File Copy

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

September 14, 1987

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Tom Reedy
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, Florida 33406

Dear Mr. Reedy:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permits to construct a cogeneration project located at the United Technology's (Pratt & Whitney) site in Palm Beach County, Florida.

Please submit, in writing, any comments which you wish to have considered concerning the Department's proposed action to Mr. Bill Thomas of the Bureau of Air Quality Management. If you have any questions please contact me at (904) 488-1344.

Sincerely,

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

CHF/bm

Attachments

cc: S. Brooks, SE Dist.
G. Sacco, Palm Beach County Health Dept.
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
K. Kosky, KBN Engineering

State of Florida
Department of Environmental Regulation
Notice of Intent

The Department gives notice of its intent to issue a permit to Power Ventures to construct a cogenerating facility consisting of four 6.3 MW internal combustion engines, located at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC).

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative determination (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within this time period constitutes a waiver of any right such person has to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the proposed agency action. Therefore, persons who may not wish to file a petition may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Rule 28-5.207, Florida Administrative Code, at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009, Apalachee Parkway, Tallahassee, Florida 32301. If no hearing officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

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

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dept. of Environmental Regulation
Southeast District
1900 S. Congress Avenue, Suite A
West Palm Beach, Florida 33406

Palm Beach County Health Department
Division of Environmental Science
and Engineering
901 E. Evernia Street
West Palm Beach, Florida 33402

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

RULES OF THE ADMINISTRATIVE COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

(1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed, typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.

(2) All petitions filed under these rules should contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) All disputed issues of material fact. If there are none, the petition must so indicate;

(d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;

(e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;

(f) A demand for the relief to which the petitioner deems himself entitled; and

(g) Such other information which the petitioner contends is material.

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

DER File Nos. AC 50-133747
50-133748
50-133749
50-133750

Power Ventures
100 Australian Avenue
West Palm Beach, Florida 33406

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue permits (copies attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Power Ventures applied on April 30, 1987, to the Department of Environmental Regulation for permits to construct a cogeneration facility consisting of four 6.3 MW internal combustion engines, located at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC).

The Department has permitting jurisdiction under Chapter 403, Florida Statutes and Florida Administrative Code Rules 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit was needed for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, FAC, you (the applicant) are required to publish at your own expense the enclosed Notice of Proposed Agency Action on permit application. The notice must be published one time only in a section of a major local newspaper of general circulation in the county in which the project is located and within thirty (30) days from receipt of is intent. Proof of publication must be provided to the Department within seven days of publication of the notice. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permits.

The Department will issue the permits with the attached conditions unless petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S. A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. Petitions must comply with the requirement of Florida Administrative Code Rules 17-103.155 and 28-5.201 (copies enclosed) and be filed with (received by) the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant must be filed within fourteen (14) days of receipt of this intent. Petitions filed by other persons must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of this intent, whichever first occurs. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes, concerning the subject permit application. Petitions which are not filed in accordance with the above provisions will be dismissed.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

CHFancy

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

Copies furnished to:

S. Brooks, SE Dist.
G. Sacco, Palm Beach County Health Dept.
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
K. Kosky, KBN Engineering

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on Sept. 15, 1987.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to §120.52(9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Judy Rogers
Clerk

9/15/87
Date

Technical Evaluation
and
Preliminary Determination

Power Ventures
West Palm Beach
Palm Beach County Florida

Four Diesel Engines

Permit Numbers:

AC 50-133747
AC 50-133748
AC 50-133749
AC 50-133750

PSD-FL-120

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

September 14, 1987

I. Application

A. Applicant

Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, Florida 33406

B. Project and Location

The applicant proposes to construct a cogenerating facility consisting of four 6.3 MW internal combustion engines, located at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO) and volatile organic compounds (VOC).

The UTM coordinates of this facility are Zone 17, 569.4 km East and 2975.9 km North.

C. Sources Reviewed

The sources reviewed in this technical evaluation will be the four dual fired, 6.3 MW internal combustion engines.

Power Ventures applied for a construction permit for the proposed project on April 30, 1987. The application was deemed complete on July 17, 1987.

D. Facility Category

This cogeneration facility is classified in accordance with the Standard Industrial Classification (SIC) Code as Major Group 49, Electric, Gas and Sanitary Services; Group No. 493, Combination Electric and Gas, and other Utility Services; Industry No. 4931, Electric and Other Services Combined.

The proposed project will be a major facility as defined by Chapter 17-2 of the Florida Administrative Code (FAC).

II. Project Description

A. Process

The proposed facility will consist of four dual fired internal combustion engines. The fuel will be 95% (heat input) natural gas and 5% (heat input) diesel fuel referred to as dual fuel. The total electrical output is expected to be 6.3 MW each or about 25 MW for all four engines. The flue gases will be passed through waste heat recovery boilers to generate up to 45,000 lbs/hr of steam at 100 psig. Both the electricity and steam generated will probably be supplied to Pratt & Whitney.

The total heat input for each engine, under normal (dual fuel firing) conditions will be 54,558,000 Btu/hr. If the natural gas supply is interrupted, diesel fuel will be fired at a rate of 55,881,000 Btu/hr.

B. Background

Power Ventures is a joint venture of FPL Energy Services and C-E Power Projects. Pratt & Whitney (P&W) will lease out land within its property to Power Ventures to build the proposed cogeneration project. P&W will not be affiliated with the project in any way other than the purchase of energy, which is produced by the project.

III. Rule Applicability

The proposed project will result in emissions of NOx, SO_2, PM, CO and VOCs. It is subject to preconstruction review in accordance with Chapter 403, of the Florida Statutes, and Chapters 17-2 and 17-4 of the Florida Administrative Code (FAC).

The proposed project is located in Palm Beach County, an area designated non-attainment for the pollutant ozone, in accordance with Rule 17-2.410, FAC. The area is designated as attainment for the other criteria pollutants in accordance with Rule 17-2.420, FAC.

The proposed project will be a new major facility and will be subject to both the New Source Review for Nonattainment Areas (Rule 17-2.510, FAC), and Prevention of Significant Deterioration Review (Rule 17-2.500, FAC).

The applicable emissions limiting standards will be determined by the Best Available Control Technology (BACT) for NOx, PM, CO, and SO_2, in accordance with Rule 17-2.630, FAC.

The applicable emission limiting standard for VOCs will be determined by the Lowest Achievable Emission Rate (LAER), in accordance with Rule 17-2.640, FAC.

In accordance with Rule 17-2.700(6), FAC, compliance with the applicable emission limiting standards shall be determined for:

a) PM by EPA Method 5 or another DER approved Method.
b) SO_2 by EPA Method 6 or another DER approved Method.
c) NOx by EPA Method 20 or another DER approved Method.
d) CO by EPA Method 10 or another DER approved Method.

e) VOC by EPA Method 25A or another DER approved Method.
f) VE by EPA Method 9 or another DER approved Method.

IV. Emission Limitations

As determined by the attached BACT/LAER determination, the emission limits for the project will be as follows for each engine:

	lb/hr		tons/yr	
Pollutant	Dual	Diesel	Dual	Diesel
Nitrogen Oxides, NOx	39	39	170	170
Sulfur Dioxide, SO_2	1	18	4	78
Particulates, PM	1	2	4	8
Carbon Monoxide, CO	41	6	177	26
Volatile Organics, VOCs	9	5	37	21

Visible emissions shall not exceed 10% opacity.

V. AIR QUALITY IMPACT ANALYSIS

1. Introduction

The proposed Power Ventures cogeneration facility, located in northwestern Palm Beach County, will emit in PSD-significant amounts five pollutants. These are the criteria pollutants particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC). The VOC emissions are not subject to PSD review however; this pollutant is regulated under the nonattainment area new source review rules (see Section 7).

The air quality impact analysis required by the PSD regulations for the pollutants PM, SO_2, NO_x, and CO includes:

- An analysis of existing air quality;
- A PSD increment analysis (for SO_2 and PM only);
- An Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, and visibility and of growth-related air quality impacts; and
- A "Good Engineering Practice" (GEP) stack height determination.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analysis depend on air quality dispersion modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the Department has reasonable assurance that the proposed sources at the Power Ventures facility, as described in this report and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A discussion of the modeling methodology and required analysis follows.

2. Modeling Methodology

The EPA-approved Industrial Source Complex Short-Term (ISCST) dispersion model was used in the air quality impact analysis. This model determines ground-level concentrations of inert gases or small particles emitted into the atmosphere by point, area, and volume sources. The model incorporates elements for plume rise, transport by the mean wind, Gaussian dispersion, and pollutant removal mechanisms such as deposition and transformation. The ISCST model also allows for the separation of sources, building wake downwash, and various other input and output features. A series of specific model features, recommended by the EPA, are referred to as the regulatory options. These features were used to address the air quality impacts of the proposed facility in both screening and refined analyses.

The initial screening modeling used a radial receptor grid with the center of the grid coinciding with the location of the proposed facility. Radials were spaced at 10° increments from 0° to 230°, the remaining angles being within the Pratt and Whitney boundary and therefore not modeled. The Pratt and Whitney facility, which completely surrounds the Power Ventures site, is enclosed by a fence and is guarded. Therefore, this boundary prohibits access by the public. Receptors were located along each radial from .75 km to 2 km from the proposed facility, at increments ranging from .35 km to .5 km. Additional receptors were located along and within the Pratt and Whitney boundary line as well as .2 km to .4 km further downwind from the boundary line receptors.

After a final list of high, second-highest short-term concentrations was developed, a refined analysis was conducted by predicting concentrations for a refined receptor grid centered on the receptor at which the highest, second-highest concentration from the screening phase was produced. The receptors were located at intervals of .1 km between the distances considered in the screening phase along seven radials and at two degree increments.

Because the proposed facility's impacts are predicted to be above the significance levels for SO_2 and NO_x only, additional modeling including other sources in the area was performed for these two pollutants. Since the other sources considered in this modeling exercise are more than 25 km from the proposed facility, a screening phase considered the interaction of the sources along receptor locations that aligned each of the modeled sources downwind from the proposed facility. Based on these results, a refined analysis was performed based on the periods which produced the highest, second highest 3- and 24-hour SO_2 concentrations and highest annual SO_2 and NO_2 concentrations.

The meteorological data used in the ISCST model consisted of five years (1970 - 1974) of hourly surface data taken at West Palm Beach, Florida. Mixing heights used in the model were based on upper air data from Miami, Florida for the same period.

Emission data (Table 1) are the maximum allowable emissions which are based on the fuel that each source is capable of firing and that produced the higher emission rate. For modeling purposes, the higher emissions from firing dual fuel or diesel fuel were used to assess impacts. As a result, the model parameters and emissions for diesel fuel were used in the NO_x, SO_2 and PM concentration analysis while those parameters for dual fuel were used for the CO concentration analysis. Table 2 lists other major sources used in the dispersion modeling.

3. Analysis of Existing Air Quality

Preconstruction ambient air quality monitoring is required for all pollutants subject to PSD review. In general, one year of quality assured data using an EPA reference, or the equivalent, monitor must be submitted. Sometimes less than one year of data, but no less than four months, may be accepted when departmental approval is given.

An exemption to the monitoring requirement can be obtained if the maximum air quality impact, as determined through air quality modeling, is less than a pollutant-specific "de minimus" concentration. In addition, if current monitoring data already exist and these data are representative of the proposed source area, then at the discretion of the Department these data may be used.

The predicted maximum air quality impacts of the proposed cogeneration facility for those pollutants subject to PSD review are given in Table 3. As shown in the table, the maximum impacts of SO_2 and NO_2 exceed the monitoring "de minimus" levels for these pollutants.

Because of the remoteness of the proposed facility, the applicant submitted SO_2 and NO_2 monitoring data from regional sites located in Palm Beach County. A list of the ambient SO_2 and NO_2 monitors located in Palm Beach County is presented in Table 4. A summary of the ambient SO_2 and NO_2 data recorded at these monitoring sites from 1983 to 1985 is presented in Table 5.

4. PSD Increment Analysis

a. Class II Area

The proposed facility is to be located in a Class II area. This area is also designated as an attainment area for both SO_2 and PM. A PSD increment analysis is therefore required to show compliance with the Class II increments.

The PSD increments represent the amount that new sources in the area may increase ambient ground-level concentrations of SO_2 and PM. At no time, however, can the increased loading of these pollutants cause or contribute to a violation of the ambient air quality standards.

All SO_2 and PM emission increases from sources constructed or modified after the baseline date (December 27, 1977) will consume PSD increment. In addition, all SO_2 and PM emission increases associated with construction or modification of major sources which occurred after January 6, 1975, will consume increment.

Atmospheric dispersion modeling, as previously described, was performed to quantify the amount of PSD increment consumed. PSD increment consuming sources are identified in Table 2. Modeling results indicate that the PM impacts were less than significant and, therefore, no further PSD analysis was performed. The results of this modeling for SO_2 are summerized in Table 6. The results indicate that the concentration increases are within the allowable limits.

b. Class I Area

A Class I area increment analysis is not required because the proposed facility is not located within 100 kilometers of a designated Class I area.

5. Ambient Air Quality Standards Analysis

Given existing air quality in the area of the proposed cogeneration facility, emissions from the new facility are not expected to cause or contribute to a violation of an AAQS.

Of the pollutants subject to review, only the criteria pollutants PM, SO_2, CO and NO_x have an AAQS. Dispersion modeling was performed as detailed in section 2, Modeling Methodology, for the proposed facility. The results, given in Table 7, showed that, with the exception of SO_2 and NO_x, the maximum impacts of these pollutants were less than the significant impact levels defined in Rule 17-2.100 (170), FAC. As such, no modeling of other sources was necessary for PM and CO.

The total impact on ambient air (Table 8) is obtained by adding a "background" concentration to the maximum modeled concentration. This "background" concentration takes into account all sources of a particular pollutant that were not explicitly modeled. For both SO_2 and NO_x, monitoring data from Palm Beach County were used to estimate the "background" concentration. These data should overestimate the actual background SO_2 around the proposed facility, since they include the influence of major sources of SO_2 along the eastern border of the county. In addition, the NO_x background should be overestimated around the proposed site, since the more heavily populated eastern part of the county has a higher density of mobile sources, the major source of NO_x in the area.

6. Additional Impacts Analysis

a. Impacts on Soils and Vegetation

The maximum ground-level concentrations predicted to occur for the criteria pollutants as a result of the proposed project, in conjunction with other sources and a background concentration, will be at or below all applicable AAQS including the national secondary standards developed to protect public welfare-related values. As such, these pollutants are not expected to have a harmful impact on soils and vegetation.

b. Impact on Visibility

Due to the distance between the proposed facility and the nearest Class I area, the Everglades National Park, (greater than 100 km) no visibility impact analysis was performed.

c. Growth-Related Air Quality Impacts

The proposed facility is not expected to significantly change employment, population, housing or commercial/industrial development in the area to the extent that an air quality impact will result.

d. GEP Stack Height Determination

Good Engineering Practice (GEP) stack height means the greater of: (1) 65 meters or (2) the maximum nearby building height plus 1.5 times the building height or width, whichever is less. For the proposed project a stack height of 19.2 meters is proposed. The proposed stack height is well below the GEP limit of 65 meters.

7. Nonattainment Area New Source Review (FAC Rule 17-2.510)

a. Applicability

The nonattainment review procedures require that a new facility emitting 100 tons per year (or more) of the pollutant for which the area is designated nonattainment complete the following preconstruction review requirements.

- ° Meet the Lowest Achievable Emission Rate (LAER) for the affected pollutant;
- ° Demonstrate that all major facilities owned or operated by the applicant are in compliance with all applicable emission limitations;
- ° Obtain necessary emission offsets; and,
- ° Demonstrate a net air quality improvement (not applicable for volatile organic compounds (VOC)).

The proposed Power Ventures cogeneration facility will be located in an area designated as nonattainment for ozone. Since it acts as an ozone precursor, the regulated pollutant for ozone nonattainment areas is the class of reactive hydrocarbons defined as volatile organic compounds. The VOC emissions of the proposed facility are estimated to be 146 tons per year. Therefore, nonattainment review is required.

b. Nonattainment Review

In accordance with the Department-approved LAER determination, the proposed facility satisfies the LAER nonattainment area new source review requirement.

The applicant has no existing facilities under its control in the state of Florida, thus satisfying the second review requirement.

The available new source allowance (NSA) for Palm Beach County is 1,350 tons. The estimated maximum VOC emissions from the proposed cogeneration facility are 146 tons per year. Therefore, a NSA of 146 tons per year is granted to the proposed facility, leaving 1204 tons remaining in the NSA.

VI. CONCLUSION

The emission limits that will be imposed have been determined to be in compliance with all applicable requirements of FAC Rule 17-2. The permitted maximum allowable emission rates should not cause or contribute to any violation of Florida's ambient air quality standards or PSD increments.

The general and specific conditions listed in the proposed construction permit (attached) will assure compliance with all applicable requirements of FAC Rule 17-2.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

PERMITTEE:
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, FL 33406

Permit Number: AC 50-133747
Expiration Date: April 1, 1989
County: Palm Beach
Latitude/Longitude: 26° 54' 17"N
80° 18' 04"W
Project: 6.3 MW Internal Combustion Engine, Unit 1

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 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 cogeneration facility consisting of a 6.3 MW dual fuel fired engine, at Pratt & Whitney site in Palm Beach County. Dual fuel will be 95% natural gas and 5% diesel fuel (heat input basis).

Construction will be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the General and Specific Conditions herein.

Attachments:

1. Power Venture's application package dated April 17, 1987.
2. DER's letter of incompleteness dated May 28, 1987.
3. Power Venture's response dated June 24, 1987.
4. Power Venture's letter of clarification dated July 1, 1987.
5. Power Venture's Additional Growth Analysis dated July 15, 1987.

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.

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:
Power Ventures

Permit Number: AC 50-133747
Expiration Date: April 1, 1989

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.
- (x) Determination of Lowest Achievable Emission Rate (LAER)

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:
Power Ventures

Permit Number: AC 50-133747
Expiration Date: April 1, 1989

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 facility may operate continuously, i.e., 8760 hrs/yr.

2. The maximum allowable emissions shall not exceed the following tabulated quantities:

	lb/hr		tons/yr	
Pollutant	Dual	Diesel	Dual	Diesel
Nitrogen Oxides, NOx	39	39	170	170
Sulfur Dioxide, SO_2	1	18	4	78
Particulates, PM	1	2	4	8
Carbon Monoxide, CO	41	6	177	26
Volatile Organics, VOCs	9	5	37	21

Visible emissions shall not exceed 10% opacity.

SPECIFIC CONDITIONS:

3. The engine shall fire an approximately 95% natural gas, 5% diesel fuel (heat input basis) fuel mixture. Only during periods of curtailed natural gas supply shall 100% diesel fuel be fired. Maximum heat input shall not exceed 56 MMBtu/hr.

4. Initial and annual compliance tests will be conducted as follows:

a) EPA Method 5 for PM
b) EPA Method 6 for SO_2
c) EPA Method 20 for NOx
d) EPA Method 10 for CO
e) EPA Method 25A for VOC
f) EPA Method 9 for VE

Other DER Approved Methods may be used in place of the above tests, only after prior approval from the Department.

5. DER's district office shall be notified in writing 15 days prior to source testing. Written reports of the tests shall be submitted to the district office with 45 days of test completion.

The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit, (Rule 17-2, FAC).

To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, along with compliance test results and Certificate of Completion, to the Department's District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate. (Rules 17-2 and 17-4, FAC).

If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application. (Rule 17-4, FAC)

PERMITTEE:
Power Ventures

Permit Number: AC 50-133747
Expiration Date: April 1, 1989

SPECIFIC CONDITIONS:

6. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's District office.

