Box 1608
Kissimmee, Florida 32741

Dear Mr. Welsh:

Enclosed is Permit Number AC 49-74856, dated March 30, 1984 to Kissimmee Utilities issued pursuant to Section 403, Florida Statutes.

Acceptance of this permit constitutes notice and agreement that the department will periodically review this permit for compliance, including site inspections where applicable, and may initiate enforcement actions for violation of the conditions and requirements thereof.

Sincerely,

for 
C. H. Fancy, P.E.
Deputy Bureau Chief
Bureau of Air Quality
Management

CHF/pa

Enclosure

cc: David A. Buff, P.E., Environmental Science and
Engineering
Charles Collins, DER St. Johns River District

Final Determination

Kissimmee Utilities
Osceola County

49.9 MW Combined Cycle Gas Turbine
Permit Number AC 49-74856

Florida Department of Environmental Regulation
Bureau of Air Quality Management
Central Air Permitting

March 28, 1984

Kissimmee Utilities
Construction Permit
AC 49-74856

Kissimmee Utilities' application for permit to construct a 49.9 MW Combined Cycle Gas Turbine has been reviewed by the Bureau of Air Quality Management. Public notice of the Department's Intent to Issue the construction permit was published in the Osceola Little Sentinel and Orlando Sentinel on Sunday, January 15, 1984. Copies of the preliminary determination have been available for public inspection at the Department's St. Johns River District Office in Orlando, Kissimmee Public Library and the Bureau of Air Quality Management in Tallahassee.

The only comments received were from Mr. James C. Welsh, Electric Utilities Director for the City of Kissimmee. Mr. Welsh requested that specific conditions No. 2, 5, 6, 7 be modified and that the expiration date of the construction permit be changed to August 1, 1984.

The Department considered the comments and reply as follows:

COMMENT:

Specific Condition 2

Table 2 of the Preliminary Determination, which lists the allowable emission limits for each pollutant, contains an inconsistency, which also occurs throughout the Preliminary Determination and the draft construction permit. Table 2 specifies the allowable emissions of SO₂ from the gas turbine to be "0.5 percent S by weight and 388 lb/hr". For the boiler, the limits are "0.5 percent S by weight".

The table should read "0.8 percent S weight and 388 lb/hr" for the gas turbine, and "0.8 percent S by weight" for the boiler. The application submitted by Kissimmee Utilities was based upon 0.8 percent S which results in the 388 lb SO₂/hr figure for the gas turbine. All air quality analysis results presented in the application and in the preliminary determination are based upon the 0.8 percent S fuel. This inconsistency is also reflected on page 11 of the Preliminary Determination.

The 0.8 percent S fuel is equivalent to the NSPS for gas turbines. The high efficiency of this combined cycle operation, and the resulting minimal environmental impacts, does not justify the lowering of the fuel sulfur content to 0.5 percent. In addition, economic penalties (i.e. fuel costs) would be associated with such a requirement. At a very conservative price differential between 0.5 and 0.8 percent S fuel of \$1/bbl,

additional fuel costs to Kissimmee Utilities could be as great as \$683,280 per year (78 bbls/hr x 8760 hr/yr x \$1/bbl).

RESPONSE:

The applicant has indicated that natural gas will be the primary fuel and No. 2 distillate oil as the secondary fuel.

Fuel oil grade No. 2 as described in the ASTM specification D 396 indicates the sulfur content to be 0.5% maximum by weight. Oil analyses of the No. 2 oil received by the bureau from locations throughout the State indicates an average sulfur content of 0.3 percent by weight. The sulfur content limit of 0.5 percent for the No.2 oil to be fired is not unreasonable. The hourly rate of SO₂ emissions will be changed to 255 lb/hr to be consistent with fuel sulfur content requirement.

The department does not understand the reason for the economic penalty. In a letter dated October 31, 1983, the applicant indicates that there will be no blending of fuel oils and the fuel oil would be received directly from the pipeline. Why would the applicant receiving No. 2 oil from the pipeline be charged more than other users of No. 2 fuel oil receiving from the pipeline? Secondly, why would the penalty be calculated for 8760 hours when the primary fuel is natural gas? These questions need to be answered before the department can reply.

COMMENT:

Specific Condition No. 5

It is requested that the NO_x emission limits for both oil and gas not be fixed concentration levels, as they are now specified in the draft permit. This NSPS formula is considered to be more appropriate, due to the fluctuations in turbine efficiency and fuel-bound nitrogen content encountered under actual operating conditions. Therefore, the only limit specified for NO_x should be the NSPS formula.