7. The Department shall be notified of the final choice of engines to be purchased for the project. At that time the permittee shall submit literature providing reasonable assurance that the engines will perform in compliance with permit limitations.

Issued this_____day of_____, 19___

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

____
Dale Twachtmann, Secretary

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

PERMITTEE:
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, FL 33406

Permit Number: AC 50-133748
Expiration Date: April 1, 1989
County: Palm Beach
Latitude/Longitude: 26° 54' 17"N
80° 18' 04"W
Project: 6.3 MW Internal Combustion Engine, Unit 2

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 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 cogeneration facility consisting of a 6.3 MW dual fuel fired engine, at Pratt & Whitney site in Palm Beach County. Dual fuel will be 95% natural gas and 5% diesel fuel (heat input basis).

Construction will be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the General and Specific Conditions herein.

Attachments:

1. Power Venture's application package dated April 17, 1987.
2. DER's letter of incompleteness dated May 28, 1987.
3. Power Venture's response dated June 24, 1987.
4. Power Venture's letter of clarification dated July 1, 1987.
5. Power Venture's Additional Growth Analysis dated July 15, 1987.

PERMITTEE:
Power Ventures

Permit Number: AC 50-133748
Expiration Date: April 1, 1989

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.

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.

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.
- (x) Determination of Lowest Achievable Emission Rate (LAER)

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:
Power Ventures

Permit Number: AC 50-133748
Expiration Date: April 1, 1989

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 facility may operate continuously, i.e., 8760 hrs/yr.

2. The maximum allowable emissions shall not exceed the following tabulated quantities:

	lb/hr		tons/yr	
Pollutant	Dual	Diesel	Dual	Diesel
Nitrogen Oxides, NOx	39	39	170	170
Sulfur Dioxide, SO_2	1	18	4	78
Particulates, PM	1	2	4	8
Carbon Monoxide, CO	41	6	177	26
Volatile Organics, VOCs	9	5	37	21

Visible emissions shall not exceed 10% opacity.

PERMITTEE:
Power Ventures

Permit Number: AC 50-133748
Expiration Date: April 1, 1989

SPECIFIC CONDITIONS:

3. The engine shall fire an approximately 95% natural gas, 5% diesel fuel (heat input basis) fuel mixture. Only during periods of curtailed natural gas supply shall 100% diesel fuel be fired. Maximum heat input shall not exceed 56 MMBtu/hr.

4. Initial and annual compliance tests will be conducted as follows:

a) EPA Method 5 for PM
b) EPA Method 6 for SO_2
c) EPA Method 20 for NOx
d) EPA Method 10 for CO
e) EPA Method 25A for VOC
f) EPA Method 9 for VE

Other DER Approved Methods may be used in place of the above tests, only after prior approval from the Department.

5. DER's district office shall be notified in writing 15 days prior to source testing. Written reports of the tests shall be submitted to the district office with 45 days of test completion.

The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit, (Rule 17-2, FAC).

To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, along with compliance test results and Certificate of Completion, to the Department's District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate. (Rules 17-2 and 17-4, FAC).

If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application. (Rule 17-4, FAC)

SPECIFIC CONDITIONS:

6. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's District office.

7. The Department shall be notified of the final choice of engines to be purchased for the project. At that time the permittee shall submit literature providing reasonable assurance that the engines will perform in compliance with permit limitations.

Issued this_____day of_____, 19___

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

____

Dale Twachtmann, Secretary

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

PERMITTEE:
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, FL 33406

Permit Number: AC 50-133749
Expiration Date: April 1, 1989
County: Palm Beach
Latitude/Longitude: 26° 54' 17"N
80° 18' 04"W
Project: 6.3 MW Internal Combustion Engine, Unit 3

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 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 cogeneration facility consisting of a 6.3 MW dual fuel fired engine, at Pratt & Whitney site in Palm Beach County. Dual fuel will be 95% natural gas and 5% diesel fuel (heat input basis).

Construction will be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the General and Specific Conditions herein.

Attachments:

1. Power Venture's application package dated April 17, 1987.
2. DER's letter of incompleteness dated May 28, 1987.
3. Power Venture's response dated June 24, 1987.
4. Power Venture's letter of clarification dated July 1, 1987.
5. Power Venture's Additional Growth Analysis dated July 15, 1987.

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.

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.

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.
(x) Determination of Lowest Achievable Emission Rate (LAER)

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:
Power Ventures

Permit Number: AC 50-133749
Expiration Date: April 1, 1989

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 facility may operate continuously, i.e., 8760 hrs/yr.

2. The maximum allowable emissions shall not exceed the following tabulated quantities:

	lb/hr		tons/yr	
Pollutant	Dual	Diesel	Dual	Diesel
Nitrogen Oxides, NOx	39	39	170	170
Sulfur Dioxide, SO_2	1	18	4	78
Particulates, PM	1	2	4	8
Carbon Monoxide, CO	41	6	177	26
Volatile Organics, VOCs	9	5	37	21

Visible emissions shall not exceed 10% opacity.

PERMITTEE:
Power Ventures

Permit Number: AC 50-133749
Expiration Date: April 1, 1989

SPECIFIC CONDITIONS:

3. The engine shall fire an approximately 95% natural gas, 5% diesel fuel (heat input basis) fuel mixture. Only during periods of curtailed natural gas supply shall 100% diesel fuel be fired. Maximum heat input shall not exceed 56 MMBtu/hr.

4. Initial and annual compliance tests will be conducted as follows:

a) EPA Method 5 for PM
b) EPA Method 6 for SO_2
c) EPA Method 20 for NOx
d) EPA Method 10 for CO
e) EPA Method 25A for VOC
f) EPA Method 9 for VE

Other DER Approved Methods may be used in place of the above tests, only after prior approval from the Department.

5. DER's district office shall be notified in writing 15 days prior to source testing. Written reports of the tests shall be submitted to the district office with 45 days of test completion.

The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit, (Rule 17-2, FAC).

To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, along with compliance test results and Certificate of Completion, to the Department's District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate. (Rules 17-2 and 17-4, FAC).

If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application. (Rule 17-4, FAC)

PERMITTEE:
Power Ventures

Permit Number: AC 50-133749
Expiration Date: April 1, 1989

SPECIFIC CONDITIONS:

6. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's District office.

7. The Department shall be notified of the final choice of engines to be purchased for the project. At that time the permittee shall submit literature providing reasonable assurance that the engines will perform in compliance with permit limitations.

Issued this _____ day of _____, 19___

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

____

Dale Twachtmann, Secretary

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

PERMITTEE:
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, FL 33406

Permit Number: AC 50-133750
Expiration Date: April 1, 1989
County: Palm Beach
Latitude/Longitude: 26° 54' 17"N
80° 18' 04"W
Project: 6.3 MW Internal Combustion Engine, Unit 4

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 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 cogeneration facility consisting of a 6.3 MW dual fuel fired engine, at Pratt & Whitney site in Palm Beach County. Dual fuel will be 95% natural gas and 5% diesel fuel (heat input basis).

Construction will be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the General and Specific Conditions herein.

Attachments:

1. Power Venture's application package dated April 17, 1987.
2. DER's letter of incompleteness dated May 28, 1987.
3. Power Venture's response dated June 24, 1987.
4. Power Venture's letter of clarification dated July 1, 1987.
5. Power Venture's Additional Growth Analysis dated July 15, 1987.

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.

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.

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.
- (x) Determination of Lowest Achievable Emission Rate (LAER)

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:
Power Ventures

Permit Number: AC 50-133750
Expiration Date: April 1, 1989

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 facility may operate continuously, i.e., 8760 hrs/yr.

2. The maximum allowable emissions shall not exceed the following tabulated quantities:

	lb/hr		tons/yr	
Pollutant	Dual	Diesel	Dual	Diesel
Nitrogen Oxides, NOx	39	39	170	170
Sulfur Dioxide, SO_2	1	18	4	78
Particulates, PM	1	2	4	8
Carbon Monoxide, CO	41	6	177	26
Volatile Organics, VOCs	9	5	37	21

Visible emissions shall not exceed 10% opacity.

SPECIFIC CONDITIONS:

3. The engine shall fire an approximately 95% natural gas, 5% diesel fuel (heat input basis) fuel mixture. Only during periods of curtailed natural gas supply shall 100% diesel fuel be fired. Maximum heat input shall not exceed 56 MMBtu/hr.

4. Initial and annual compliance tests will be conducted as follows:

a) EPA Method 5 for PM
b) EPA Method 6 for SO_2
c) EPA Method 20 for NOx
d) EPA Method 10 for CO
e) EPA Method 25A for VOC
f) EPA Method 9 for VE

Other DER Approved Methods may be used in place of the above tests, only after prior approval from the Department.

5. DER's district office shall be notified in writing 15 days prior to source testing. Written reports of the tests shall be submitted to the district office with 45 days of test completion.

The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and submit a new schedule and request for an extension of the construction permit, (Rule 17-2, FAC).

To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, along with compliance test results and Certificate of Completion, to the Department's District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate. (Rules 17-2 and 17-4, FAC).

If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application. (Rule 17-4, FAC)

PERMITTEE:
Power Ventures

Permit Number: AC 50-133750
Expiration Date: April 1, 1989

SPECIFIC CONDITIONS:

6. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's District office.

7. The Department shall be notified of the final choice of engines to be purchased for the project. At that time the permittee shall submit literature providing reasonable assurance that the engines will perform in compliance with permit limitations.

Issued this_____day of_____, 19___

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

____
Dale Twachtmann, Secretary

Best Available Control Technology (BACT)/Lowest Achievable
Emission Rate (LAER) Determination
Power Ventures
Palm Beach County

The applicant proposes to install a cogeneration facility at the United Technologies Pratt & Whitney site in Palm Beach County, Florida. The cogeneration facility will consist of four nominal 8,800 brake horsepower engines with an electric generation capability of 6,300 kw each. The primary fuel will be a combination of natural gas (95% of heat input) and diesel fuel (5% of heat input) which is referred to as dual fuel. The total heat input for each engine under dual fuel firing is 54,558,000 Btu/hr. If natural gas is interrupted, diesel fuel will be used. Under diesel operation, the engines will be fired at a rate of 55,881,000 Btu/hr.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the four engines based on a 92% annual availability factor to be as follows:

Pollutant	Maximum Potential Emissions (tons/year) Dual Fuel	Diesel Fuel	PSD Significant Emission Rate (tons/year)
NOx	1,879	3,806	40
SO_2	14.4	284	40
PM	11.8	27.2	25
CO	648	93.9	100
VOC	135	76.2	40
As	2.24×10^{-4}	4.5×10^{-3}	0
Pb	2.71×10^{-3}	0.052	0.6
Be	3.06×10^{-6}	6.0×10^{-5}	0.0004
Hg	0.010	2.74×10^{-4}	0.1

Rule 17-2.500(2)(f)(3) requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table. The facility is located in an area classified as attainment for all air pollutants, except ozone. The emission limits for the air pollutant ozone (VOC's are the controlling pollutant) are determined through the application and employment of Lowest Achievable Emission Rate (LAER), Rule 17-2.640, if the emissions exceed 100 tons per year.

BACT/LAER Determination Requested by the Applicant

The BACT/LAER Determinations requested by the applicant on a pollutant by pollutant basis are given below:

Pollutant	Determination
NOx	6.0 g/hp-hr (dual fuel) 12.1 g/hp-hr (diesel)
SO_2	Low sulfur fuel (natural gas, sulfur content of diesel will be limited to 0.3%)
PM	Application of good combustion techniques
CO	Application of good combustion techniques

Date of Receipt of a BACT/LAER Application

June 25, 1987

Review Group Members

This determination was based upon comments received from the applicant and the Stationary Source Control Section.

BACT/LAER Determination Procedure:

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination will be 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.

In making the LAER determination, the Department shall give consideration to and make a determination that reflects:

(a) Any information published by the U.S. Environmental Protection Agency pursuant to Section 108 of the 1977 Clean Air Act as required by Section 178 of that Act concerning determinations of LAER.

(b) The most stringent emissions limitation which is contained in the implementation of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or the most stringent emission limitation which is acheived in practice by such class or category of source, whichever is more stringent.

(c) All scientific, engineering, technical material, or other relevant information available to the Department.

BACT/LAER Determined by DER:

Pollutant	Emission Limit
NOx	2.0 g/hp-hr
SO_2	0.02 lb/10^6 Btu (dual-fuel firing) 0.32 lb/10^6 Btu (diesel firing)
PM	0.013 lb/10^6 Btu (dual fuel firing) 0.03 lb/10^6 Btu (diesel firing)
CO	Good combustion techniques
VOC	0.43 g/hp-hr (dual fuel) 0.24 g/hp-hr (diesel)

BACT/LAER Determination Rationale

The DER's BACT/LAER determination is essentially equivalent to that proposed by the applicant except for the pollutant nitrogen oxides (NOx). As stated at the beginning of this determination, the facility will be located in an area that is nonattainment for ozone. NOx is known to be a precursor to ozone thus a strategy to minimize the formation of ozone should stress good control of NOx. This emphasis to control NOx is particularly important since the proposed emissions of NOx when using dual fuel will be nearly 14 times greater than the proposed VOC emissions. This strategy of focusing the control on the NOx emissions has been widely used by other permitting authorities in the U.S. when permitting internal combustion engines. This practice serves as an explanation for the applicant's statement that "Application of VOC emission limitations beyond that proposed is currently not contained in any SIP or previous LAER or BACT determination."

Upon reviewing the BACT/LAER determinations completed by other states for large internal combustion engines and communicating with various equipment manufacturers, the Department has established a NOx emission limitation of 2.0 g/hp-hr as being BACT/LAER for NOx and ozone respectively. In accordance with this determination, three alternate control strategies have been identified. These strategies are listed as follows:

1) Catalytic Reduction

2) Clean Burn Engines

3) Dual Fuel Turbines

The applicant has stated that the cost of using ammonia injected catalytic reduction to control NOx emissions from the dual fuel engines is prohibitively high. With regard to determining the cost effectiveness of air pollution control, the EPA has developed costing guidelines to obtain the highest reduction of emissions per dollars invested. This method of maximizing emission reductions per capital invested is a major factor when New Source Performance Standards (NSPS) are developed by the EPA. For NOx emissions EPA has determined that a cost of up to $1,000 per ton of emissions controlled ($0.50/lb) is reasonable for NSPS.

The applicant has stated that a catalytic reduction system can achieve NOx reductions of up to 90% at a cost of $22,000 per cubic foot of catalyst. Using the approximated catalyst requirement of 16 cubic feet per each 8000 horsepower engine and taking into consideration the cost of ammonia for the system, an economic analyses can be done to see if catalytic control is justified. Assuming that the catalyst has a lifetime of 2 years (air pollution control personnel in California reported that the catalyst lifetime for existing large stationary internal combustion engines applications was typically 2-3 years) and using an interest rate of 9.0 percent the annualized cost of the catalyst alone would be approximately $800,400. Assuming a 1 to 1 requirement of ammonia for NOx removal the total annual cost of equipping the engines with catalytic reduction can be computed.

At 90% efficiency the catalytic reduction system would remove approximately 1,691 tons of NOx per year for dual fired operation at 92% availability. Using the applicants ammonia cost of $150.00 per ton, the annual cost supplying ammonia to the catalyst will be $253,650 bringing the total cost to $1,054,050 per year. This corresponds to a cost of approximately $623.00 per ton of NOx control which is well within EPA's guidelines. The annualized cost of installing and operating the catalytic reduction system would also increase the cost of control, but these costs would be minimal and not add appreciably to the overall cost. It should be noted that BACT/LAER should be a level of control which is at least as stringent as NSPS, thus the cost to provide BACT/LAER could be higher than that proposed for NSPS and yet be considered reasonable. For example, the South Coast Air Quality Management District (Los Angles area) in California, which has high ambient levels of nitrogen oxides, has established a BACT cost guideline of $9,000 per ton of NOx controlled.

Another method that could be used to minimize the emissions of NOx and thereby minimize the subsequent formation of ozone would be the use of "clean burn" engines instead of the proposed dual fuel engines. Clean burn engines are designed such that NOx emissions are minimized. According to information supplied by various manufacturers, clean burn engines are guaranteed to limit NOx emissions to levels as low as 1.5 g/hp-hr. The clean burn engine does have the disadvantage of being designed to operate on gaseous fuel only and would not provide the versatility of diesel firing during periods of natural gas curtailment. Since the applicant desires the option of diesel firing during natural gas interruption, the use of dual fuel turbines is suggested as a third option to minimize NOx emissions.

Dual fueled turbines like dual fuel internal combustion engines are capable of firing both gaseous and liquid fuels. These turbines are presently being used in other parts of the country and have been proposed for use in Florida. The dual fueled turbine allows the versatility of diesel firing yet provides the benefit of the NOx emissions being more easily and economically controlled than the NOx emissions from dual fueled internal combustion engines. It is likely that the NOx emissions from a dual fueled turbine could be controlled to levels much less than 2.0 g/hp-hr through the use of inexpensive control techniques such as steam injection.

The Department agrees with the applicant that BACT for SO_2, PM, and CO is represented by low sulfur fuel and the application of good combustion techniques. During the normal mode of operation (dual fuel) the only pollutant other than NOx which exceeds the significant level, thereby requiring BACT, is CO. A review of the BACT/LAER Clearinghouse indicates that BACT for CO in nearly all cases is good combustion techniques. Good combustion is also cited as BACT in many cases for PM. In some instances a limitation for fuel ash content was judged to be BACT for PM. Both natural gas and diesel contain only trace amounts of ash, thereby providing justification that BACT for PM will be achieved.

Environmental Impact Analyses

The impacts analyses for the BACT determination is based on dual fuel operation. The applicant has stated that diesel will be used as the primary fuel only during natural gas curtailment. It is expected that natural gas curtailments would be very rare, lasting no more than one to two weeks.

Assuming the units operate in the dual fuel mode at an annual availability of 92%, the only pollutant requiring a BACT analyses that contributes significantly to ambient impacts is NOx. For this mode of operation, the resulting annual NOx impact at the proposed emission rate is 23.45 ug/m^3. When the background NOx concentration is taken into consideration with the proposed impact from the engines, the resulting impact would be approximately double the present amount. The proposed operation of the internal combustion engines would contribute significantly to the NOx concentrations in the area thereby strengthening the need for good NOx control.

Although the engines are expected to operate essentially all of the time in the dual fuel mode, the firing of the engines with diesel as the primary fuel would serve to increase the impacts of NOx and SO_2. The SO_2 impact would significantly contribute to the SO_2 concentration in the area for diesel operation, however, during the normal firing mode (dual fuel) SO_2 emissions would be minimal. As is the case, the firing of low sulfur content diesel is deemed to be BACT for SO_2 since the use of diesel as the primary fuel should be limited to only a few days each year.

Energy Impact Analyses

Each of the three alternatives identified by the Department should not result in energy impacts which are significant when compared to the applicant's proposal. Two of the alternatives suggest that the proposed internal combustion engines be replaced with energy production equipment which by virtue of design either emits less NOx or can be more readily and economically controlled for NOx emissions. Only one alternative (addition of catalytic reduction system) to the proposed facility would require additional energy for operation. It is important to note that this facility is an energy producer and the energy that would be required to operate a catalytic reduction system would represent a very small fraction of the generator output.

Conclusion

The Department has determined that the installation of four dual fuel internal combustion engines as proposed by the applicant does not satisfy the requirements for BACT/LAER for NOx/VOCs. The facility is locating in an area that is designated as nonattainment for ozone and, as proposed, will be emitting at least 1,879 tons of NOx (precursor to ozone) annually. In addition, the facility will be a major source of VOCs. As is the case, the Department has concluded that BACT/LAER for NOx/VOCs is to limit the NOx emissions to a level of 2.0 g/hp-hr. This emissions level was based on a study that identified three alternatives which would be capable of attaining this limitation and meet the criteria for BACT. Aside from NOx, the department agrees with the applicant that BACT is being applied.

Details of the Analysis May be Obtained by Contacting:

Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Recommended by:

____
C. H. Fancy, P.E.
Deputy Bureau Chief, BAQM

____
Date

Approved by:

____
Dale Twachtmann, Secretary

____
Date

BEST AVAILABLE COPY

Check Sheet

Company Name: Power Ventures

Permit Number: AC 56-133747, -748, -749, -750

PSD Number: PSD FL-120

Permit Engineer:

Cross References:

- ☐
- ☐
- ☐

Application:

- ☑ Initial Application
- ☐ Incompleteness Letters
- ☐ Responses
- ☐ Waiver of Department Action
- ☐ Department Response
- ☐ Other

Intent:

- ☑ Intent to Issue
- ☑ Notice of Intent to Issue
- ☑ Technical Evaluation
- ☑ BACT or LAER Determination
- ☑ Unsigned Permit
- Correspondence with:
  - ☐ EPA
  - ☐ Park Services
  - ☐ Other
- ☑ Proof of Publication
- ☐ Petitions - (Related to extensions, hearings, etc.)
- ☐ Waiver of Department Action
- ☐ Other

Revised

Final Determination:

- ☑ Final Determination
- ☑ Signed Permit
- ☑ BACT or LAER Determination
- ☐ Other

Post Permit Correspondence:

- ☐ Extensions/Amendments/Modifications
- ☐ Other

Revision #5

PS Form 3811, July 1983 447-845

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: Mr. Tom Reedy
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, FL 33406

4. Type of Service:
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail

Article Number
P 274 007 694

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature – Addressee
X Barbara Jones

6. Signature – Agent
X

7. Date of Delivery
9-17-87

8. Addressee's Address (ONLY if requested and fee paid)
100 Australian Ave #304
W.P.B. FL 33407

P 274 007 694

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

★ U.S.G.P.O. 1985-480-794

Sent to Tom Reedy Power Ventures	
Street and No. 100 Australian Ave., Suite 304	
P.O. State and ZIP Code West Palm Beach, FL 33406	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 09/15/87 Permits: AC 50-133747, 50-133748, 50, 133749 & 50-133750. PSD-FL-120	

PS Form 3800, June 1985

BEST AVAILABLE COPY

Power Ventures
Palm Beach County
AC 50-133747, -748, -749.
(750 - w/D) PSD-FL-120

Date Complete: Jan. 21, 1988
TEIPD mailed: Mar. 18, 1988 } 58 days
P/N Rec'd BAQM: Apr. 5, 1988 } 14 day
Apr. 18, 1988 } req. P/N

April 19 → 30, 1988 = 12 days
May 1 → 20, 1988 = 20 days
90 days

May 20, 1988 = Day 90

Mr Wayne Ondler
F. P. L.
JEN / JB
P. O. Box 14000
Juno Beach
FL 33408.

POWER VENTURES

1. Package dated April 17, 1987
2. DER's letter dated, May 28 1987 original in file
3. PV Response dated, June 24, 1987
4. PV Add'l info dated July 1, 1987
~~5.~~
5. ~~Response~~ PV Add'l info dated July 15, 1987

ENG → Tom Reedy
CC → S. Brooks
W. Aronson
M. Flores
W. Ondler
K. Kosky
P. Rawls
G. Sacco

Florida Department of Environmental Regulation

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

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

Mr. Robert Fagan
PW Ventures, Inc.
1000 Prospect Hill Road
Windsor, CT 06095

May 16, 1988

Enclosed are permits Nos. AC 50-133747, 50-133748, 50-133749, for PW Ventures, Inc. to construct a cogenerating facility consisting of three 6.3 MW internal combustion engines. The engines will be fired by dual fuel, 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC). This facility will be located at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. This permit is issued pursuant to Section 403, Florida Statutes.

Any Party to these permits has the right to seek judicial review of the permits 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 these permits are filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

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

Copy furnished to:

S. Brooks, SE Dist.
G. Sacco, PBCHD
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
T. Reedy, PW Ventures
K. Kosky, KBN Engineering

Final Determination

PW Ventures, Inc.
Palm Beach County, Florida

Three Diesel Engines

Permit Numbers:

Unit 1, AC 50-133747
Unit 2, AC 50-133748
Unit 3, AC 50-133749

PSD-FL-120

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

May 9, 1988

Final Determination

PW Ventures' application to construct three diesel engines at the Pratt and Whitney site in Palm Beach County, Florida, was reviewed by the Department. Public Notice of the Department's Intent to Issue the permits was published in The Palm Beach Post on March 31, 1988.

No comments were received in response to the Public Notice and therefore the final action of the Department is to issue the permits as proposed in the Revised Preliminary Determination.

Florida Department of Environmental Regulation

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

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary

PERMITTEE:
PW Ventures, Inc.
1000 Propect Hill Road
Windsor, CT 06095

Permit Number: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989
County: Palm Beach
Latitude/Longitude: 26° 54' 17"N
80° 18' 04"W
Project: 6.3 MW Internal Combustion Engine, Unit 1, 2, and 3

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 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 6.3 MW dual fuel fired engine as part of a three engine cogeneration facility, at Pratt & Whitney site in Palm Beach County. Dual fuel will be 95% natural gas and 5% diesel fuel (heat input basis).

The PSD permit number for this project is PSD-FL-120

Construction will be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the General and Specific Conditions herein.

Attachments:
1. Power Venture's application package dated April 17, 1987.
2. DER's letter of incompleteness dated May 28, 1987.
3. Power Venture's response dated June 24, 1987.
4. Power Venture's letter of clarification dated July 1, 1987.
5. Power Venture's Additional Growth Analysis dated July 15, 1987.
6. Peter Cunningham's letter dated September 29, 1987.
7. Power Venture's package received October 28, 1987.
8. Peter Cunningham's letter dated October 30, 1987.
9. KBN's letter received December 15, 1987.
10. Peter Cunningham's letter dated December 28, 1987.
11. KBN's letter received January 21, 1988.
12. Combustion Engineering's letter received January 29, 1988.
13. Peter Cunningham's letter dated January 27, 1988.
14. Revised Technical Evaluation and Preliminary Determination dated March 18, 1988.

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:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

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.

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)
( ) 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.

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 source may operate continuously, i.e., 8760 hrs/year. (The engine is projected to have an availability factor of 92%).

2. The maximum allowable emissions shall not exceed the following tabulated quantities for each engine:

PERMITTEE:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

SPECIFIC CONDITIONS:

Pollutant	lb/hr Dual	lb/hr Diesel	tons/yr Dual	tons/yr Diesel
Nitrogen Oxides, NOx	97	233	391	939
Sulfur Dioxide, SO_2	2	18	5	73
Particulates, PM	1	2	3	7
Carbon Monoxide, CO	40	6	162	24
Volatile Organics, VOCs	8	5	33	19

Visible emissions shall not exceed 10% opacity.

The above limits are based on the BACT determination as follows:

Pollutant	Emission Limit Basis Dual Fuel	Emission Limit Basis Diesel
NOx	5 g/hp-hr	12 g/hp-hr
SO_2	0.02 lb/MMBtu	0.32 lb/MMBtu
VOC	0.43 g/hp-hr	0.24 g/hp-hr
CO	good combustion	

3. The engine shall fire an approximately 95% natural gas, 5% diesel fuel (heat input basis) fuel mixture. Only during periods of curtailed natural gas supply shall 100% diesel fuel be fired. Maximum heat input shall not exceed 56 MMBtu/hr per engine.

4. Initial and annual compliance tests will be conducted as follows:

a) EPA Method 5 for PM
b) EPA Method 6 for SO_2
c) EPA Method 20 for NOx
d) EPA Method 10 for CO
e) EPA Method 25/25A for VOC
f) EPA Method 9 for VE

Other DER Approved Methods may be used in place of the above tests, only after prior approval from the Department.

5. Upon review of initial compliance test results, DER may require monitoring of VOC emissions to ensure that annual emissions are less than 100 tons, or restrict operating hours or restrict fuel usage.

6. DER's Southeast district office shall be notified in writing 15 days prior to source testing. Written reports of the tests shall be submitted to the district office within 45 days of test completion.

PERMITTEE:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

SPECIFIC CONDITIONS:

The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and the permittee shall submit a new schedule and request for an extension of the construction permit, (Rule 17-2, FAC).

To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, along with compliance test results and Certificate of Completion, to the Department's Southeast district office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate, (Rules 17-2 and 17-4, FAC).

If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application, (Rule 17-4, FAC).

7. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to the Southeast district office.

8. The Department shall be notified of the final choice of engines to be purchased for the project. At that time the permittee shall submit literature providing reasonable assurance that the engines will perform in compliance with the permit limitations.

Issued this 12 day of May, 1988

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Dale Twachtmann

Dale Twachtmann, Secretary

Best Available Control Technology (BACT) Determination
PW Ventures
Palm Beach County

The applicant proposes to install a cogeneration facility at the United Technologies Pratt & Whitney site in Palm Beach County, Florida. The cogeneration facility will consist of three nominal 8,800 brake horsepower engines with an electric generation capability of 6,300 kw each. The primary fuel will be a combination of natural gas (95% of heat input) and diesel fuel (5% of heat input) which is referred to as dual fuel. The total heat input per engine under dual fuel firing is 54,558,000 Btu/hr. If natural gas is interrupted, diesel fuel will be used. Under diesel operation, each engine will be fired at a rate of 55,881,000 Btu/hr.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the three engines based on a conservatively high 92% annual availability factor to be as follows:

Pollutant	Maximum Potential Emissions (tons/year) Dual Fuel	Diesel Fuel	PSD Significant Emission Rate (tons/year)
NOx	1,174	2,855	40
SO_2	10.8	213	40
PM	8.9	20.4	25
CO	486	70.4	100
VOC	<100*	57.2	40
As	$1.68x10^{-4}$	$3.38x10^{-3}$	0
Pb	$2.03x10^{-3}$	0.039	0.6
Be	$2.3x10^{-6}$	$4.5x10^{-5}$	0.0004
Hg	$7.5x10^{-3}$	$2.06x10^{-4}$	0.1

*Hours of operation will be limited if necessary to maintain annual VOC emissions below 100 tons.

Rule 17-2.500(2)(f)(3) of the Florida Administrative Code requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table. The facility is located in an area classified as attainment for all air pollutants, except ozone. Since the annual emissions of the air pollutant ozone (VOC's are the controlling pollutant) will be limited to less than 100 tons, the application and employment of Lowest Achievable Emission Rate (LAER), Rule 17-2.640, does not apply.

BACT Determination Requested by the Applicant

The BACT Determinations requested by the applicant on a pollutant by pollutant basis are given below:

Pollutant	Determination
NOx	5.0 g/hp-hr (dual fuel) 12.1 g/hp-hr (diesel)
SO_2	Low sulfur fuel (natural gas, sulfur content of diesel will be limited to 0.3%)
CO	Application of good combustion techniques

Date of Receipt of a BACT Application

June 25, 1987

Review Group Members

This determination was based upon comments received from the applicant and the Stationary Source Control Section.

BACT Determination Procedure:

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination will be 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.

BACT Determined by DER:

Pollutant	Emission Limit
NOx	5.0 g/hp-hr (dual-fuel firing) 12.0 g/hp-hr (diesel firing)
SO_2	0.02 lb/10^6 Btu (dual-fuel firing) 0.32 lb/10^6 Btu (diesel firing)
CO	Good combustion techniques
VOC	0.43 g/hp-hr (dual fuel) 0.24 g/hp-hr (diesel)

BACT Determination Rationale

The DER's BACT determination is essentially equivalent to that proposed by the applicant. Upon reviewing the BACT/LAER determinations completed by other states for large internal combustion engines and communicating with various equipment manufacturers, the Department has accepted a NOx emission limitation of 5.0 g/hp-hr and 12.0 g/hp-hr as being BACT for dual-fuel firing and diesel firing, respectively. In accordance with this determination, five alternate power production/control strategies that would reduce NOx emissions were evaluated.

1) Catalytic Reduction

2) Clean Burn Engines

3) Dual Fuel Turbines

4) Boiler/Steam Turbine

5) Combined Cycle

Catalytic reduction of NOx emissions has been successful for engine exhaust streams at near stoichiometric conditions (i.e., low exhaust O_2 concentrations). Most large stationary internal combustion (IC) engines operate at air-to-fuel ratios that are typically much greater than stoichiometric, (high O_2 concentrations in exhaust), and consequently the use of catalytic reduction has not been as successful. Although catalyst systems are currently under development and have been demonstrated for one very narrow application (i.e., fuel-rich naturally aspirated gas engines), they have not been demonstrated for the broad range of IC engines manufactured. This is particularly true of turbo-charged engines, fuel-lean gas engines, and diesel engines. Upon reviewing the current applications of catalytic reduction, it has been determined that this technology has not progressed to the point that it is feasible for use on the large bore dual fueled engines proposed by the applicant. The applicant has documented this infeasibility through correspondence from several manufacturers of large bore engines. As is the case, the use of catalytic reduction does not warrant further consideration as BACT.

The other four alternatives (clean burn engines, dual fuel turbines, boiler/steam turbine, and the combined cycle) are commonly used methods of producing power which are capable of low NOx emissions, either inherent in the combustion process or by the addition of economical control equipment. To evaluate these alternatives the cost/benefit of reducing NOx has been examined.

With regard to determining the cost effectiveness of air pollution control, the EPA has developed costing guidelines to obtain the highest reduction of emissions per dollars invested. This method of maximizing emission reductions per capital invested is a major factor when New Source Performance Standards (NSPS) are developed by the EPA. For NOx emissions EPA has determined that a cost of up to $1,000 per ton of emissions controlled ($0.50/lb) is reasonable for NSPS.

Clean burn engines are designed such that NOx emissions are minimized. According to information supplied by various manufacturers, clean burn engines are guaranteed to limit NOx emissions to levels as low as 1.5 g/hp-hr. An evaluation of using clean-burn engines to produce the needed power indicates that the cost of producing power with the clean-burn engine which has a smaller bore relative the large dual fuel IC engine would be substantially higher due to the lower electrical conversion efficiency of smaller bore engines.

The applicant has indicated that the engine-generator cost of purchasing and installing the smaller bore clean burn engine would be $210.00 higher per kilowatt generated than the proposed dual-fuel engine. In addition, the cost of fuel for using the less efficient clean burn engine would amount to an additional $525,000 annually. Assuming a capital charge factor (function of depreciation, taxes, and interest) of 0.2 the annualized cost of installing and operating the clean burn engines would amount to an additional $1,325,000. When this cost is taken into consideration with the maximum NOx reduction expected by using the clean burn engines of 732 tons per year, (1.5 g/hp-hr vs. 5.0 g/hp-hr)the cost of control is approximately $1,810 per ton of NOx.

In addition to the higher cost of using the clean burn engines, the applicant has expressed concern about the inability of the engine to operate on diesel fuel. Thus clean burn engines could not operate during periods of natural gas interruption which would not give the applicant the flexibility to operate at all times.

Dual fueled turbines like dual fuel internal combustion engines are capable of firing both gaseous and liquid fuels. These turbines are presently being used in other parts of the country and have been proposed for use in Florida. The dual fueled turbine allows the versatility of diesel firing yet provides the benefit of the NOx emissions being more easily and economically controlled than the NOx emissions from dual fueled internal combustion engines. The NOx emissions from a dual fueled turbine can be controlled to levels much less than the proposed 5.0 g/hp-hr through the use of inexpensive control techniques such as steam injection.

The applicant has stated that the use of dual fuel turbines to generate the power needed is not attractive for several reasons. The primary reason for selecting the dual fuel IC engine over the dual fuel turbined is the lower fuel consumption associated with all loads (See Figure 1). This differential in fuel consumption results in an additional $1,160,000 per year at full load, assuming the installed cost per kilowatt for the turbine and engine is equivalent. The applicant has indicated that the cost varies in accordance to the size of the turbine and that matching the needed power requirement to the rated output would require using at least two smaller units resulting in a relatively higher installed cost.

A review of a dual fueled gas turbines with outputs similar to that proposed by the applicant indicate that the uncontrolled emissions of NOx would be equivalent to approximately 2.7. g/hp-hr. When compared to the proposed NOx level of 5.0 g/hp-hr the use of a dual fueled turbine would result in an annual reduction of approximately 481 tons per year. Comparing this reduction to the additional fuel cost of producing the needed power, results in a cost of approximately $2,412 per ton of NOx controlled. Permitting experience has shown that this cost would decrease as NOx control by water injection was increased due to the substantial emission reductions that can be obtained by using the relatively inexpensive method of control. It is expected, however, that even with the inclusion of water injection the cost would be greater than the $1,000 per ton guideline. In addition to the higher cost of using a dual-fuel turbine, the applicant has stated that the use of the turbine has disadvantages in terms of both the load following capabilities and the electrical/thermal energy output ratio.

For this installation the electrical demand is constantly changing. In accordance with these load changes, the power production unit must have good load following capability. Dual fueled turbines have much poorer load following capabilities than the proposed IC engines. Also with regard to energy output, the proposed IC engines produce a higher percentage of electrical output than gas turbines which better satisfies the energy demands of this facility. These characteristics for the alternatives available are given in Table 1.

The steam electric cycle is another option that, like the proposed dual fuel IC engine, has good load following capability but has the disadvantage of a much poorer electrical conversion efficiency resulting in higher operating costs for a given output. The applicant has estimated the annual fuel cost of using the steam electric cycle to result in an additional $3,800,000 when compared to the proposed IC engines. Assuming a typical control level (NSPS) for the steam electric cycle of 0.20 pounds per million Btu the cost of control can be evaluated.

This NSPS emissions level (0.20 pounds per million Btu) equates to an annual NOx emission of approximately 118 tons per year (reduction of 972 tons). Based on these figures the cost of control is approximately $4,099 per ton of NOx which is well above the cost guideline and is deemed to be prohibitively expensive.

The combined cycle is the final alternative to be evaluated. A combined cyle configuration typically utilizes a gas turbine as the first means of producing electrical energy, then uses the heat energy of the turbine's exhaust to produce steam which is passed through a steam turbine/generator as the second means of generating electrical energy. The combined cycle, one of the newest and most common cogeneration configurations, is being used increasingly in the State of Florida.

In comparison to dual fuel turbines, the combined cycle has a higher installed cost due to the additional cycle but has a lower operating cost which is attributed to increased efficiency. The applicant has indicated that the annualized cost of purchasing, installating and operating a combined cycle facility results in an additional $1,000,000. Assuming an uncontrolled NOx reduction which is equivalent to that of the dual fuel turbine (481 tons per year) the cost to control NOx would be approximately $2,079 per ton. As previously explained, it is expected that this cost per ton figure would decrease as control was enhanced by water injection, but the cost would likely remain above the $1,000 per ton guideline.

The Department agrees with the applicant that BACT for SO_2 and CO is represented by low sulfur fuel and the application of good combustion techniques. During the normal mode of operation (dual fuel) the only pollutant other than NOx which exceeds the significant level, thereby requiring BACT, is CO. A review of the BACT/LAER Clearinghouse indicates that BACT for CO in nearly all cases is good combustion techniques.

Environmental Impact Analyses

The impacts analyses for the BACT determination is based on dual fuel operation. The applicant has stated that diesel will be used as the primary fuel only during natural gas curtailment. It is expected that natural gas curtailments would be very rare, lasting no more than one to two weeks.