RESPONSE:

The NSPS formula for gas turbines $[0.0075 (14/Y) + F]$ defines Y as the manufacturer's rated heat rate at peak load (KJ/Watt-hr). The value of Y shall not exceed 14.4 KJ/Watt-hr which is the heat rate of a gas turbine operating at 25 percent efficiency.

The applicant proposed a Y value of 13.66 KJ/Watt-hr based on the manufacturer's rated heat rate. This value was considered when evaluating BACT.

The BACT emission limit of 79 ppmv NO_x, when burning natural gas, allows approximately a 5.36% increase, due to the efficiency

adjustment factor, over the selected numerical limit of 75 ppmv NOx corrected to 15 percent oxygen.

The linear efficiency adjustment factor was selected to permit increased NOx emissions from high efficiency gas turbines. The overall efficiency of the gas turbine combined with the boiler will yield to a Y value of 9.34 KJ/Watt-hr. When this value is substituted into the NSPS formula, an increase of approximately 54%, over the selected 75 ppmv, will be obtained. This is not the intent of the NSPS.

It should be noted that to be consistent with the intent of the standard, the efficiency factor must be based on the gas turbine efficiency itself (as defined in 40 CFR 60.331), not the overall efficiency of a gas turbine combined with other equipment (FR, Vol 44, No. 176, 9/10/79).

Gaseous and premium distillate fuels contain little or no "fuel-bound" or "organic" nitrogen. Heavy residual fuel oil and crude oils can contain high levels of fuel-bound nitrogen. A limited fuel-bound allowance above the numerical NOx limit (up to 50 ppm NOx) was chosen by EPA as an alternative to allow combustion of high nitrogen fuels (heavy oil, shale oil, coal derived fuels). The BACT emission limit of 129 ppm was based on the maximum NOx allowance of 50 ppm when burning fuel oil No. 2. No credit was given for the fuel-bound nitrogen when burning natural gas. Therefore, the BACT-NOx emission limits will remain as specified in the draft permit. (Please see EPA's letter dated April 28, 1983).

COMMENT:

Specific Condition No. 6

The draft permit conditions do not specify which fuel (i.e. gas or oil) to test on. Kissimmee Utilities proposed to test on oil only since this represents the worst case for NOx, CO, and particulate matter emissions from the gas turbine. Gas firing produces essentially no particulate matter emissions. Because of the configuration of the turbine, boiler and stack, it is simplest to conduct the performance tests at the main stack outlet of the boiler. Since only the gas turbine is required to be tested, no supplementary firing of fuel in the combined cycle boiler will occur during the performance tests. Thus, only gas turbine emissions will be tested, although the sample location will be downstream of the boiler.

RESPONSE:

Performance tests will be done firing natural gas which is the primary fuel.

EPA Appendix A, Test method 20, Section 6.1. reads, "for supplementary fired, combined-cycle plants, the sampling site shall be located between the gas turbine and the boiler." The department does not plan to change this requirement.

COMMENT:

Specific Condition No. 7

A continuous monitoring system to measure the amount of water injected into the turbine is not currently installed at Kissimmee Utilities. However, a water meter and integrator is installed, and the meter reading will be recorded hourly by plant personnel for purposed of complying with this condition.

RESPONSE:

NSPS subsection 60.334(a) requires the installation and operation of a continuous monitoring system to monitor and record the fuel consumption and the ratio of water to fuel being fired in the turbine. The applicant has the water and fuel consumption meters which will provide the data for the ratio calculation, but not automatically. The applicant proposes to have this data recorded on an hourly basis by plant personnel.

The department believes, that in this case, the use of hourly data may satisfy the intent of the NSPS monitoring requirement. If not, the system will have to be modified. Specific condition No. 7 will not be changed.

COMMENT:

Specific Condition No. 13

We request that the expiration date of this construction permit not be sooner than August 1, 1984. This will allow us sufficient time for performance testing and submittal of an operating permit application 90 days prior to expiration of the construction permit.

RESPONSE:

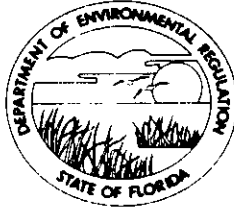
The expiration date of this permit, AC 49-74856, will be changed to August 1, 1984.