Assuming the units operate in the dual fuel mode at an annual availability of 92%, the only pollutant requiring a BACT analyses that contributes significantly to ambient impacts is NOx. For dual fuel operation the maximum resulting annual NOx impact from the IC engines is estimated to be 14.7 ug/m^3. When the concentrations contributed by other sources and the background are taken into consideration, the resulting impact would be 45.3 ug/m^3 which is less than the Florida Ambient Air Quality Standard of 100 ug/m^3. For diesel operation the resulting impact would be increased to 65.3 ug/m^3. It is expected that the actual NOx impact resulting from the IC engines will be closer to that modeled for dual fuel operation since the time spent in the diesel firing mode would be limited. It should be noted, however, that the impacts associated with either dual fuel or diesel firing contribute significantly to the NOx concentration especially when compared to the impacts from other sources.

Although the engines are expected to operate essentially all of the time in the dual fuel mode, the firing of the engines with diesel as the primary fuel would serve to increase the impacts of NOx and SO_2. The SO_2 impact would significantly contribute to the SO_2 concentration in the area for diesel operation, however, during the normal firing mode (dual fuel) SO_2 emissions would be minimal. As is the case, the firing of low sulfur content diesel is deemed to be BACT for SO_2 since the use of diesel as the primary fuel should be limited to only a few days each year.

Conclusion

The Department has determined that the installation of three dual fuel internal combustion engines with the emissions limitations established in this evaluation represent BACT. This decision is based largely on the fact that several other large bore IC engines have been recently permitted with similar emission limitations (See Table 2). A review of the available power production/control alternatives which would provide a reduction in NOx emissions indicates that the cost of providing the control exceeds the cost per ton guideline. It should be noted, however, that BACT should be a level of control which is at least as stringent as NSPS, thus the cost to provide BACT could be higher than that proposed for NSPS and yet be considered reasonable. For example, the South Coast Air Quality Management District (Los Angeles area) in California, which has high ambient levels of nitrogen oxides, has established a BACT cost guideline of $9,000 per ton of NOx controlled. Although each of the alternatives evaluated would easily fall within these cost guidelines, it has been determined that the concerns of the applicant to have power production equipment which has dual fuel capability, good load following characteristics, and a high electrical to thermal output ratio are sufficient to warrant the use of dual fuel IC engines in this particular case.

It is important to note that this BACT determination is based on the assumption that the annual VOC emissions will remain below 100 tons per year. For VOC emissions equal to or greater than 100 tons per year the Lowest Achievable Emission Rate (LAER) would be applied for the pollutant VOC and the determination of BACT for NOx could differ as well. This is based on the fact that NOx is known to be a precursor to ozone thus a strategy to minimize the formation of ozone should stress good control of NOx. This strategy of focusing the control on the NOx emissions has been used by other permitting authorities in the U.S. when permitting internal combustion engines. Because this BACT determination took into consideration that annual VOC emissions would not equal or exceed 100 tons per year, documentation should be provided on a regular basis that this limitation will not be equaled or exceeded. As is the case, the applicant should be required to limit the overall hours of operation or provide monitoring, unless it can be shown that actual VOC emissions will remain well below the 100 ton per year level.

It should also be noted that the NOx impacts attributed to this facility as proposed appear to be high in comparison to other sources which are large emitters of nitrogen oxides. This is of particular importance in view of the current studies with regard to establishing NOx increments and NOx reduction controls. As is the case, the applicant may want to consider the options available to further reduce the NOx impacts which will be directly attributed to this installation.

PRATT & WHITNEY COGENERATION PROJECT

COMPARISON OF SPECIFIC FUEL CONSUMPTION (HEAT RATE) FOR PRIME MOVER OPTIONS

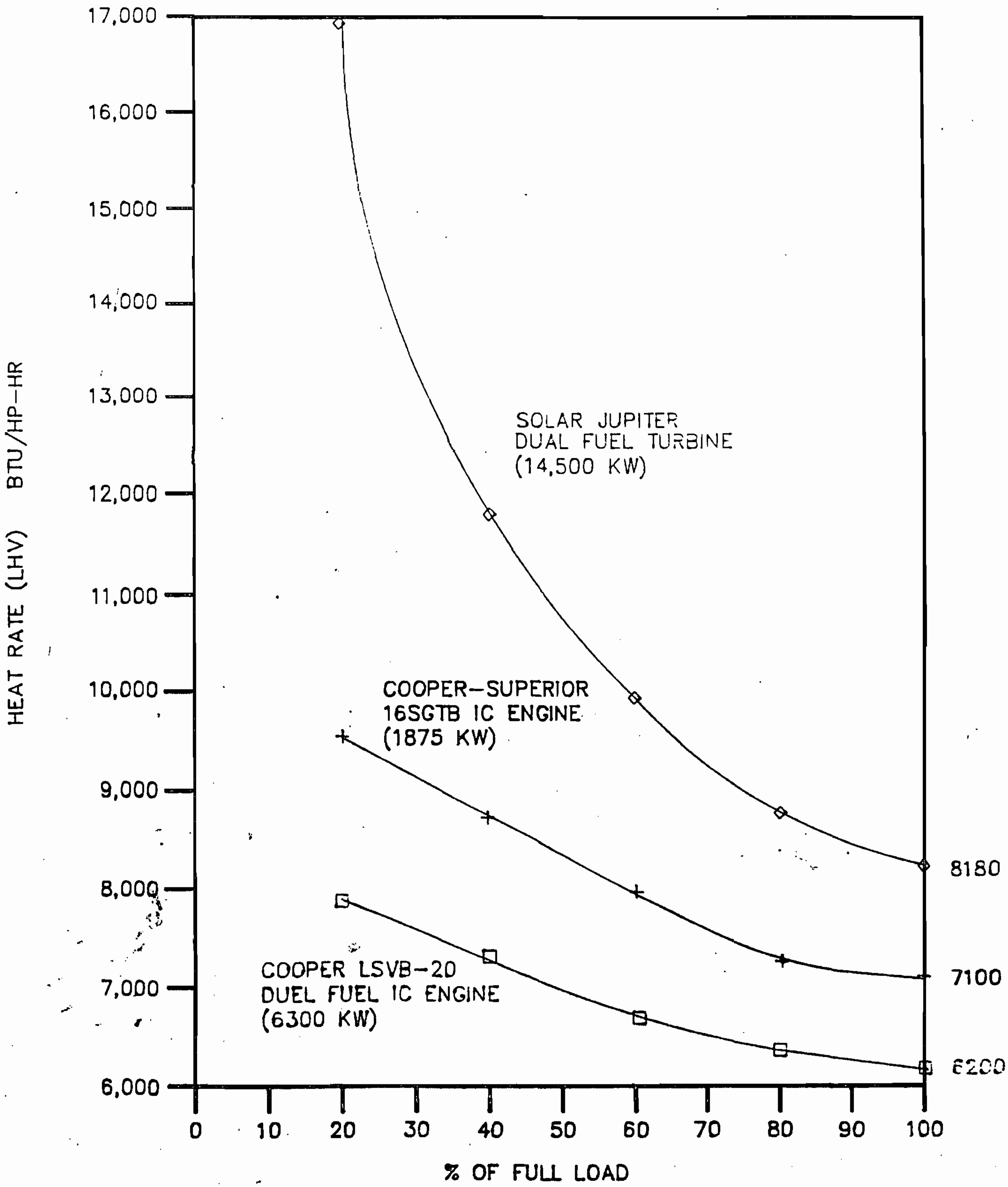

Figure 1

TABLE 1

COMPARISON OF PRIME MOVER CAPABILITIES TO PRATT & WHITNEY DESIGN REQUIREMENTS

Prime Mover	Cycle	Approximate Electricity Conversion Efficiency	Load Following Capability*	Fuel Capability
Boiler/Steam Turbine	Rankine	(20%)	Good	Natural Gas/Fuel Oil
Gas Turbine	Brayton	(31%)	Poor	Natural Gas/Fuel Oil
Spark IC Engine	Otto	(36%)	Fair	Natural Gas
Compression IC Engine	Diesel	(41%)	Good	Natural Gas/Fuel Oil

* See Figure 1

Table 2. Recent Large Bore Installations and Permitted NO_x Emission Rates

Site	Operation Date	Engines	Fuel Type	NO_x Emissions
City of Easton, MO	late '88	2x6300 KW (cooper)	#2 oil of the backup	12 gm/bbp-hr
Harrisburg, PA (Steam Works)	Eng. #1-9/85 Eng. #2-6/87	2x6300 KW	Dual fuel	Permit levels of 6.0 gm/bhp-hr on duel fuel & 12.0 on 100% fuel oil. Currently, they have temporary permit for engines but have met emissions test. Final permit expected shortly. Facility contact: Jim Floyd (717) 231-3838.
South Texas Univ., TX	1988	1x6300 KW	Dual fuel	Guaranteed limits of 5.0 & 12.0 gm/bhp-hr for dual fuel & 100% fuel oil. Facility contact Jerry Smith or Tom Atlee, (713) 266-6900.
Trenton, NJ Dist. Heating	1984	2x6300 KW	Dual fuel	Guaranteed NO_x limits are 5 or 12.0 gm/bhp-hr. Facility Contact: Mr. Brody (609) 395-7837.
City of Cushing, OK	Mid 1988	1x6300 KW	Dual fuel	Guaranteed NO_x limits are 5.0 & 12.0 gm/bhp-hr. For dual fuel and 100% fuel oil firing, respectively. Permit conditions being reviewed. This is an addition to an existing facility permit. Permit expected in 1988.
3M Corp. Austin, TX	1988	2x6300 KW	Dual fuel	Guaranteed NO_x limits 5.0 & 12.0 gm/bhp-hr for dual fuel 100% fuel oil firing, respectively.
Indiana Univ. of Penn., PA	1988	4x6300 KW	Dual fuel	Same as above

PW Ventures
Palm Beach County

Details of the Analysis May be Obtained by Contacting:

Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Recommended by:

for C. H. Fancy, P.E.
Deputy Bureau Chief, BAQM

May 10, 1988
Date

Approved by:

Dale Twachtmann, Secretary

12 May 88
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: Dale Twachtmann

FROM: Howard L. Rhodes

SUBJ: Approval of PW Ventures Cogeneration Facility

State Construction Permit Numbers: AC 50-133747
50-133748
50-133749

Federal Permit Number: PSD-FL-120

DATE: May 9, 1988

Attached for your approval and signature are permits prepared by Central Air Permitting for the above mentioned company to construct a cogeneration facility consisting of three diesel engines at the Pratt & Whitney site in Palm Beach County, Florida. No comments were received during the public notice period.

Day 90, after which these permits will be issued by default, is May 20, 1988.

I recommend your approval and signature.

HLR/aqm/pr

attachments

RECEIVED
MAY 12 1988
Office of the Secretary

RECEIVED
MAY 13 1988
DER - BAQM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

March 18, 1988

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Robert Fagan
PW Ventures, Inc.
1000 Prospect Hill Road
Windsor, CT 06095

Dear Mr. Fagan:

Attached is one copy of the revised Technical Evaluation and Preliminary Determination and proposed permit to construct a cogeneration project at the United Technology's (Pratt & Whitney) site in Palm Beach County, Florida.

Please submit, in writing, any comments which you wish to have considered concerning the Department's proposed action to Mr. Bill Thomas of the Bureau of Air Quality Management.

Sincerely,

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

CHF/bm

Attachments

cc: S. Brooks, SE District
G. Sacco, PBCHD
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
T. Reedy, PW Ventures
K. Kosky, KBN Engineering

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 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 additional service(s) requested.

1. XXX Show to whom delivered, date, and addressee's address. †(Extra charge)†
2. ☐ Restricted Delivery †(Extra charge)†

3. Article Addressed to: Mr. Robert Fagan PW Ventures, Inc. 1000 Propsect Hill Road Windsor, CT 06095	4. Article Number P 702 175 485
	Type of Service: ☐ Registered ☐ Insured XXX Certified ☐ COD ☐ Express Mail
	Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature — Addressee X W. Kennedy	8. Addressee's Address *(ONLY if requested and fee paid)*
6. Signature — Agent X	
7. Date of Delivery 5/19/88	

PS Form **3811**, Mar. 1987 ★ U.S.G.P.O. 1987-178-268 **DOMESTIC RETURN RECEIPT**

P 702 175 485

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. Robert Fagan ~~PW Ventures, Inc.~~	
Street and No. 1000 Prospect Hill Rd.	
P.O., State and ZIP Code Windsor, CT 06095	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 05/16/88 Permits: AC 50-133747,-748, -749	

PS Form 3800, June 1985

PM
4 April 1988
Gainesville, FL

File Copy

KBN

April 4, 1988
88001

RECEIVED

APR 5 1988

DER - BAQM

Mr. C.H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

Enclosed is the proof of publication of the notice of intent by the Florida Department of Environmental Regulation to issue a permit to construct a cogeneration project at the United Technology's (Pratt & Whitney) site in Palm Beach County, Florida.

If I can be of any additional assistance, please call me.

Sincerely,

Robert C. McCann Jr. for

Kennard F. Kosky, P.E.
Principal Engineer

KFK/lgs

Enc.

cc: Thor Hibbler

Copied: Pradeep Raval
May Linn
Isidore Goldman, SE Dist
Gene Sacco

4.8.88 mc

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P.O. Box 14288 5700 SW 34th Street Gainesville, FL 32604 904/375-8000 Telex: 984689 KBN ENG UD

THE PALM BEACH POST

Published Daily and Sunday
West Palm Beach, Palm Beach County, Florida

RECEIVED

APR 5 1988

DER-BAQM

PROOF OF PUBLICATION

STATE OF FLORIDA

COUNTY OF PALM BEACH

Before the undersigned authority personally appeared Barbara M. McCord who on oath says that she/he is Class. Adv. Mgr. of The Palm Beach Post, a daily and Sunday newspaper published at West Palm Beach in Palm Beach County, Florida; that the attached copy of advertising, being a Notice

in the matter of intent

in the --- Court, was published in said newspaper in the issues of March 31, 1988

Affiant further says that the said The Post is a newspaper published at West Palm Beach, in said Palm Beach County, Florida, and that the said newspaper has heretofore been continuously published in said Palm Beach County, Florida, daily and Sunday and has been entered as second class mail matter at the post office in West Palm Beach, in said Palm Beach County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she/he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Barbara M. McCord

Sworn to and subscribed before me this 1 day of April A.D. 19 88

[signature]

NO. 819861
...te of Florida
...epartment of
...onmental Regulation
Notice of Intent

...Department of Environ-...ntal Regulation hereby ...ves notice of its intent to issue permits to PW Ventures to construct a cogenerating facility consisting of three 6.3 MW internal combustion engines, at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by dual fuel, 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC). The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative determination (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within this time period constitutes a waiver of any right such person has to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the proposed agency action. Therefore, persons who may not wish to file a petition may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Rule 28-5.207, Florida Administrative Code, at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32301. If no hearing officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

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

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dept. of Environmental Regulation
Southeast District
1900 S. Congress Avenue, Suite A
West Palm Beach, Florida 33406

Palm Beach County Health Department
Division of Environmental Science and Engineering
901 E. Evernia Street
West Palm Beach, Florida 33402

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

PUB: The Palm Beach Post
March 31, 1988

● **SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 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 additional service(s) requested.

1. ☒ Show to whom delivered, date, and addressee's address. 2. ☐ Restricted Delivery.

3. Article Addressed to: Mr. Robert Fagan PW Ventures, Inc. 1000 Prospect Hill Road Windsor, CT 06095	4. Article Number P 274 010 438
	Type of Service: ☐ Registered ☐ Insured XXX Certified ☐ COD ☐ Express Mail
	Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature — Addressee X	8. Addressee's Address (*ONLY if requested and fee paid*)
6. Signature — Agent X W. Kennedy	
7. Date of Delivery 3/22/88	

PS Form 3811, Feb. 1986 **DOMESTIC RETURN RECEIPT**

P 274 010 438

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P.O., State and ZIP Code Windsor, CT 06095	
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Mailed: 03-18-88
Permits: AC 50-133747, -48, -49, Federal Permit:PSD-FL-120

PS Form 3800, June 1985

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Applications for Permits by:

PW Ventures, Inc.
1000 Prospect Hill Road
Windsor, CT 06095

DER File No. AC 50-133747
50-133748
50-133749

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit (copy attached) for the proposed project as detailed in the applications specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, PW Ventures applied on April 30, 1987, to the Department of Environmental Regulation for permits to construct a cogeneration facility consisting of three 6.3 MW internal combustion engines, at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC).

The Department has permitting jurisdiction under Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit was needed for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, FAC, you (the applicant) are required to publish at your own expense the enclosed Notice of Proposed Agency Action on permit applications. The notice must be published one time only in a section of a major local newspaper of general circulation in the county in which the project is located and within thirty (30) days from receipt of this intent. Proof of publication must be provided to the Department within seven days of publication of the notice. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permits.

The Department will issue the permits with the attached conditions unless petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S. A person whose substantial interests are affected by the

Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. Petitions must comply with the requirement of Florida Administrative Code Rules 17-103.155 and 28-5.201 (copy enclosed) and be filed with (received by) the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant must be filed within fourteen (14) days of receipt of this intent. Petitions filed by other persons must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of this intent, whichever first occurs. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes, concerning the subject permit application. Petitions which are not filed in accordance with the above provisions will be dismissed.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

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

Copies furnished to:

S. Brooks, SE District
G. Sacco, PBCHD
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
K. Kosky and T. Reedy, KBN Engineering

State of Florida
Department of Environmental Regulation
Notice of Intent

The Department of Environmental Regulation hereby gives notice of its intent to issue permits to PW Ventures to construct a cogenerating facility consisting of three 6.3 MW internal combustion engines, at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by dual fuel, 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC). The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative determination (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within this time period constitutes a waiver of any right such person has to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the proposed agency action. Therefore, persons who may not wish to file a petition may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Rule 28-5.207, Florida Administrative Code, at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32301. If no hearing officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

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

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dept. of Environmental Regulation
Southeast District
1900 S. Congress Avenue, Suite A
West Palm Beach, Florida 33406

Palm Beach County Health Department
Division of Environmental Science
and Engineering
901 E. Evernia Street
West Palm Beach, Florida 33402

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

RULES OF THE ADMINISTRATIVE COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

(1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed, typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.

(2) All petitions filed under these rules should contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) All disputed issues of material fact. If there are none, the petition must so indicate;

(d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;

(e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;

(f) A demand for the relief to which the petitioner deems himself entitled; and

(g) Such other information which the petitioner contends is material.

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on March 18, 1988.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to §120.52(9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Judy Rogers
Clerk

March 18, 1988
Date

Revised
Technical Evaluation
and
Preliminary Determination

PW Ventures, Inc.
Palm Beach County, Florida

Three Diesel Engines

Permit Numbers:

Unit 1, AC 50-133747
Unit 2, AC 50-133748
Unit 3, AC 50-133749

PSD-FL-120

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

March 17, 1988

I. Application

A. Applicant

PW Ventures, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

B. Project and Location

The applicant proposes to construct a cogenerating facility consisting of three 6.3 MW internal combustion engines at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO) and volatile organic compounds (VOC).

The UTM coordinates of this facility are Zone 17, 569.4 km East and 2975.9 km North.

C. Sources Reviewed

The sources reviewed in this technical evaluation will be the three dual fuel fired, 6.3 MW internal combustion engines.

PW Ventures applied for a construction permit for the proposed project on April 30, 1987. The application was deemed complete on January 21, 1988.

D. Facility Category

This cogeneration facility is classified in accordance with the Standard Industrial Classification (SIC) Code as Major Group 49, Electric, Gas and Sanitary Services; Group No. 493, Combination Electric and Gas, and other Utility Services; Industry No. 4931, Electric and Other Services Combined.

The proposed project will be a major facility as defined by Chapter 17-2 of the Florida Administrative Code (FAC).