CONCLUSION

The final action by the Department shall be to issue the permit with the changes noted above.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

PERMITTEE:

Kissimmee Utilities
P. O. Box 1608
Kissimmee, Florida
32741

Permit Number: AC 49-74856
Date of Issue:
Expiration Date: August 1, 1984
County: Osceola
Latitude/Longitude: 28° 17' 20" N.
81° 24' 20" W
Project: 49.9 MW Combined Cycle Gas
Turbine

This permit is issued under the provisions of Chapter 403, Florida Statutes, Florida Administrative Code Rules 17-2 and 17-4, and 40 CFR 52.21. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), 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 49.9 MW combined cycle combustion gas turbine to be located at Kissimmee Utilities Power plant on 112 Ruby Street, City of Kissimmee, Osceola County, Florida. The UTM coordinates of the proposed plant are 460.1 Km East and 3129.3 Km North.

Construction shall be in accordance with the attached permit application, plans, documents and drawings except as otherwise noted on page 5 through 9, Specific Conditions.

Attachments are as follows:

1. Application to Construct Air Pollution Sources, DER Form 17-1.122(16) received on September 9, 1983.
2. Clair Fancy's letter of October 6, 1983.
3. Response to Clair Fancy's letter received on November 7, 1983.

PERMITTEE: Kissimmee Utilities I. D. Number:
Permit Number: AC 49-74856
Date of Issue:
Expiration Date: August 1, 1984

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

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. Nor 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 does not constitute 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, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, 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.

PERMITTEE: Kissimmee Utilities

I. D. Number:

Permit Number: AC 49-74856

Date of Issue:

Expiration Date: August 1, 1984

GENERAL CONDITIONS:

6. The permittee shall at all times 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.

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, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

- a. Having access to and copying any records that must be kept under the conditions of the permit;
- b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sampling or monitoring 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 notify and provide the department with the following information:

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

PERMITTEE: Kissimmee Utilities I. D. Number:
Permit Number: AC 49-74856
Date of Issue:
Expiration Date: August 1, 1984

GENERAL CONDITIONS:

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 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 arising under the Florida Statutes or department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

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 17-4.12 and 17-30.30, 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 is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

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.

14. The permittee shall comply with the following monitoring and record keeping requirements:

- a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

PERMITTEE: Kissimmee Utilities I. D. Number:
Permit Number: AC 49-74856
Date of Issue:
Expiration Date: August 1, 1984

GENERAL CONDITIONS:

- b. The permittee shall retain 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), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be 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;
 - the person responsible for performing the sampling or measurements;
 - the date(s) 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 submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. The new source shall be constructed in accordance with the capacities and specifications stated in the application.
2. The maximum emission rates for the 49.9 MW combined cycle gas turbine shall not exceed the emission limits listed in the following table:

PERMITTEE: Kissimmee Utilities I. D. Number:
 Permit Number: AC 49-74856
 Date of Issue:
 Expiration Date: August 1, 1984

SPECIFIC CONDITIONS:

ALLOWABLE EMISSION LIMITS
 49.9 MW Combined Cycle Combustion Turbine

Pollutant	Standard	Gas Turbine (a)	Boiler	Basis
NO _x (a)	0.0075 $\frac{(14.4)}{Y} + F$	79 PPM (gas) and 129 (oil) at 15 percent oxygen on a dry basis		NSPS, BACT
SO ₂	0.8 percent S by weight 0.015 percent by volume at 15 percent oxygen on a dry basis	0.5 percent S by weight and 255 lb/hr	0.5 percent S by weight	NSPS, BACT
PM (b)	20% opacity	20% opacity or 22 lb/hr	20% opacity	BACT
VOC	--	19 lb/hr		BACT
CO	--	80 lb/hr		BACT
Mercury (Hg)	--	0.0004 lb/hr		Estimated by Applicant
Beryllium (Be)	--	0.00004 lb/hr		EPA 600/57-81-003b

(a) The allowable NO_x emission rate for the gas turbine was determined by the following formula:
 $STD = 0.0075 \frac{(14.4)}{Y} + F$ where:

STD = allowable NO_x emissions (percent by volume at 15 percent oxygen and on a dry basis).
 Y = manufacturer's rated heat rate at manufacturer's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour. The efficiency factor must be based on the gas turbine efficiency itself, not the overall efficiency of the gas turbine combined with other equipment.

NO_x = 79 PPM when burning natural gas
 NO_x = 129 PPM when burning fuel oil No. 2

(b) Visible emissions: Not to exceed 20% opacity; 40% opacity is permitted for not more than two-minutes in any one hour.