II. Project Description

A. Process

The proposed facility will consist of three dual fuel fired internal combustion engines. The fuel will be 95% (heat input) natural gas and 5% (heat input) diesel fuel referred to as dual fuel. The total electrical output is expected to be 6.3 MW each or about 19 MW for all three engines. The flue gases will be passed through waste heat recovery boilers to generate steam. Both the electricity and steam generated will probably be supplied to Pratt & Whitney.

The total heat input for each engine, under normal (dual fuel firing) conditions, will be 54,558,000 Btu/hr. If the natural gas supply is interrupted, diesel fuel will be fired at a rate of 55,881,000 Btu/hr.

B. Background

PW Ventures is a single purpose corporation created by Power Ventures to own and operate this project. Pratt & Whitney (P&W) will lease out land within its property to PW Ventures to build the proposed cogeneration project. P&W will not be affiliated with the project in any way other than the purchase of energy, which is produced by the project.

III. Rule Applicability

The proposed project will result in emissions of NOx, SO_2, PM, CO and VOCs. It is subject to preconstruction review in accordance with Chapter 403, of the Florida Statutes, and Chapters 17-2 and 17-4 of the Florida Administrative Code (FAC).

The proposed project is located in Palm Beach County, an area designated non-attainment for the pollutant ozone, in accordance with Rule 17-2.410, FAC. The area is designated as attainment for the other criteria pollutants in accordance with Rule 17-2.420, FAC.

The proposed project will be a new major facility and will be subject to a Prevention of Significant Deterioration Review (Rule 17-2.500, FAC). A nonattainment area review will not be required since VOC emissions are less than 100 tons per year.

The applicable emissions limiting standards will be determined by the Best Available Control Technology (BACT) for NOx, CO, and SO_2, in accordance with Rule 17-2.630, FAC.

In accordance with Rule 17-2.700(6), FAC, compliance with the applicable emission limiting standards shall be determined for:

a) PM by EPA Method 5 or another DER approved Method.

b) SO_2 by EPA Method 6 or another DER approved Method.

c) NOx by EPA Method 20 or another DER approved Method.

d) CO by EPA Method 10 or another DER approved Method.

e) VOC by EPA Method 25A or another DER approved Method.

f) VE by EPA Method 9 or another DER approved Method.

IV. Emission Limitations

As determined by the attached BACT determination, the emission limits for the project will be as follows for each engine (at 92% availability):

Pollutant	lb/hr Dual	lb/hr Diesel	tons/yr Dual	tons/yr Diesel
Nitrogen Oxides, NOx	97	233	391	939
Sulfur Dioxide, SO_2	2	18	5	73
Particulates, PM	1	2	3	7
Carbon Monoxide, CO	40	6	162	24
Volatile Organics, VOCs	8	5	33	19

Visible emissions shall not exceed 10% opacity.

V. AIR QUALITY IMPACT ANALYSIS

(Based on information submitted in the original application which projected emissions greater than the eventual permitted levels).

1. Introduction

The proposed PW Ventures cogeneration facility, located in northwestern Palm Beach County, will emit in PSD-significant amounts five pollutants. These are the criteria pollutants particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC). The VOC emissions are not subject to PSD review however; this pollutant is regulated under the nonattainment area new source review rules (see Section 7).

The air quality impact analysis required by the PSD regulations for the pollutants PM, SO_2, NO_x, and CO includes:

- An analysis of existing air quality;
- A PSD increment analysis (for SO_2 and PM only);
- An Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, and visibility and of growth-related air quality impacts; and
- A "Good Engineering Practice" (GEP) stack height determination.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analysis depend on air quality dispersion modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the Department has reasonable assurance that the proposed sources at the PW Ventures facility, as described in this report and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A discussion of the modeling methodology and required analysis follows.

2. Modeling Methodology

The EPA-approved Industrial Source Complex Short-Term (ISCST) dispersion model was used in the air quality impact analysis. This model determines ground-level concentrations of inert gases or small particles emitted into the atmosphere by point, area, and volume sources. The model incorporates elements for plume rise, transport by the mean wind, Gaussian dispersion, and pollutant removal mechanisms such as deposition and transformation. The ISCST model also allows for the separation of sources, building wake downwash, and various other input and output features. A series of specific model features, recommended by the EPA, are referred to as the regulatory options. These features were used to address the air quality impacts of the proposed facility in both screening and refined analyses.

The initial screening modeling used a radial receptor grid with the center of the grid coinciding with the location of the proposed facility. Radials were spaced at 10° increments from 0° to 230°, the remaining angles being within the Pratt and Whitney boundary and therefore not modeled. The Pratt and Whitney facility, which completely surrounds the PW Ventures site, is enclosed by a fence and is guarded. Therefore, this boundary prohibits access by the public. Receptors were located along each radial from .75 km to 2 km from the proposed facility, at increments ranging from .35 km to .5 km. Additional receptors were located along and within the Pratt and Whitney boundary line as well as .2 km to .4 km further downwind from the boundary line receptors.

After a final list of high, second-highest short-term concentrations was developed, a refined analysis was conducted by predicting concentrations for a refined receptor grid centered on the receptor at which the highest, second-highest concentration from the screening phase was produced. The receptors were located at intervals of .1 km between the distances considered in the screening phase along seven radials and at two degree increments.

Because the proposed facility's impacts are predicted to be above the significance levels for SO_2 and NO_x only, additional modeling including other sources in the area was performed for these two pollutants. Since the other sources considered in this modeling exercise are more than 25 km from the proposed facility, a screening phase considered the interaction of the sources along receptor locations that aligned each of the modeled sources downwind from the proposed facility. Based on these results, a refined analysis was performed based on the periods which produced the highest, second highest 3- and 24-hour SO_2 concentrations and highest annual SO_2 and NO_2 concentrations.

The meteorological data used in the ISCST model consisted of five years (1970 - 1974) of hourly surface data taken at West Palm Beach, Florida. Mixing heights used in the model were based on upper air data from Miami, Florida for the same period.

Emission data (Table 1) are the maximum allowable emissions which are based on the fuel that each source is capable of firing and that produced the higher emission rate. For modeling purposes, the higher emissions from firing dual fuel or diesel fuel were used to assess impacts. As a result, the model parameters and emissions for diesel fuel were used in the NO_x, SO_2 and PM concentration analysis while those parameters for dual fuel were used for the CO concentration analysis. Table 2 lists other major sources used in the dispersion modeling.

3. Analysis of Existing Air Quality

Preconstruction ambient air quality monitoring is required for all pollutants subject to PSD review. In general, one year of quality assured data using an EPA reference, or the equivalent, monitor must be submitted. Sometimes less than one year of data, but no less than four months, may be accepted when Departmental approval is given.

An exemption to the monitoring requirement can be obtained if the maximum air quality impact, as determined through air quality modeling, is less than a pollutant-specific "de minimus" concentration. In addition, if current monitoring data already exist and these data are representative of the proposed source area, then at the discretion of the Department these data may be used.

The predicted maximum air quality impacts of the proposed cogeneration facility for those pollutants subject to PSD review are given in Table 3. As shown in the table, the maximum impacts of SO_2 and NO_2 exceed the monitoring "de minimus" levels for these pollutants.

Because of the remoteness of the proposed facility, the applicant submitted SO_2 and NO_2 monitoring data from regional sites located in Palm Beach County. A list of the ambient SO_2 and NO_2 monitors located in Palm Beach County is presented in Table 4. A summary of the ambient SO_2 and NO_2 data recorded at these monitoring sites from 1983 to 1985 is presented in Table 5.

4. PSD Increment Analysis

a. Class II Area

The proposed facility is to be located in a Class II area. This area is also designated as an attainment area for both SO_2 and PM. A PSD increment analysis is therefore required to show compliance with the Class II increments.

The PSD increments represent the amount that new sources in the area may increase ambient ground-level concentrations of SO_2 and PM. At no time, however, can the increased loading of these pollutants cause or contribute to a violation of the ambient air quality standards.

All SO_2 and PM emission increases from sources constructed or modified after the baseline date (December 27, 1977) will consume PSD increment. In addition, all SO_2 and PM emission increases associated with construction or modification of major sources which occurred after January 6, 1975, will consume increment.

Atmospheric dispersion modeling, as previously described, was performed to quantify the amount of PSD increment consumed. PSD increment consuming sources are identified in Table 2. Modeling results indicate that the PM impacts were less than significant and, therefore, no further PSD analysis was performed. The results of this modeling for SO_2 are summarized in Table 6. The results indicate that the concentration increases are within the allowable limits.

b. Class I Area

A Class I area increment analysis is not required because the proposed facility is not located within 100 kilometers of a designated Class I area.

5. Ambient Air Quality Standards Analysis

Given existing air quality in the area of the proposed cogeneration facility, emissions from the new facility are not expected to cause or contribute to a violation of an AAQS.

Of the pollutants subject to review, only the criteria pollutants PM, SO_2, CO and NO_x have an AAQS. Dispersion modeling was performed as detailed in section 2, Modeling

Methodology, for the proposed facility. The results, given in Table 7, showed that, with the exception of SO_2 and NO_x, the maximum impacts of these pollutants were less than the significant impact levels defined in Rule 17-2.100 (170), FAC. As such, no modeling of other sources was necessary for PM and CO.

The total impact on ambient air (Table 8) is obtained by adding a "background" concentration to the maximum modeled concentration. This "background" concentration takes into account all sources of a particular pollutant that were not explicitly modeled. For both SO_2 and NO_x, monitoring data from Palm Beach County were used to estimate the "background" concentration. These data should overestimate the actual background SO_2 around the proposed facility, since they include the influence of major sources of SO_2 along the eastern border of the county. In addition, the NO_x background should be overestimated around the proposed site, since the more heavily populated eastern part of the county has a higher density of mobile sources, the major source of NO_x in the area.

6. Additional Impacts Analysis

a. Impacts on Soils and Vegetation

The maximum ground-level concentrations predicted to occur for the criteria pollutants as a result of the proposed project, in conjunction with other sources and a background concentration, will be at or below all applicable AAQS including the national secondary standards developed to protect public welfare-related values. As such, these pollutants are not expected to have a harmful impact on soils and vegetation.

b. Impact on Visibility

Due to the distance between the proposed facility and the nearest Class I area, the Everglades National Park, (greater than 100 km) no visibility impact analysis was performed.

c. Growth-Related Air Quality Impacts

The proposed facility is not expected to significantly change employment, population, housing or commercial/industrial development in the area to the extent that an air quality impact will result.

d. GEP Stack Height Determination

Good Engineering Practice (GEP) stack height means the greater of: (1) 65 meters or (2) the maximum nearby building height plus 1.5 times the building height or width, whichever is less. For the proposed project a stack height of 19.2 meters is proposed. The proposed stack height is well below the GEP limit of 65 meters.

7. Nonattainment Area New Source Review (FAC Rule 17-2.510)

Since emissions of VOCs will be below 100 tons per year, a nonattainment area review will not be required for the proposed project.

VI. CONCLUSION

The emission limits that will be imposed have been determined to be in compliance with all applicable requirements of FAC Rule 17-2. The permitted maximum allowable emission rates should not cause or contribute to any violation of Florida's ambient air quality standards or PSD increments.

The general and specific conditions listed in the proposed construction permit (attached) will assure compliance with all applicable requirements of FAC Rule 17-2.

Table 1
Power Ventures Cogeneration Facility
Maximum Emission Rates

Pollutant	(lb/hr)	(ton/yr)	PSD Significant Emission Rate (TPY)
PM	6.76	29.6	25
CO	160.8 (1)	704.3	100
NOx	944.4	4136.5	40
SO_2	70.6	309.2	40
VOC	25 (1)	99	40
Pb	.013	.006	.6
Be	.000015	.00006	.0004
Hg	.0024 (1)	.01	.1
As	.000056	.00025	—

(1) Based on facility firing dual fuel. All others based on firing diesel fuel.

Table 2
Power Ventures Cogeneration Facility's
Modeling Source Parameters

Source	UTM-E (km)	UTM-N (km)	Stack Height (m)	Exit Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	Emissions SO_2 (g/s)	Emissions NOx (g/s)	PSD Source
Power Ventures	565.6	2978.5	19.2	422	24.3	0.91	8.9	119.0	Y
Pratt and Whitney	565.3	2978.2	8.23	1366	8.35	0.66	6.2	—	
	559.0	2978.6	1.83	533	40.2	0.91	16.0	17.8	
	599.2	2978.3	15.2	533	40.2	0.91	47.9	17.8	
	558.1	2979.1	4.57	644	13.4	3.40	23.4	25.0	Y
	558.0	2978.3	4.57	533	6.93	0.76	9.02	0.9	
	565.5	2978.5	12.2	477	35.9	0.46	—	0.9	
FPL - Riviera	594.2	2960.6	45.7	430	6.30	4.57	108.4	16.5	
	594.2	2960.6	90.9	408	18.9	4.88	698.5	224.3	
Lake Worth Utilities	592.8	2943.7	18.3	434	6.2	1.52	72.6	14.5	
	592.8	2943.7	38.1	408	7.7	2.13	103.9	21.3	
	592.8	2943.7	38.1	408	9.7	2.29	133.9	27.5	
	592.8	2943.7	22.9	450	18.3	3.05	11.6	2.4	
Palm Beach RRF	585.8	2960.2	76.2	505	24.9	2.04	99.3	37.8	Y
FPL-Martin	543.1	3022.0	152.1	421	21.[illegible]	7.99	1583.0	593.7	Y
Osceola Sugar	544.2	2968.0	25.0	341	18.1	1.52	45.7	15.1	
	544.2	2968.0	25.0	341	15.0	1.52	21.6	7.0	Y
	544.2	2968.0	27.4	341	15.0	1.93	23.5	7.8	Y
Atlantic Sugar	552.9	2945.2	18.3	344	15.0	1.83	73.0	19.8	
	552.9	2945.2	27.4	339	15.7	1.68	11.8	5.9	Y
Sugar Cane Growers	534.9	2953.3	33.5	344	11.2	2.82	24.2	7.0	
	534.9	2953.3	24.4	344	15.2	1.40	44.8	15.7	
	534.9	2953.3	12.2	606	15.2	1.40	51.0	10.5	
	534.9	2953.3	47.2	344	10.6	3.05	26.7	11.9	Y

Table 3
Power Ventures Congeneration Facility
Maximum Air Quality Impacts For
Comparison to the Deminimus Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m^3)	Deminimus Ambient Impact Level (ug/m^3)
PM (24-hour)	4.37	10
SO_2 (24-hour)	45.59	13
NO_2 (Annual)	51.63	14
CO (8-hour)	168.18	575

Table 4
Monitoring Sites at Which Sulfur Dioxide and Nitrogen Dioxide Concentrations are Measured in Palm Beach County

SAROAD Site No.	Site Address	UTM Coordinates Zone	North (km)	East (km)	Relative Location from P&W Facilty* Direction (Degrees)	Distance (km)	Spatial Scale/ Monitoring Objective
Sulfur Dioxide							
3840-003-6	2030 Avenue L, Riviera Beach	17	2962.350	592.480	120	26.8	Neighborhood/ Maximum Concentration
Nitrogen Dioxide							
4760-001-6	First Street and Tamarind Avenue, West Palm Beach	17	2955.030	593.232	131	31.7	Neighborhood/ Maximum Concentration

* UTM Coordinates of P&W facility are 569.4 East and 2975.9 North

Table 5
Ambient SO_2 and NO_2 Air Quality Data for the Monitors Located in Palm Beach County 1983 - 1985

SAROAD Site No.	Year	Data Collection (%)	Measured Concentration (ug/m^3)		
			3-Hour*	24-Hour*	Annual
Sulfur Dioxide					
3840-003-6	1983	95.4	63	29	3
	1984	98.1	61	36	8
	1985	92.5	54	26	5
Nitrogen Dioxide					
4760-001-6	1983	82.8	NA	NA	19
	1984	93.0	NA	NA	27
	1985	84.0	NA	NA	22

NA = Not applicable for comparison to AAQS

* Second Highest Concentrations

Table 6
Power Ventures Cogeneration Facility
Comparison to PSD Class II Increments

Pollutant and Averaging Time	PSD Class II Increment (ug/m^3)	Max Concentration (ug/m^3)	Percent Class II Increment Consumed
SO_2 (3-hour)	512	119.3(1)	23.3
SO_2 (24-hour)	91	47.1(1)	51.8
SO_2 (Annual)	20	5.0	24.9

(1) Highest, second highest concentration for averaging period.

Note: Predicted maximum concentrations result from modeling all PSD sources in emissions inventory.

Table 7
Power Ventures Cogeneration Facility
Significant Impact Analysis

Pollutant and Averaging Time	Maximum Impact of Project (ug/m^3)	Significant Impact Level (ug/m^3)
SO_2 (3-hour)	119.1	25
SO_2 (24-hour)	45.6	5
SO_2 (Annual)	3.9	1
PM (24-hour)	4.4	5
PM (Annual)	0.4	1
NO_2 (Annual)	51.6	1
CO (1-hour)	340.5	2000
CO (8-hour)	168.2	500

Table 8
Power Ventures Cogeneration Facility
Comparison of Total Impacts with the AAQS

Pollutant and Averaging Time	Maximum Predicted Impact (all sources) (ug/m^3)	Existing Background (ug/m^3)	Maximum Total Impact (ug/m^3)	FL AAQS (ug/m^3)
SO_2 (3-hour)	295.7	64 (1)	359.7	1300
SO_2 (24-hour)	158.4	36 (1)	194.4	260
SO_2 (Annual)	23.8	8 (2)	31.8	60
PM (24-hour)	4.4 (3)	—	—	150
PM (Annual)	0.4 (3)	—	—	60
NO_2 (Annual)	54.9	27 (2)	81.9	100
CO (1-hour)	340.5 (3)	—	—	40,000
CO (8-hour)	168.2 (3)	—	—	10,000

(1) Existing background is estimated using the highest, second highest monitored concentrations from representive monitors in the area (1983-85).

(2) Existing background is estimated using the highest monitored concentrations from representive monitors in the area (1983-85).

(3) Less than significant; no further analysis necessary.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

PERMITTEE:
PW Ventures, Inc.
1000 Propect Hill Road
Windsor, CT 06095

Permit Number: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989
County: Palm Beach
Latitude/Longitude: 26° 54' 17"N
80° 18' 04"W
Project: 6.3 MW Internal Combustion Engine, Unit 1, 2, and 3

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 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 6.3 MW dual fuel fired engine as part of a three engine cogeneration facility, at Pratt & Whitney site in Palm Beach County. Dual fuel will be 95% natural gas and 5% diesel fuel (heat input basis).

The PSD permit number for this project is PSD-FL-120

Construction will be in accordance with the permit application and plans, documents, and reference material submitted unless otherwise stated in the General and Specific Conditions herein.

Attachments:

1. Power Venture's application package dated April 17, 1987.
2. DER's letter of incompleteness dated May 28, 1987.
3. Power Venture's response dated June 24, 1987.
4. Power Venture's letter of clarification dated July 1, 1987.
5. Power Venture's Additional Growth Analysis dated July 15, 1987.
6. Peter Cunningham's letter dated September 29, 1987.
7. Power Ventures package received October 28, 1987.
8. Peter Cunningham's letter dated October 30, 1987.
9. KBN's letter received December 15, 1987.
10. Peter Cunningham's letter dated December 28, 1987.
11. KBN's letter received January 21, 1988.
12. Combustion Engineering letter received January 29, 1988.
13. Peter Cunningham's letter dated January 27, 1988.

PERMITTEE:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

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:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

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.

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)
( ) 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.

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 source may operate continuously, i.e., 8760 hrs/year. (The engine is projected to have an availability factor of 92%).

2. The maximum allowable emissions shall not exceed the following tabulated quantities for each engine:

PERMITTEE:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

SPECIFIC CONDITIONS:

Pollutant	lb/hr Dual	lb/hr Diesel	tons/yr Dual	tons/yr Diesel
Nitrogen Oxides, NOx	97	233	391	939
Sulfur Dioxide, SO_2	2	18	5	73
Particulates, PM	1	2	3	7
Carbon Monoxide, CO	40	6	162	24
Volatile Organics, VOCs	8	5	33	19

Visible emissions shall not exceed 10% opacity.

The above limits are based on the BACT determination as follows:

Pollutant	Emission Limit Basis Dual Fuel	Emission Limit Basis Diesel
NOx	5 g/hp-hr	12 g/hp-hr
SO_2	0.02 lb/MMBtu	0.32 lb/MMBtu
VOC	0.43 g/hp-hr	0.24 g/hp-hr
CO	good combustion	

3. The engine shall fire an approximately 95% natural gas, 5% diesel fuel (heat input basis) fuel mixture. Only during periods of curtailed natural gas supply shall 100% diesel fuel be fired. Maximum heat input shall not exceed 56 MMBtu/hr per engine.

4. Initial and annual compliance tests will be conducted as follows:

a) EPA Method 5 for PM
b) EPA Method 6 for SO_2
c) EPA Method 20 for NOx
d) EPA Method 10 for CO
e) EPA Method 25/25A for VOC
f) EPA Method 9 for VE

Other DER Approved Methods may be used in place of the above tests, only after prior approval from the Department.

5. Upon review of initial compliance test results, DER may require monitoring of VOC emissions to ensure that annual emissions are less than 100 tons, or restrict operating hours or restrict fuel usage.

6. DER's district office shall be notified in writing 15 days prior to source testing. Written reports of the tests shall be submitted to the district office within 45 days of test completion.

PERMITTEE:
PW Ventures, Inc.

Permit Numbers: AC 50-133747
AC 50-133748
AC 50-133749
Expiration Date: December 1, 1989

SPECIFIC CONDITIONS:

The construction shall reasonably conform to the plans and schedule submitted in the application. If the permittee is unable to complete construction on schedule, the Department must be notified in writing 60 days prior to the expiration of the construction permit and the permittee shall submit a new schedule and request for an extension of the construction permit, (Rule 17-2, FAC).

To obtain a permit to operate, the permittee must demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit, including the application fee, along with compliance test results and Certificate of Completion, to the Department's District office 90 days prior to the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms of the construction permit until its expiration date. Operation beyond the construction permit expiration date requires a valid permit to operate. (Rules 17-2 and 17-4, FAC).

If the construction permit expires prior to the permittee requesting an extension or obtaining a permit to operate, then all activities at the project must cease and the permittee must apply for a new permit to construct which can take up to 90 days to process a complete application. (Rule 17-4, FAC)

7. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to DER's District office.

8. The Department shall be notified of the final choice of engines to be purchased for the project. At that time the permittee shall submit literature providing reasonable assurance that the engines will perform in compliance with permit limitations.

Issued this_____day of_____, 19___

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

____
Dale Twachtmann, Secretary

Best Available Control Technology (BACT) Determination
PW Ventures
Palm Beach County

The applicant proposes to install a cogeneration facility at the United Technologies Pratt & Whitney site in Palm Beach County, Florida. The cogeneration facility will consist of three nominal 8,800 brake horsepower engines with an electric generation capability of 6,300 kw each. The primary fuel will be a combination of natural gas (95% of heat input) and diesel fuel (5% of heat input) which is referred to as dual fuel. The total heat input per engine under dual fuel firing is 54,558,000 Btu/hr. If natural gas is interrupted, diesel fuel will be used. Under diesel operation, each engine will be fired at a rate of 55,881,000 Btu/hr.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the three engines based on a conservatively high 92% annual availability factor to be as follows:

	Maximum Potential Emissions (tons/year)		PSD Significant Emission Rate
Pollutant	Dual Fuel	Diesel Fuel	(tons/year)
NOx	1,174	2,855	40
SO_2	10.8	213	40
PM	8.9	20.4	25
CO	486	70.4	100
VOC	<100*	57.2	40
As	1.68×10^{-4}	3.38×10^{-3}	0
Pb	2.03×10^{-3}	0.039	0.6
Be	2.3×10^{-6}	4.5×10^{-5}	0.0004
Hg	7.5×10^{-3}	2.06×10^{-4}	0.1

*Hours of operation will be limited if necessary to maintain annual VOC emissions below 100 tons.

Rule 17-2.500(2)(f)(3) of the Florida Administrative Code requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table. The facility is located in an area classified as attainment for all air pollutants, except ozone. Since the annual emissions of the air pollutant ozone (VOC's are the controlling pollutant) will be limited to less than 100 tons, the application and employment of Lowest Achievable Emission Rate (LAER), Rule 17-2.640, does not apply.

BACT Determination Requested by the Applicant

The BACT Determinations requested by the applicant on a pollutant by pollutant basis are given below:

Pollutant	Determination
NOx	5.0 g/hp-hr (dual fuel) 12.1 g/hp-hr (diesel)
SO_2	Low sulfur fuel (natural gas, sulfur content of diesel will be limited to 0.3%)
CO	Application of good combustion techniques

Date of Receipt of a BACT Application

June 25, 1987

Review Group Members

This determination was based upon comments received from the applicant and the Stationary Source Control Section.

BACT Determination Procedure:

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination will be 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.

KBN

Mr. C.H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Fla. 32399-2400

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604

(d) The social and economic impact of the application of such technology.

BACT Determined by DER:

Pollutant	Emission Limit
NOx	5.0 g/hp-hr (dual-fuel firing) 12.0 g/hp-hr (diesel firing)
SO_2	0.02 lb/10^6 Btu (dual-fuel firing) 0.32 lb/10^6 Btu (diesel firing)
CO	Good combustion techniques
VOC	0.43 g/hp-hr (dual fuel) 0.24 g/hp-hr (diesel)

BACT Determination Rationale

The DER's BACT determination is essentially equivalent to that proposed by the applicant. Upon reviewing the BACT/LAER determinations completed by other states for large internal combustion engines and communicating with various equipment manufacturers, the Department has accepted a NOx emission limitation of 5.0 g/hp-hr and 12.0 g/hp-hr as being BACT for dual-fuel firing and diesel firing, respectively. In accordance with this determination, five alternate power production/control strategies that would reduce NOx emissions were evaluated.

1) Catalytic Reduction

2) Clean Burn Engines

3) Dual Fuel Turbines

4) Boiler/Steam Turbine

5) Combined Cycle

Catalytic reduction of NOx emissions has been successful for engine exhaust streams at near stoichiometric conditions (i.e., low exhaust O_2 concentrations). Most large stationary internal combustion (IC) engines operate at air-to-fuel ratios that are typically much greater than stoichiometric, (high O_2 concentrations in exhaust), and consequently the use of catalytic reduction has not been as successful. Although catalyst systems are currently under development and have been demonstrated for one very narrow application (i.e., fuel-rich naturally aspirated gas engines), they have not been demonstrated for the broad range of IC engines manufactured. This is particularly true of turbocharged engines, fuel-lean gas engines, and diesel engines. Upon reviewing the current applications of catalytic reduction, it has been determined that this technology has not progressed to the point that it is feasible for use on the large bore dual fueled engines proposed by the applicant. The applicant has documented this infeasibility through correspondence from several manufacturers of large bore engines. As is the case, the use of catalytic reduction does not warrant further consideration as BACT.

The other four alternatives (clean burn engines, dual fuel turbines, boiler/steam turbine, and the combined cycle) are commonly used methods of producing power which are capable of low NOx emissions, either inherent in the combustion process or by the addition of economical control equipment. To evaluate these alternatives the cost/benefit of reducing NOx has been examined.

With regard to determining the cost effectiveness of air pollution control, the EPA has developed costing guidelines to obtain the highest reduction of emissions per dollars invested. This method of maximizing emission reductions per capital invested is a major factor when New Source Performance Standards (NSPS) are developed by the EPA. For NOx emissions EPA has determined that a cost of up to $1,000 per ton of emissions controlled ($0.50/lb) is reasonable for NSPS.

Clean burn engines are designed such that NOx emissions are minimized. According to information supplied by various manufacturers, clean burn engines are guaranteed to limit NOx emissions to levels as low as 1.5 g/hp-hr. An evaluation of using clean-burn engines to produce the needed power indicates that the cost of producing power with the clean-burn engine which has a smaller bore relative the large dual fuel IC engine would be substantially higher due to the lower electrical conversion efficiency of smaller bore engines.

The applicant has indicated that the engine-generator cost of purchasing and installing the smaller bore clean burn engine would be $210.00 higher per kilowatt generated than the proposed dual-fuel engine. In addition, the cost of fuel for using the less efficient clean burn engine would amount to an additional $525,000 annually. Assuming a capital charge factor (function of depreciation, taxes, and interest) of 0.2 the annualized cost of installing and operating the clean burn engines would amount to an additional $1,325,000. When this cost is taken into consideration with the maximum NOx reduction expected by using the clean burn engines of 732 tons per year, (1.5 g/hp-hr vs. 5.0 g/hp-hr)the cost of control is approximately $1,810 per ton of NOx.

In addition to the higher cost of using the clean burn engines, the applicant has expressed concern about the inability of the engine to operate on diesel fuel. Thus clean burn engines could not operate during periods of natural gas interruption which would not give the applicant the flexibility to operate at all times.

Dual fueled turbines like dual fuel internal combustion engines are capable of firing both gaseous and liquid fuels. These turbines are presently being used in other parts of the country and have been proposed for use in Florida. The dual fueled turbine allows the versatility of diesel firing yet provides the benefit of the NOx emissions being more easily and economically controlled than the NOx emissions from dual fueled internal combustion engines. The NOx emissions from a dual fueled turbine can be controlled to levels much less than the proposed 5.0 g/hp-hr through the use of inexpensive control techniques such as steam injection.

The applicant has stated that the use of dual fuel turbines to generate the power needed is not attractive for several reasons. The primary reason for selecting the dual fuel IC engine over the dual fuel turbined is the lower fuel consumption associated with all loads (See Figure 1). This differential in fuel consumption results in an additional $1,160,000 per year at full load, assuming the installed cost per kilowatt for the turbine and engine is equivalent. The applicant has indicated that the cost varies in accordance to the size of the turbine and that matching the needed power requirement to the rated output would require using at least two smaller units resulting in a relatively higher installed cost.

A review of a dual fueled gas turbines with outputs similar to that proposed by the applicant indicate that the uncontrolled emissions of NOx would be equivalent to approximately 2.7. g/hp-hr. When compared to the proposed NOx level of 5.0 g/hp-hr the use of a dual fueled turbine would result in an annual reduction of approximately 481 tons per year. Comparing this reduction to the additional fuel cost of producing the needed power, results in a cost of approximately $2,412 per ton of NOx controlled. Permitting experience has shown that this cost would decrease as NOx control by water injection was increased due to the substantial emission reductions that can be obtained by using the relatively inexpensive method of control. It is expected, however, that even with the inclusion of water injection the cost would be greater than the $1,000 per ton guideline. In addition to the higher cost of using a dual-fuel turbine, the applicant has stated that the use of the turbine has disadvantages in terms of both the load following capabilities and the electrical/thermal energy output ratio.

For this installation the electrical demand is constantly changing. In accordance with these load changes, the power production unit must have good load following capability. Dual fueled turbines have much poorer load following capabilities than the proposed IC engines. Also with regard to energy output, the proposed IC engines produce a higher percentage of electrical output than gas turbines which better satisfies the energy demands of this facility. These characteristics for the alternatives available are given in Table 1.

The steam electric cycle is another option that, like the proposed dual fuel IC engine, has good load following capability but has the disadvantage of a much poorer electrical conversion efficiency resulting in higher operating costs for a given output. The applicant has estimated the annual fuel cost of using the steam electric cycle to result in an additional \$3,800,000 when compared to the proposed IC engines. Assuming a typical control level (NSPS) for the steam electric cycle of 0.20 pounds per million Btu the cost of control can be evaluated.

This NSPS emissions level (0.20 pounds per million Btu) equates to an annual NOx emission of approximately 118 tons per year (reduction of 972 tons). Based on these figures the cost of control is approximately \$4,099 per ton of NOx which is well above the cost guideline and is deemed to be prohibitively expensive.

The combined cycle is the final alternative to be evaluated. A combined cyle configuration typically utilizes a gas turbine as the first means of producing electrical enerey, then uses the heat energy of the turbine's exhaust to produce steam which is passed through a steam turbine/generator as the second means of generating electrical energy. The combined cycle, one of the newest and most common cogeneration configurations, is being used increasingly in the State of Florida.

In comparison to dual fuel turbines, the combined cycle has a higher installed cost due to the additional cycle but has a lower operating cost which is attributed to increased efficiency. The applicant has indicated that the annualized cost of purchasing, installating and operating a combined cycle facility results in an additional \$1,000,000. Assuming an uncontrolled NOx reduction which is equivalent to that of the dual fuel turbine (481 tons per year) the cost to control NOx would be approximately \$2,079 per ton. As previously explained, it is expected that this cost per ton figure would decrease as control was enhanced by water injection, but the cost would likely remain above the \$1,000 per ton guideline.

The Department agrees with the applicant that BACT for SO_2 and CO is represented by low sulfur fuel and the application of good combustion techniques. During the normal mode of operation (dual fuel) the only pollutant other than NOx which exceeds the significant level, thereby requiring BACT, is CO. A review of the BACT/LAER Clearinghouse indicates that BACT for CO in nearly all cases is good combustion techniques.

Environmental Impact Analyses

The impacts analyses for the BACT determination is based on dual fuel operation. The applicant has stated that diesel will be used as the primary fuel only during natural gas curtailment. It is expected that natural gas curtailments would be very rare, lasting no more than one to two weeks.

Assuming the units operate in the dual fuel mode at an annual availability of 92%, the only pollutant requiring a BACT analyses that contributes significantly to ambient impacts is NOx. For dual fuel operation the maximum resulting annual NOx impact from the IC engines is estimated to be 14.7 ug/m^3. When the concentrations contributed by other sources and the background are taken into consideration, the resulting impact would be 45.3 ug/m^3 which is less than the Florida Ambient Air Quality Standard of 100 ug/m^3. For diesel operation the resulting impact would be increased to 65.3 ug/m^3. It is expected that the actual NOx impact resulting from the IC engines will be closer to that modeled for dual fuel operation since the time spent in the diesel firing mode would be limited. It should be noted, however, that the impacts associated with either dual fuel or diesel firing contribute significantly to the NOx concentration especially when compared to the impacts from other sources.

Although the engines are expected to operate essentially all of the time in the dual fuel mode, the firing of the engines with diesel as the primary fuel would serve to increase the impacts of NOx and SO_2. The SO_2 impact would significantly contribute to the SO_2 concentration in the area for diesel operation, however, during the normal firing mode (dual fuel) SO_2 emissions would be minimal. As is the case, the firing of low sulfur content diesel is deemed to be BACT for SO_2 since the use of diesel as the primary fuel should be limited to only a few days each year.

Conclusion

The Department has determined that the installation of three dual fuel internal combustion engines with the emissions limitations established in this evaluation represent BACT. This decision is based largely on the fact that several other large bore IC engines have been recently permitted with similar emission limitations (See Table 2). A review of the available power production/control alternatives which would provide a reduction in NOx emissions indicates that the cost of providing the control exceeds the cost per ton guideline. It should be noted, however, that BACT should be a level of control which is at least as stringent as NSPS, thus the cost to provide BACT could be higher than that proposed for NSPS and yet be considered reasonable. For example, the South Coast Air Quality Management District (Los Angeles area) in California, which has high ambient levels of nitrogen oxides, has established a BACT cost guideline of $9,000 per ton of NOx controlled. Although each of the alternatives evaluated would easily fall within these cost guidelines, it has been determined that the concerns of the applicant to have power production equipment which has dual fuel capability, good load following characteristics, and a high electrical to thermal output ratio are sufficient to warrant the use of dual fuel IC engines in this particular case.

It is important to note that this BACT determination is based on the assumption that the annual VOC emissions will remain below 100 tons per year. For VOC emissions equal to or greater than 100 tons per year the Lowest Achievable Emission Rate (LAER) would be applied for the pollutant VOC and the determination of BACT for NOx could differ as well. This is based on the fact that NOx is known to be a precursor to ozone thus a strategy to minimize the formation of ozone should stress good control of NOx. This strategy of focusing the control on the NOx emissions has been used by other permitting authorities in the U.S. when permitting internal combustion engines. Because this BACT determination took into consideration that annual VOC emissions would not equal or exceed 100 tons per year, documentation should be provided on a regular basis that this limitation will not be equaled or exceeded. As is the case, the applicant should be required to limit the overall hours of operation or provide monitoring, unless it can be shown that actual VOC emissions will remain well below the 100 ton per year level.

It should also be noted that the NOx impacts attributed to this facility as proposed appear to be high in comparison to other sources which are large emitters of nitrogen oxides. This is of particular importance in view of the current studies with regard to establishing NOx increments and NOx reduction controls. As is the case, the applicant may want to consider the options available to further reduce the NOx impacts which will be directly attributed to this installation.