F = NO_x emission allowance for fuel-bound nitrogen as follows:
 Fuel-bound nitrogen (Percent by weight) F (NO_x percent by volume)
 N ≤ 0.015 0
 0.015 < N ≤ 0.1 0.04(N)
 0.1 < N ≤ 0.25 0.04 + 0.0067(N - 0.1)
 N > 0.25 0.005

where: N = the nitrogen content of the fuel (percent by weight)
 N > 0.25 is proposed by the applicant

3. The plant shall be allowed to operate continuously (8760 hours per year)

PERMITTEE: Kissimmee Utilities I. D. Number:
Permit Number: AC 49-74856
Date of Issue:
Expiration Date: August 1, 1984

SPECIFIC CONDITIONS:

4. The source shall be allowed to use either natural gas of No. 2 fuel oil.
5. Maximum sulfur (S) content in the oil shall not exceed 0.5 percent S by weight.
6. Before this construction permit expires, the 49.9 MW combined cycle gas turbine will be tested for particulate matter, sulfur dioxide, visible emissions (VE), carbon monoxide and nitrogen oxides. Except as provided under 40 CFR 60.8(b), the performance tests shall be in accordance with the provisions of the following reference methods in Appendix A of 40 CFR 60.
 - a. Method 1. Sample and Velocity Traverses
 - b. Method 2. Volumetric Flow Rate.
 - c. Method 3. Gas Analysis
 - d. Reference Method 5 must be used to determine the initial compliance status of the unit with respect to the PM standard. Thereafter visible emissions may be used unless 10% opacity is exceeded. In that case, compliance must be demonstrated by Method 5. Compliance with the opacity limitation will be determined by reference Method 9.
 - e. Compliance with the sulfur dioxide emission limits will be determined by reference Method 20 or by calculations based on fuel analysis (ASTM D2880-77 and 010720-70) for sulfur content.
 - f. Compliance with carbon monoxide emission limits will be determined by reference Method 10.
 - g. Compliance with volatile organic compound emission limits will be assumed provided the CO allowable emission rate is achieved; specific VOC compliance testing is not required.

PERMITTEE: Kissimmee Utilities

I. D. Number:
Permit Number: AC 49-74856
Date of Issue:
Expiration Date: August 1, 1984

- h. Compliance with the allowable emission limits for nitrogen oxides shall be conducted using EPA reference Method 20 Subpart GG Section 60.335. The sampling site shall be located between the gas turbine and the boiler.

During performance tests to determine compliance with the proposed standard, measured NO_x emission at 15 percent oxygen will be adjusted to ISO ambient atmospheric conditions by the following correction factor:

$$\text{NO}_x = (\text{NO}_{x_{\text{OBS}}}) \left(\frac{P_{\text{ref}}}{P_{\text{OBS}}} \right)^{0.5} e^{19(H_{\text{OBS}} - 0.00633)} \left(\frac{288^\circ\text{K}}{T_{\text{amb}}} \right)^{1.53}$$

where:

NO_x = Emissions of NO_x at 15 percent oxygen and ISO standard ambient conditions.

$\text{NO}_{x_{\text{OBS}}}$ = Measured NO_x emission at 15 percent oxygen, ppmv.

P_{ref} = Reference combustor inlet absolute pressure at 101.3 kilopascals (1 atmosphere) ambient pressure.

P_{obs} = Measured combustor inlet absolute pressure at test ambient pressure.

H_{obs} = Specific humidity of ambient air at test.

e = Transcendental constant (2.718).

T_{AMB} = Temperature of ambient air at test.

Test results will be the average of 3 valid runs. The Department will be notified 30 days in advance of the compliance test. The test will be conducted at permitted capacity $\pm 10\%$.

7. A continuous monitoring system shall be installed to monitor and record the fuel consumption and the ratio of water to fuel being fired in the turbine.
8. Sulfur and nitrogen content of the fuel being fired in the gas turbine shall be determined and recorded as specified in the NSPS for Gas Turbines 40 CFR 60, Subpart GG, Section 60.334.

PERMITTEE: Kissimmee Utilities

I. D. Number:

Permit Number: AC 49-74856

Date of Issue:

Expiration Date: August 1, 1984

The records of fuel oil usage will be kept by the company, available for regulatory agency's inspection, for a two year period.

10. The applicant shall comply with all requirements of 40 CFR 60, Subpart GG, Standards of Performance for stationary gas turbines.
11. Reasonable precautions to prevent fugitive particulate emissions during construction such as coating or spraying roads and construction sites used by contractors will be taken by the applicant.
12. The applicant shall report any delays in construction and completion of this unit to the Department's St. Johns River District office.
13. The applicant will demonstrate compliance with the conditions of the construction permit, and submit a complete application for an operating permit to the Department's St. Johns River District office prior to 90 days of the expiration date of the construction permit. The applicant may continue to operate in compliance with all terms of the construction permit until its expiration date or issuance of an operating permit.
14. Upon obtaining an operating permit, the applicant will be required to submit periodic test reports on the actual operation and emissions of the facility. These reports will give the data specified in 40 CFR 60.334.
15. The source shall comply with the provisions and requirements of the attached general conditions.
16. Stack sampling facilities will include the eyebolt and angle described in Chapter 17-2.700, Florida Administrative Code.

Issued this 30 day of March, 1984.

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION


VICTORIA J. TSCHINKEL, Secretary

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) DETERMINATION
Kissimmee Utilities
Osceola County

Kissimmee Utilities, Kissimmee, Florida, plans to increase their existing electric generating capability by an additional 49.9 gross megawatts. The proposed supplementary-fired combined cycle gas turbine system is composed of one 400 million Btu/hr heat input gas turbine (30.9 megawatt gross output) from which the exhaust gases discharge into a waste heat boiler. The steam produced will operate two steam turbines each producing 9.5 megawatt gross output. The boiler has a 41.7 million Btu per hour supplemental heat source to generate additional steam.

The system will fire natural gas with No. 2 oil as stand-by fuel. Hourly fuel consumption at maximum firing will be 0.491 million cubic feet of gas or 78 barrels of oil. The system is scheduled to operate 8,760 hours per year.

BACT Determination Requested by the Applicant:

<u>Pollutant</u>	<u>Emission Limit</u>
NO _x	129 PPM when firing oil
SO ₂	0.8% maximum fuel sulfur content

Date of Receipt of a BACT Application:

September 9, 1983

Date of Publication in the Florida Administrative Weekly:

September 4, 1981

Review Group Members:

Comments were obtained from the New Source Review Section, the Air Modeling Section, and the St. Johns River District Office.

BACT Determination by DER:

Turbine Emissions

Limit

NO _x (gas)	79 PPM (water injection)
NO _x (oil)	129 PPM (water injection)
SO ₂	No. 2 distillate oil with sulfur content not to exceed 0.5 percent or natural gas as fuel

Visible Emissions

Maximum 20% opacity

Boiler Emissions

Limit

SO₂ & Particulates

Natural gas as fuel
or
No. 2 distillate oil with sulfur content not to exceed 0.5 percent

Visible Emissions

Not to exceed 20% opacity.
40% opacity is permitted for not more than two minutes in any one hour.

Turbine NO_x emission limits calculated using the NSPS formula in Subpart GG, subsection 40 CFR 60.332.

$$\text{NO}_x = 0.0075 \frac{(14.4)}{Y} + F$$

Y = Manufacturer's rated heat rate at manufacturers rated load. Applicant indicates this parameter is 13.66 kJ/watt-hr.

F = NO_x emission allowance for fuel-bound nitrogen. Applicant indicates this parameter is 0.005.

Compliance with the turbine NO_x emission limit shall be in accordance with 40 CFR 60, Appendix A; Method 20 as set forth in the NSPS subsection 40 CFR 60.335. The sampling site shall be located between the gas turbine and the boiler.

The excess emission reports required under subsection 40 CFR 60.7(c) are to be sent to the Department of Environmental Regulation, Bureau of Air Quality Management, 2600 Blair Stone Road, Tallahassee, Florida, 32301. The information to be submitted to the department is outlined in Subpart GG, subsection 40 CFR 60.334(c).

Compliance with the opacity limits shall be in accordance with DER Method 9 (Rule 17-2.700(6)(a)9.).

BACT Determination Rationale:

Nitric oxides produced by the combustion of fuel in the gas turbine are formed by the combination of nitrogen and oxygen in the combustion air. NO_x is also formed from the reaction of the nitrogen in the fuel with the oxygen in the combustion air. Formation of the latter NO_x will be minimized by the applicant's use of natural gas or distillate oil as fuel, both of which have low nitrogen content.

NO_x formation is extremely sensitive to flame temperature, therefore injecting water or steam into the gas turbine reaction zone will reduce production of NO_x . The use of the wet control technique to reduce NO_x emissions to or below the NSPS limits is determined to be BACT.