PRATT & WHITNEY COGENERATION PROJECT

COMPARISON OF SPECIFIC FUEL CONSUMPTION (HEAT RATE) FOR PRIME MOVER OPTIONS

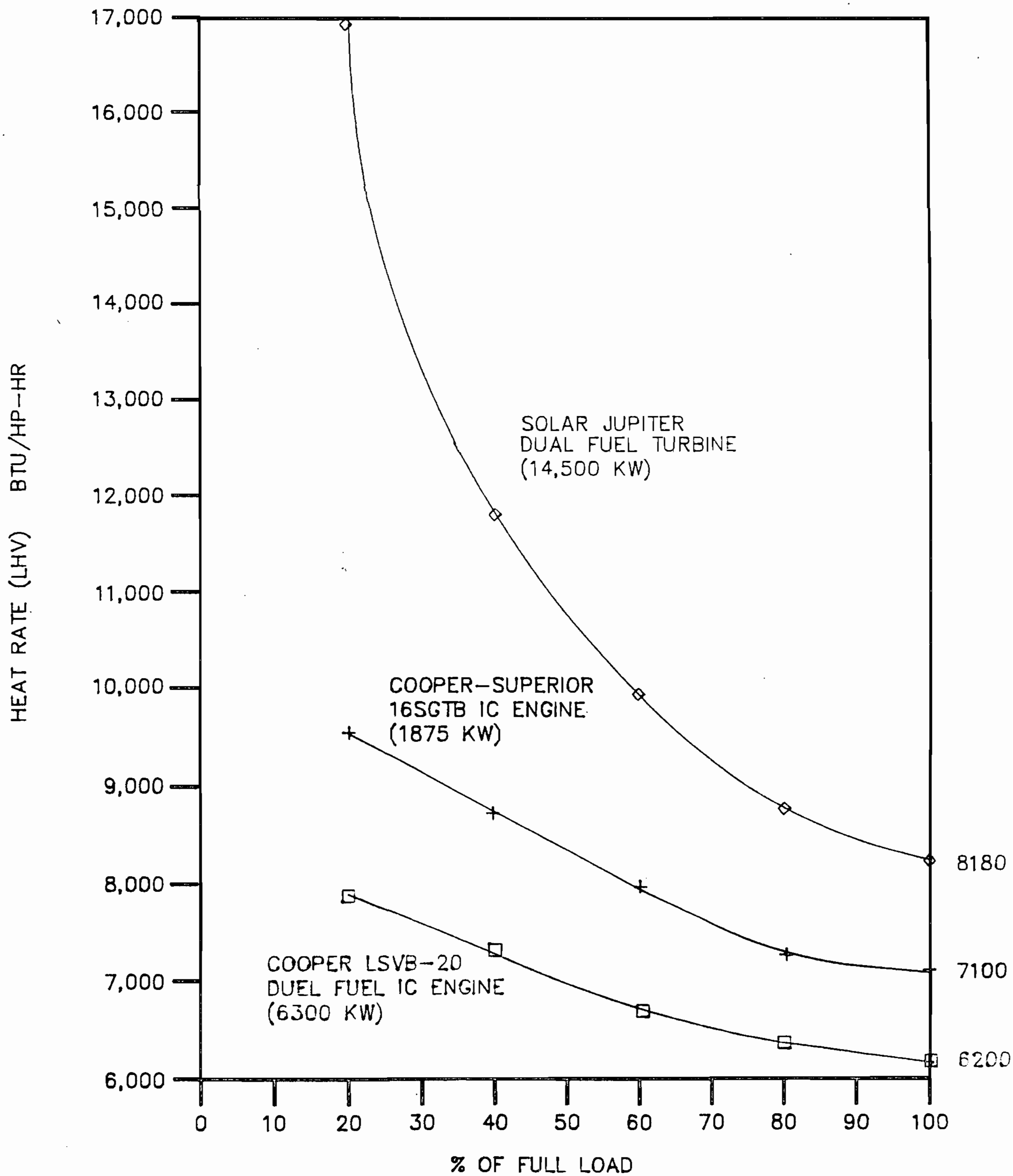

Figure 1

TABLE 1

COMPARISON OF PRIME MOVER CAPABILITIES TO PRATT & WHITNEY DESIGN REQUIREMENTS

Prime Mover	Cycle	Approximate Electricity Conversion Efficiency	Load Following Capability*	Fuel Capability
Boiler/Steam Turbine	Rankine	(20%)	Good	Natural Gas/Fuel Oil
Gas Turbine	Brayton	(31%)	Poor	Natural Gas/Fuel Oil
Spark IC Engine	Otto	(36%)	Fair	Natural Gas
Compression IC Engine	Diesel	(41%)	Good	Natural Gas/Fuel Oil

* See Figure 1

Table 2. Recent Large Bore Installations and Permitted NO_x Emission Rates

Site	Operation Date	Engines	Fuel Type	NO_x Emissions
City of Easton, MO	late '88	2x6300 KW (cooper)	#2 oil of the backup	12 gm/bbp-hr
Harrisburg, PA (Steam Works)	Eng. #1-9/85 Eng. #2-6/87	2x6300 KW	Dual fuel	Permit levels of 6.0 gm/bhp-hr on duel fuel & 12.0 on 100% fuel oil. Currently, they have temporary permit for engines but have met emissions test. Final permit expected shortly. Facility contact: Jim Floyd (717) 231-3838.
South Texas Univ., TX	1988	1x6300 KW	Dual fuel	Guaranteed limits of 5.0 & 12.0 gm/bhp-hr for dual fuel & 100% fuel oil. Facility contact Jerry Smith or Tom Atlee, (713) 266-6900.
Trenton, NJ Dist. Heating	1984	2x6300 KW	Dual fuel	Guaranteed NO_x limits are 5 or 12.0 gm/bhp-hr. Facility Contact: Mr. Brody (609) 395-7837.
City of Cushing, OK	Mid 1988	1x6300 KW	Dual fuel	Guaranteed NO_x limits are 5.0 & 12.0 gm/bhp-hr. For dual fuel and 100% fuel oil firing, respectively. Permit conditions being reviewed. This is an addition to an existing facility permit. Permit expected in 1988.
3M Corp. Austin, TX	1988	2x6300 KW	Dual fuel	Guaranteed NO_x limits 5.0 & 12.0 gm/bhp-hr for dual fuel 100% fuel oil firing, respectively.
Indiana Univ. of Penn., PA	1988	4x6300 KW	Dual fuel	Same as above

Details of the Analysis May be Obtained by Contacting:

Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Recommended by:

____
C. H. Fancy, P.E.
Deputy Bureau Chief, BAQM

____
Date

Approved by:

____
Dale Twachtmann, Secretary

____
Date

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COMBUSTION ENGINEERING

DER
JAN 29, 1988
BAQM

January 28, 1988
0013-002-026

Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

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

SUBJECT: Application to Construct Cogeneration Project - Four Diesel Engines
Permits No. AC 50-133747, 48, 49, 50 and PSD-FL-120
(Pratt & Whitney Site)

Dear Mr. Fancy:

This correspondence is transmitted to request that the Department of Environmental Regulation issue the Permits to Construct for the diesel engine cogeneration project to be located at the Pratt & Whitney facility in Palm Beach County in the name of PW Ventures, Inc., rather than Power Ventures. PW Ventures, Inc. is a single purpose corporation which has been created by Power Ventures specifically to own and operate the Pratt & Whitney Cogeneration Project. The address of PW Ventures, Inc. is 1000 Prospect Hill Road, Windsor, CT 06095. As President of PW Ventures, Inc. and a corporate officer of Power Ventures, I am authorized to make this request.

It is my understanding that the Department plans to make its final decision regarding these permits shortly. I trust that the enclosed information has been submitted soon enough to enable the Department to make this name change prior to permit issuance.

Power Projects, Inc.
A subsidiary of
Combustion Engineering, Inc.
320 Lennon Lane
Walnut Creek, California 94598
(415) 746-3000

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~~C~~
~~B~~ FYI

ij

If the Department has any questions regarding this matter or we can provide further clarification, please contact me at (203) 285-9247, our local representative in Florida, Mr. Tom Reedy, at (305) 886-3104, or our consultant, Mr. Ken Kosky of KBN Engineering and Applied Services, Inc., at (904) 375-8000.

Sincerely,

Robert D. Fagan

Robert D. Fagan
President - PW Ventures, Inc.

Enclosure

cc: Barry Andrews (DER)
Ken Kosky (KBN)

RDF:TH:lmw

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Max Linn
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CARLOS ALVAREZ
BRIAN H. BIBEAU
ELIZABETH C. BOWMAN
WILLIAM L. BOYD, IV
RICHARD S. BRIGHTMAN
PETER C. CUNNINGHAM
WILLIAM H. GREEN
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ELEANOR M. HUNTER
DAVID L. POWELL
CHERYL G. STUART

OF COUNSEL
W. ROBERT FOKES

DER
JAN 27, 1988 mr
BAQM

January 27, 1988

HAND DELIVERED THIS DATE

Mr. Dale H. Twachtmann, Secretary
c/o Office of General Counsel
Florida Department of Environmental
Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Power Ventures
Air Construction Permits
DER File Nos. AC 50-133747, 50-133748,
50-133749, 50-133750; PSD-FL-120
OGC Nos. 87-1276, 87-1277, 87-1278,
87-1279, 87-1280

Dear Secretary Twachtmann:

On or about September 16, 1987, applicant, Power Ventures, received the Department's "Notice of Intent to Issue" the referenced air permits authorizing construction of four diesel engines, along with the accompanying "Technical Evaluation and Preliminary Determination" dated September 14, 1987. The intent to issue was signed by Clair H. Fancy, Deputy Chief of the Bureau of Air Quality Management. Pursuant to your order dated January 8, 1988, Power Ventures has until January 28, 1988 to file a petition for administrative proceedings regarding the Department's proposed agency action on these permits.

I am writing on behalf of Power Ventures to request an extension of twenty-nine (29) days, to and including February 26, 1988, in which to file a petition for administrative proceedings regarding the Department's proposed action on

1-28-88

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CARLOS ALVAREZ
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ELEANOR M. HUNTER
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CHERYL G. STUART

OF COUNSEL
W. ROBERT FOKES

DER
JAN 27, 1988
BAQM

January 27, 1988

HAND DELIVERED THIS DATE

Mr. Dale H. Twachtmann, Secretary
c/o Office of General Counsel
Florida Department of Environmental
Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Power Ventures
Air Construction Permits
DER File Nos. AC 50-133747, 50-133748,
50-133749, 50-133750; PSD-FL-120
OGC Nos. 87-1276, 87-1277, 87-1278,
87-1279, 87-1280

Dear Secretary Twachtmann:

On or about September 16, 1987, applicant, Power Ventures, received the Department's "Notice of Intent to Issue" the referenced air permits authorizing construction of four diesel engines, along with the accompanying "Technical Evaluation and Preliminary Determination" dated September 14, 1987. The intent to issue was signed by Clair H. Fancy, Deputy Chief of the Bureau of Air Quality Management. Pursuant to your order dated January 8, 1988, Power Ventures has until January 28, 1988 to file a petition for administrative proceedings regarding the Department's proposed agency action on these permits.

I am writing on behalf of Power Ventures to request an extension of twenty-nine (29) days, to and including February 26, 1988, in which to file a petition for administrative proceedings regarding the Department's proposed action on the referenced permits. This request is made pursuant to F.A.C. Rule 17-103.070, which provides that a timely request for extension of time shall toll the running of the time period in which a petition must be filed. As good cause for granting this extension of time for filing, Power Ventures would show the following:

1. The permits proposed by the Department would include limitations on emissions of nitrogen oxides from the diesel engines based upon the Bureau of Air Quality Management's Technical Evaluation and Preliminary Determination.

2. Power Ventures has serious concerns about the proposed nitrogen oxides emission limits and the preliminary determination underlying those limits.

3. Representatives of Power Ventures met with staff of the Bureau of Air Quality Management on September 25, 1987 to discuss the concerns of the applicant and its consultants regarding the proposed nitrogen oxides emission limits. As a result of that meeting, Power Ventures submitted additional engineering information to the Department by letter dated October 23, 1987. In view of subsequent discussions with BAQM staff, Power Ventures decided to revise the project by deleting one of the proposed diesel engines, as indicated in a letter submitted to the Department on January 20, 1988. With this change, it appears that all outstanding issues have been resolved, and that appropriate revisions to the permits will be made in the near future.

4. This request is filed as a protective measure to avoid waiver of Power Ventures' right to challenge the Department's proposed agency action with respect to the referenced permits. Grant of this request will allow the parties an opportunity to achieve a mutually acceptable resolution of the issues in question, without the initiation of formal administrative proceedings. It is anticipated that twenty-nine additional days will provide sufficient time for final resolution.

I hereby certify that I have spoken with Barry Andrews, BACT Coordinator for the Department's Bureau of Air Quality Management, and that he expressed agreement with the grant of this request.

BEST AVAILABLE COPY

Mr. Dale H. Twachtmann
January 27, 1988
Page 3

Accordingly, I respectfully request that you formally extend the time for filing of a petition for administrative proceedings in regard to the Department's proposed agency action on air construction permits Nos. AC 50-133747, 50-133748, 50-133749, 50-133750 and PSD-FL-120 to and including February 26, 1988.

Sincerely,

Peter C. Cunningham
James S. Alves
Counsel for Power Ventures

/gb

cc: Barry Andrews, P.E.
Betsy Pittman, Esquire
Tom Reedy
Ken Kosky

Copied: Barry Andrews,
[illegible]
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DER
JAN 21, 1988
BAQM

January 20, 1988

Mr. C.H. Fancy, P.E.
Deputy Chief, Bureau of Air Quality Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Application to Construct Cogeneration Project- Four Diesel Engines

Permits No. AC 50-133747, -48, -49, -50 and PSD-FL-120 (Pratt & Whitney Site)

Attention: Barry Andrews, BACT Coordinator

Dear Barry:

This correspondence is being submitted on behalf of the applicant, Power Ventures to confirm decisions regarding the number of diesel engines to be constructed and total volatile organic compound (VOC) emissions.

Based upon the electric load demands of the Pratt & Whitney facility only three diesel engines will be constructed. As a result, air construction permits will be required for only three engines. With three engines, the total emissions and impacts from the cogeneration plant will be three-fourths of that indicated in the PSD analysis.

The VOC emissions at three-fourths of the value listed in the PSD analysis would be 101.25 tons/year (refer to Table 2-2). Since a conservative 92% annual availability factor was used to calculate annual VOC emissions and additional information from engine manufacturers suggests that VOC emissions may be lower than indicated,

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Barry Andrews
Bureau of Air Quality Management
Florida Department of Environmental
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2600 Blair Stone Road, Room 338
Tallahassee, Florida 32399-2400

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Your Phone Number (Very Important): (904) 375-8000
Company: KBN ENG & APPLIED SCIENCES
Department/Floor No.
Street Address: 5700 SW 34TH STREET STE 1262
City: GAINESVILLE State: FL ZIP Required For Correct Invoicing: 32608

2 To (Recipient's Name) Please Print: Mr. C.H. Fancy, P.E.
Recipient's Phone Number (Very Important): 904 488-4805
Company: Dept. of Environmental Reg. (DER)
Department/Floor No.
Exact Street Address (Use of P.O. Boxes or P.O. ® Zip Codes Will Delay Delivery And Result in Extra Charge.): Twin Towers Office Building
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total VOC emissions from the facility are projected to be below 100 tons/year and non-attainment provisions would not apply. Power Ventures would agree to permit conditions that limits VOC emissions to less than 100 tons/year for the three engines. Placing this emissions limit cap on the three engines would allow operational flexibility.

Please call if you have any questions.

Sincerely,

Ken Kosky

Kennard F. Kosky, P.E.
Principal Engineer

cc: T. Hibbler

Copied: Barry Andrews
Pradip Raval
Max Linn
CHF/BT

1/21/88 mr

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ATTORNEYS AND COUNSELORS

SUITE 420, FIRST FLORIDA BANK BUILDING
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(904) 222-7500

December 28, 1987

DER
DEC 28 1987
BAQM

<u>HAND DELIVERED THIS DATE</u>

Mr. Dale H. Twachtmann, Secretary
c/o Office of General Counsel
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Power Ventures
Air Construction Permits
DER File Nos. AC 50-133747, 50-133748, 50-133749, 50-133750;
PSD-FL-120

Dear Secretary Twachtmann:

On or about September 16, 1987, applicant, Power Ventures, received the Department's "Notice of Intent to Issue" the referenced air permits authorizing construction of four diesel engines, along with the accompanying "Technical Evaluation and Preliminary Determination" dated September 14, 1987. The intent to issue was signed by Clair H. Fancy, Deputy Clerk of the Bureau of Air Quality Management. Pursuant to your orders dated October 19 and November 3, 1987, Power Ventures has until December 29, 1987 to file a petition for administrative proceedings regarding the Department's proposed agency action on these permits.

I am writing on behalf of Power Ventures to request an extension of thirty (30) days, to and including January 28, 1988, in which to file a petition for administrative proceedings regarding the Department's proposed action on the referenced permits. This request is made pursuant to F.A.C.

12·29·87

~~[illegible]~~
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Rule 17-103.070, which provides that a timely request for extension of time shall toll the running of the time period in which a petition must be filed. As good cause for granting this extension of time for filing, Power Ventures would show the following:

1. The permits proposed by the Department would include limitations on emissions of nitrogen oxides from the diesel engines based upon the Bureau of Air Quality Management's Technical Evaluation and Preliminary Determination.

2. Power Ventures has serious concerns about the proposed nitrogen oxides emission limits and the preliminary determination underlying those limits.

3. Representatives of Power Ventures met with staff of the Bureau of Air Quality Management on September 25, 1987 to discuss the concerns of the applicant and its consultants regarding the proposed nitrogen oxides emission limits. As a result of that meeting, Power Ventures has prepared certain engineering information in support of its position on the appropriate nitrogen oxide emission limitations. This information was submitted to the Department by letter dated October 23, 1987. Discussions regarding outstanding issues have continued, but ultimate resolution has been delayed by scheduling conflicts caused by the holiday season.

4. This request is filed as a protective measure to avoid waiver of Power Ventures' right to challenge the Department's proposed agency action with respect to the referenced permits. Grant of this request will allow the parties an opportunity to discuss the applicant's concerns regarding the proposed permits, and to achieve a mutually acceptable resolution of the issues in question, without the initiation of formal administrative proceedings. It is anticipated that thirty additional days will provide sufficient time for final resolution.

I hereby certify that I have spoken with Betsy Pittman, Assistant General Counsel for the Department, and that she stated no objection to the grant of this request.

Accordingly, I respectfully request that you formally extend the time for filing of a petition for administrative proceedings in regard to the Department's proposed agency

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Clair H. Fancy
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
2600 Blair Stone Road, Room 338
Tallahassee, Florida 32399-2400

DER
DEC 28 1987
BAQM

action on air construction permits Nos. AC 50-133747, 50-133748, 50-133749, 50-133750 and PSD-FL-120 to and including January 28, 1988.

Sincerely,

Peter C. Cunningham
James S. Alves
Counsel for Power Ventures

/gb

cc: Clair H. Fancy, P.E.
Betsy Pittman, Esquire
Tom Reedy
Ken Koskey

Copied Pradeep Raval
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Max Linn
Barry Andrews
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Company: KBN ENG & APPLIED SCIENCES

Department/Floor No.

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Recipient's Phone Number (Very Important): 904 ...

Company: ~~Dept.Envir.Regulation(Twin Towers Off.Bldg)~~

Department/Floor No.

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December 14, 1987

Mr. C.H. Fancy, P.E.
Deputy Chief Bureau of Air Quality Management
Department of environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

DER
DEC 15 1987
BAQM

Subject: Application to Construct Cogeneration Project - Four Diesel Engines
Permits No. AC 50-133747, -48, -49, -50 and PSD-FL-120 (Pratt & Whitney Site)

Attention: Barry Andrews, BACT Coordinator

Dear Barry:

This correspondence is to clarify information submitted in the October 23, 1987 letter as you requested on December 9, 1987. Presented below are itemized responses to your information request.

1. The statement on page 3, 3rd complete paragraph, first sentence refers to steam electric cycles that would typically be installed for a cogeneration project. Presented in Table A is a comparison of the energy requirements of a dual fuel IC Engine and a standard steam cycle of the type that would be installed. Note that the energy usage for this option is greater than the no project alternative presented in Table 2 of the October 23, 1987 letter. The reason for this is the low steam requirements for the project. Table B presents the capital, operating and total annualized cost differentials for the steam cycle relative to the proposed dual fuel engines.

2. The need for backup fuel for the prime mover is a design requirement placed on the project by Pratt & Whitney. If spark ignited, IC Engines were used and Natural Gas were curtailed, there would be an additional cost of \$5,688/Day (79 x 10^6 BTU/HR x \$3/10^6 BTU x 24 hours) to assure thermal requirements. Electric power would be purchased from the local utility.

3. Tables A and B include the energy requirements and cost differentials respectively for a combined cycle facility (gas

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604 904/375-8000

turbine with heat recovery steam-electric generator). There are two significant problems with this alternative for the Pratt & Whitney project. First, it is difficult to size a combined cycle plant in the energy range required for the Pratt & Whitney project. Second, a combined cycle has the same load following difficulties as a gas turbine. As a consequence, the operating costs will likely be higher than presented in Tables A & B.

4. The annualized costs presented for the small bore spark ignited IC engine of $1,325,000 is the sum of the operating costs ($525,000) and annualized capital costs ($4,000,000 x 0.2 = $800,000, where 0.2 = capital charge factor). The capital charge factor is calculated based on the methodology described in Attachment 1. This is a standard approach used by EPA in calculating cost-effectiveness of air pollution control equipment.

5. The information in Table 1, of the October 23, 1987 letter was based on design and manufacturer's information as follows:

Boiler/Steam Turbine	-	Combustion Engineering Power Projects
Gas Turbine	-	Solar Corporation
Spark IC Engine	-	Cooper Industries
Dual Fuel IC Engine	-	Cooper Industries

Please call if you have any further questions.