The SO_2 emissions from the gas turbine are strictly a function of the fuel sulfur content. Flue gas desulfurization systems are economically unattractive compared to the cost of low sulfur fuels. The firing of natural gas or No. 2 oil containing a maximum of 0.5% sulfur is determined as BACT for the control of SO_2 emissions.

The reduction of NO_x emissions results in an increase in CO emissions. CO emissions are considered to be a local problem since CO readily reacts to form CO_2 . NO_x emissions, however, are linked to the formation of photochemical oxidants and are subject to long range transport. As a result of this trade-off, no emission limit for CO is specified in this determination.

The proposed stationary gas turbine is subject to the requirements of Subpart GG, New Source Performance Standards (NSPS) and Florida Administrative Code Rule 17-2.660. The Department has been delegated the authority to implement and enforce the NSPS program, therefore, the quarterly excess emission reports required by 40 CFR 60(c) are to be sent to the Department of Environmental Regulation.

The supplemental heat source to the waste heat recovery boiler is 41.7 million Btu per hour. The major air pollutant from this source would be SO_2 when firing No. 2 distillate oil. The emission rate of SO_2 will be 0.5 lb/10⁶ Btu, which is less than the current NSPS standard for fossil-fuel-fired steam generators, therefore, the installation of a FGD system is not justified. The waste heat recovery boiler will not operate when the gas turbine is down.

The monitoring provisions of the NSPS for the gas turbine requires that the sulfur content and nitrogen content of the fuel

fired is determined as set forth in subsection 40 CFR 60.334. The same fuel source will be used to fire the boiler supplemental heaters, therefore, the Department has determined that only an opacity emission limit for the waste heat boiler is necessary to insure compliance.

The applicant indicated that beryllium emissions would be 1.2 pounds per year based upon an emission factor from the guideline publication EPA-450/2-80-074. The beryllium emission factor for distillate oil was based on characterization of fuel samples. A later publication, EPA-600/57-81-003b, presented a summary of uncontrolled emissions in the exhaust gas from a distillate oil-fired boiler. The emission factor for beryllium was 0.00004 Ng/J as compared to the applicants emission factor of .00014 Ng/J. Using the most recent emission factor the annual amount of beryllium emitted would be 0.35 pounds which is less than the significant emission rate of 0.8 pounds per year (Table 500-2).

Details of the Analysis May be Obtained by Contacting:

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended By:

[Signature]
for C. H. Fancy, Deputy Bureau Chief, BAQM

Date:

March 29, 1984

Approved:

March 30, 1984
Victoria J. Tschinkel, Secretary


Date:

[Signature]

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
From: _____	Date: _____	
Reply Optional []	Reply Required []	Info. Only []
Date Due: _____	Date Due: _____	

TO: Victoria J. Tschinkel
FROM: Steve Smallwood 
DATE: March 28, 1984
SUBJ: Approval of Attached Air Construction Permit
and BACT Determination

Attached for your approval and signature is one Air Construction Permit and BACT Determination for which the applicant is Kissimmee Utilities. The construction proposed is a 49.9 MW Combined Cycle Gas Turbine at the applicant's facility in Osceola County, Florida.

The waiver date, after which the permit would be issued by default, is April 2, 1984.

The Bureau recommends your approval and signature.

SS/pa

Attachment

No. 0158261

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO		
Mr. James C. Welsh		
STREET AND NO.		
P.O., STATE AND ZIP CODE		
POSTAGE	\$	
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE	¢
	SPECIAL DELIVERY	¢
	RESTRICTED DELIVERY	¢
	OPTIONAL SERVICES	
	RETURN RECEIPT SERVICE	
	SHOW TO WHOM AND DATE DELIVERED	¢
	SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
	SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
	SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES	\$	
POSTMARK OR DATE		
4/10/84		

PS Form 3800, Apr. 1976

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO

Mr. James C. Welsh

P.O. Box 1508

Kissimmee, FL 32741

CONSULT POSTMASTER FOR FEES

RESTRICTED DELIVERY

RESTRICTED DELIVERY

CONSULT POSTMASTER FOR FEES

Article Addressed to

Mr. James C. Welsh

P.O. Box 1508

Kissimmee, FL 32741

ARTICLE DESCRIPTIONS

REGISTERED NO. CERTIFIED NO. RETURNED NO.

0158261

DATE OF DELIVERY

APR 12 1984

POSTMARK OR DATE

4/10/84

U.S. POSTAGE

MISSISSIPPI

APR 12 1984

U.S. POSTAGE