Sincerely,

David A. Buff

for Kennard F. Kosky, P.E.
Principal Engineer

attachments

Copied: CHF/BT
Barry Andrews
Pradeep Raval
12.16.87

Table A. Energy Requirements Comparison of Dual Fuel IC Engine, Steam Cycle and Combined Cycle

Parameter	Dual Fuel IC Engine[A]	Steam Cycle[B]	Combined Cycle[C]
1. Heat Rate (Btu/kw-hr)	8,660	17,750	10,690
a. Differential from proposed	-0-	9,090	2,030
2. Additional Steam Requirements (10^6 Btu/hr)	-0-	-0-	-0-
3. Natural Gas Usage (10^6 ft^3/yr)[D]	1,120	2,296	1,382
a. Differential from proposed (10^6 ft^3/yr)[E]	-0-	1,176	262
4. Annual Fuel Cost[F] Differential ($1,000)	-0-	3,810	850
5. Heat Balance[G]			
a. Useful energy(%)			
(1) Electricity	41	20	36
(2) Exhaust	13	25	26
(3) Jacket Water	6	0	0
(4) Lube Oil	3	0	0
(5) Total	63	45	62
b. Losses (%)			
(1) Exhaust/Mechanical	14	10	35
(2) Jacket Water	6	40	0
(3) Lube Oil	2	0	0
(4) Radiation	15	5	3
(5) Total	37	55	38

A. Cooper LSVB-20 (6300 kW).
B. Standard Non Critical Temperature and Pressure Steam Cycle
C. Combined Cycle Using Solar Jupiter (14500kW) Based on Average Load Conditions.
D. Natural gas usage was calculated using the heat rate shown in Figure E for 100% load. Therefore all differentials are conservative estimates. Calculations based on 1050 Btu/ft^3 for pipeline natural gas.
E. Based on an average of 15.5 MWe.
F. Based on a natural gas cost of $3.24/1000 ft^3 from Cost and Quality of Fuels for Electricity Plants, 1985 Department of Energy, July 1986.
G. As a percent of fuel energy.

Table B. Summary of Capital, Operating and Total Annualized Cost Differentials for Alternative Prime Movers Compared to Dual Fuel, IC Engine

Alternative Prime Mover	$/kw Installed	Capital Cost Differential ($1,000)	Annualized Capital Cost Differential* ($1,000)	Operating Cost Differential ($1,000)	Total Annualized Cost ($1,000)
Spark Ignited IC Engine	590	4,000	800	525	1,325
Gas Turbine+	380	4,200	840	1,160	2,000
Steam Cycle	400	400	80	3,810	3,890
Combined Cycle+	420	750	150	850	1,000

* Capital Charge Factor of 0.2 times capital costs.
+ Costs shown do not include penalty of lower heat rate for load fluctuations.

Basis for Derivation of Capital Charge Factor

The annualized capital cost is computed by multiplying the capital cost by the capital charge factor. The capital charge factor is given as:

$$Fn = CR + T(CR - 1/n) - ic/n$$

where,

Fn is the capital charge factor applied to the capital investment to obtain an annualized cost of capital.

C is the capital recovery factor

T is a tax factor

n is the depreciable life of the equipment

i is the investment tax credit.

$$C = \frac{i}{1 - (1 + i)^{-n}}$$

$$T = \frac{t}{1 - t} \times (1 - r \times (id/ie))$$

where,

i is the rate of return

id is the interest rate on debit

ie is the return on equity

r is the debit to equity ratio

t is the marginal income tax (state and federal)

The values of the various parameters that were chosen to represent 1987 economic conditions are as follows:

id = 5.2%

ie = 15%

r = 0.4286 or 0.3 : 0.7

t = 0.4

n = 16

i = 0

Values calculated from these basic parameters are:

i = 14%

C = 0.1434

T = 0.5

F = 0.208

United States Department of the Interior

NATIONAL PARK SERVICE
AIR QUALITY DIVISION
P. O. BOX 25287
DENVER, CO 80225

IN REPLY REFER TO:
December 7, 1987

N3615(475)

DER
DEC 10 1987
BAQM

Mr. Bill Thomas
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Thomas:

We have reviewed the Prevention of Significant Deterioration (PSD) Permit Application, Technical Evaluation and Preliminary Determination for the Power Ventures cogeneration project located at a site in Palm Beach County, Florida. The site is approximately 25 km from Loxahatchee National Wildlife Refuge, a class II area and 360 km from Chassahowitzka National Wildlife Refuge, a class I area.

The application included analyses for best available control technology, air quality modeling, and air quality related values. Our review of these analyses indicates that they are adequate in assessing the air quality impacts from the proposed facility.

The results of the air quality modeling analysis indicate that there will be no significant impacts on any Fish and Wildlife Service areas due to the proposed facility. The predicted maximum concentration values for all pollutants are below ambient air standards and PSD increments.

We encourage the Bureau of Air Quality Management to advise PSD permit applicants wishing to locate near Federal class I and class II areas that the cumulative impacts (those of the proposed source plus those of existing sources in the area) should also be assessed. This could easily be done as part of the applicant's ambient air quality modeling analysis by placing, at a minimum, a single receptor point at the nearest boundaries of each potentially affected Federal area. Cumulative impacts are of concern because sensitive resources in these areas are subjected to the total ambient concentrations in the atmosphere not just those predicted for proposed individual sources.

12·17·87

CHF

~~[illegible]~~

FYI

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We do not have any specific comments on this application but we do appreciate the opportunity to review any information on projects that may impact Fish and Wildlife Service resources.

If you have any questions, please call me or Bud Rolofson at (303) 969-2072.

Sincerely,

Miguel I. Flores

Miguel I. Flores
Chief, Permit Review
and Technical Support Branch

Copied: Pradeep Raval
Barry Andrews
CHF/BT
12/17/87

United States Department of the Interior

NATIONAL PARK SERVICE
AIR QUALITY DIVISION
P. O. BOX 25287
DENVER, CO 80225

IN REPLY REFER TO:
December 7, 1987

N3615(475)

DER
DEC 10 1987
BAQM

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Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
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Miguel I. Flores

Miguel I. Flores
Chief, Permit Review
and Technical Support Branch

Copied: Pradeep Raval
Barry Andrews
CHF/BJT
12/17/87

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

AIR-4

PM
30 NOV
1987

Mr. C. H. Fancy, P.E., Chief
Bureau of Air Quality Management
Twin-Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

DER
DEC 3 1987
BAQM

20

PM
30 Nov. 1987
Atlanta, GA

File Copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 27 1987

4APT/APB

Mr. C. H. Fancy, P. E., Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Power Ventures, PSD-FL-120

Dear Mr. Fancy:

This is to acknowledge receipt of your October 29, 1987, submittal of additional modeling information regarding the above referenced facility. We will retain this information for our files.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Copied Bradley Pascal
Max Linn
CHF/BT
} 12/4/87

file copy

HOPPING BOYD GREEN & SAMS

ATTORNEYS AND COUNSELORS

SUITE 420, FIRST FLORIDA BANK BUILDING
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314
(904) 222-7500

October 30, 1987

HAND DELIVERED THIS DATE

Mr. Dale H. Twachtmann, Secretary
c/o Office of General Counsel
Florida Department of Environmental
Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

DER
OCT 30 1987
BAQM

Re: Power Ventures
Air Construction Permits
DER File Nos. AC 50-133747,
50-133748, 50-133749, 50-133750;
PSD-FL-120

Dear Secretary Twachtmann:

On or about September 16, 1987, applicant, Power Ventures, received the Department's "Notice of Intent to Issue" the referenced air permits authorizing construction of four disel engines, along with the accompanying "Technical Evaluation and Preliminary Determination" dated September 14, 1987. The intent to issue was signed by Clair H. Fancy, Deputy Clerk of the Bureau of Air Quality Management. Pursuant to your order dated October 19, 1987, Power Ventures has until October 30, 1987 to file a petition for administrative proceedings regarding the Department's proposed agency action on these permits.

I am writing on behalf of Power Ventures to request an extension of sixty (60) days, to and including December 29, 1987, in which to file a petition for administrative proceedings regarding the Department's proposed action on the referenced permits. This request is made pursuant to F.A.C.

Rule 17-103.070, which provides that a timely request for extension of time shall toll the running of the time period in which a petition must be filed. As good cause for granting this extension of time for filing, Power Ventures would show the following:

1. The permits proposed by the Department would include limitations on emissions of nitrogen oxides from the diesel engines based upon the Bureau of Air Quality Management's Technical Evaluation and Preliminary Determination.

2. Power Ventures has serious concerns about the proposed nitrogen oxides emission limits and the preliminary determination underlying those limits.

3. Representatives of Power Ventures met with staff of the Bureau of Air Quality Management on September 25, 1987 to discuss the concerns of the applicant and its consultants regarding the proposed nitrogen oxides emission limits. As a result of that meeting, Power Ventures has prepared certain engineering information in support of its position on the appropriate nitrogen oxide emission limitations. This information was submitted to the Department by letter dated October 23, 1987.

4. This request is filed as a protective measure to avoid waiver of Power Ventures' right to challenge the Department's proposed agency action with respect to the referenced permits. Grant of this request will allow the parties an opportunity to discuss the applicant's concerns regarding the proposed permits, and to achieve a mutually acceptable resolution of the issues in question, without the initiation of formal administrative proceedings. It is anticipated that sixty additional days will provide sufficient time for the Department to review the information recently submitted by Power Ventures and to formulate its response.

I hereby certify that I have spoken with Betsy Pittman, Assistant General Counsel for the Department, and that she stated no objection to the grant of this request.

Accordingly, I respectfully request that you formally extend the time for filing of a petition for administrative proceedings in regard to the Department's proposed agency

Mr. Dale H. Twachtmann
October 30, 1987
Page 3

action on air construction permits Nos. AC 50-133747, 50-133748, 50-133749, 50-133750 and PSD-FL-120 to and including December 29, 1987.

Sincerely,

Peter C. Cunningham
Counsel for Power Ventures

cc: Clair H. Fancy, P.E.
Betsy Pittman, Esquire
Tom Reedy
Ken Koskey
Wayne Aronson - EPA
Miguel Flores - NPS } 11/4/87 (my)
Pradeep Raval
Mary Ann

file

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

October 29, 1987

Mr. Miguel Flores
Chief, Permit Review and Technical
Support Branch
National Park Service-Air
Post Office Box 25287
Denver, Colorado 80225

Dear Mr. Flores:

RE: Power Ventures
State Construction Permit Numbers: AC 50-133747, 48, 49,50
Federal Permit Number: PSD-FL-120

Enclosed for your review and comment is additional information submitted by the referenced applicant. The existing facility is within 100 kilometers of the Brighton Indian Reservation, the Loxahatchee National Wildlife Refuge, the Big Cypress Indian Reservation, and the Big Cypress Swamp. Please submit any comments or questions to Pradeep Raval or Max Linn at the above address or call him at (904)488-1344 at your earliest convenience.

Sincerely,

M. V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

cc: P. Raval
M. Linn
W. Aronson, EPA
G. Sacco, PBCDP
S. Brooks, SE Dist.

File

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

October 29, 1987

Mr. Wayne Aronson
Chief
Program Support Section
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Aronson:

RE: Power Ventures
State Construction Permit Numbers: AC 50-133747, 48, 49 & 50
Federal Number: PSD-FL-120

Enclosed for your review and comment is additional information submitted by the referenced applicant. Please submit any comments or questions to Pradeep Raval or Max Linn at the above address or call them at (904)488-1344 at your earliest convenience.

Sincerely,

M.V. Janes

Margaret V. Janes
Planner
Bureau of Air Quality
Management

/bm

enclosure

cc: P. Raval
M. Linn
M. Flores, NPS
G. Sacco, PBCDP
S. Brooks, SE Dist.

PM
27 Oct 1987
West Palm Beach, FL
Airborne Express
3996508?1

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IMPELL POWER PROJECTS

FPL ENERGY SERVICES INC

POWER VENTURES

a Florida partnership

October 23, 1987

DER
OCT 28 1987
BAQM

Mr. C. H. Fancy, P.E.
Deputy Chief Bureau of Air Quality Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

SUBJECT: Application to Construct Four Diesel Engines, Permits No. 5.
AC 50-133747,-48,-49,-50 and PSO-FL-120 (Pratt & Whitney Site)

Dear Mr. Fancy:

In our meeting of September 25, 1987 at your offices, one of the topics we discussed was the design basis used to select the prime movers for the Pratt & Whitney cogeneration project. A summary of this information is presented below. Also, additional information on the air quality impacts of the proposed facility is being presented.

PROJECT DESIGN REQUIREMENTS

The decision to use large bore dual fuel engines results from integrating Pratt & Whitney's site requirements with the available fuels and best suited prime mover technology. There are three basic design requirements for the Pratt & Whitney facility which must be satisfied by the cogeneration system. First, the cogeneration project must be a load following system, thereby satisfying 100% of Pratt & Whitney's electrical and thermal requirements. This is necessary since the Pratt & Whitney project is an internal cogeneration system, i.e., no power sales to the local utility. Many cogeneration projects have a firm sales contract with the local utility for the power produced. These systems (base load systems) are operated at full load at all times. In contrast, the Pratt & Whitney project must vary its electrical energy output to follow the host facility's electrical load. The selection of a prime mover for a load following system is significantly different than that for a base load system.

The second design requirement is that the ratio of electrical to thermal energy of the proposed cogeneration facility matches that required by the Pratt & Whitney site. A facility requiring a large amount of thermal energy

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calls for a prime mover which generates large amounts of waste heat that is readily convertible to thermal energy, e.g., steam or hot water. A facility requiring a small amount of thermal energy requires a prime mover with a minimum amount of waste heat with the majority of the heat input (i.e., fuel) converted to shaft horsepower, producing electricity. The Pratt & Whitney site requires a small amount of thermal energy (approximately 32%) relative to the amount of electric energy (approximately 68%).

The third design requirement is that backup fuel capability is required. This backup fuel design requirement ensures a continual fuel supply and plant operation during periods of emergency natural gas curtailments. This design requirement is necessary for this cogeneration project.

The selection of the prime movers was therefore made within the framework of Pratt & Whitney's specific design requirements:

1. Load Following Capabilities - The prime mover must operate efficiently at various electrical loads, be able to load follow easily, and respond to load changes rapidly, including drastic load changes. For example, drastic load changes are caused by starting large electric motors and Pratt & Whitney has a 5,000 HP electric motor drive for an air compressor. (Pratt & Whitney load profiles are attached as Figures A, B, C & D. The annual average electrical load is 15.5 MW.)

2. Electrical/Thermal Energy Output Ratio - A high ratio of electrical/thermal energy output is required at the Pratt & Whitney facility. Therefore, the maximum amount of fuel input to the prime movers must be converted to electricity. This calls for a highly efficient prime mover.

3. Dual Fuel Capabilities - The prime movers must be capable of burning at least two different fuels.

PRIME MOVER SELECTION

Since fuel costs and availability are a major determinant in system design, the next step in the prime mover analysis was fuel selection.

Natural gas was chosen as the primary fuel based on its availability,ease of transportation and environmental qualities. The Florida Gas Transmission (FGT) pipeline runs across the Pratt & Whitney site and the cogeneration project's demand capacity can easily be served through this pipeline.

Since natural gas was the logical choice as the primary fuel, No. 2 (light) fuel oil was selected as the backup fuel. This choice of fuel oil as the secondary fuel was based on such factors as transportation and storage, but most importantly on the fact that many prime movers which burn natural gas can also burn fuel oil.

Once the primary and secondary fuels had been chosen, cogeneration and prime mover system cycles were reviewed. Cogeneration systems are grouped into two main categories (cycles): topping cycle systems and bottoming cycle systems. A topping cycle cogeneration facility is one in which the energy input to the facility is first used to produce useful electrical power and the reject heat from power production is then used to produce useful thermal energy. A bottoming cycle cogeneration facility is one in which the energy input to the system is first applied to a useful thermal energy process and the reject heat emerging from the process is then used for electrical power production. Topping cycles are more widely used, with bottoming cycles usually limited to industrial processes where high-pressure high-temperature steam is generated for process use and subsequently run through a steam turbine to generate electricity. Since Pratt & Whitney's thermal energy uses require low-pressure low-temperature steam, the bottoming cycle was ruled out and the topping cycle configuration chosen.

Topping cycle cogeneration systems use four basic prime mover types or cycles:

* Boiler/Steam Turbine - Rankine Cycle
* Gas Turbine - Brayton Cycle
* Spark Ignition Internal Combustion (IC) Engine - Otto Cycle
* Compression Ignition Internal Combustion Engine - Diesel Cycle

A boiler coupled with a steam turbine has acceptable load following and backup fuel capabilities, but a system of this type is used only in applications where large amounts of thermal energy are required and electrical power production is of limited importance. Gas turbines are more efficient for generating electricity and they generally are capable of burning light grade fuel oil (dual fuel turbines). However, this type of prime mover performs poorly at partial load levels. While spark ignition IC engines are more efficient than gas turbines and have better load following capability, they are not capable of burning a backup fuel and this makes them unacceptable for projects which require fuel flexibility. Compression ignition IC engines have the greatest electrical conversion efficiency and load following capability as good or better than any of the other prime mover types. Used as dual fuel engines these prime movers normally operate on a mixture of 95% natural gas and 5% fuel oil. In dual-fuel engines, the natural gas charge is admitted to the cylinder before or during the early part of the compression stroke. Burning is initiated by a small charge of pilot fuel oil that is injected near the end of the compression stroke. The pilot fuel oil supplies approximately 5% (at full load) of the total heat charge to the cylinder, its chief purpose being to start the burning of the air-natural gas mixture. In case of a gas shortage, the engines can be operated on any percentage of gas and oil up to 100% fuel oil. These engines thus provide maximum use of natural gas while providing backup fuel capability.

Table 1 compares each prime mover considered to the design requirements for Pratt & Whitney. More detailed information on the energy use and load following capability of Dual Fuel, Compression Ignited IC Engines, Spark Ignited IC Engines and Gas Turbines is presented in Table 2 and Figure E. A comparison of this information supports the following facts regarding the design requirements for Pratt & Whitney:

1. Load Following Capabilities - At full load operation the spark-ignited IC engine and gas turbine require 14.5% and 31.9% more fuel, respectively, than the proposed project. At 50% load fuel differentials increase relative to a dual fuel compression ignited IC engine to 18.6% for a spark ignited IC engine and 52.9% for a gas turbine.

2. Electrical/Thermal Energy Output Ratio - As shown in Table 2, the electricity produced by the gas turbines is 54% of the total useful energy, while for dual fuel, compression ignited IC and spark-ignited IC engines the electricity is about 65% of the useful energy. It should be noted that the total useful energy from a spark ignited IC engine is 12.5% less than from a dual fuel, compression ignited IC engine.

3. Dual Fuel Capabilities - Both the gas turbine and dual fuel, compression ignited IC engines are capable of burning both natural gas and fuel oil.

On the basis of this information, dual fuel, compression ignited IC engines are the only prime mover type capable of adequately meeting the Pratt & Whitney project's 3 major design requirements.

ECONOMIC CONSIDERATIONS

Once the prime mover type had been chosen, prime mover sizing was investigated. Given the need for 19 MWe of power output from dual fuel, compression ignited IC engines, large bore (i.e., greater than 5 MWe each) engines are the best choice. Larger engines are more fuel efficient and the larger the output per engine, the less the installed cost per MW.

As with many parts of cogeneration project design, project economics play a strong role in prime mover selection. This is particularly true for prime mover sizing. Alternative prime mover sizes and types were reviewed for the Pratt & Whitney project. The results of this review showed that small bore (i.e., less than 2 MWe per engine) IC engines or dual fuel turbines would not be economically viable for this project. In the case of smaller bore spark-ignited IC engines, approximately ten engines would be required instead of three large bore units. The cost penalty to procure and install small units would add more than 50% to the engine-generator cost (small bore engine cost of $590/KW vs. $380/KW for a large bore engine), resulting in a project capital cost increase of about $4,000,000. Since smaller bore engines have poorer electrical conversion efficiency, an additional fuel cost penalty (15% minimum, see Figure E) would be imposed on the project. This would amount to an additional fuel cost of at least $525,000 per year (see Table 2).

The economic impact of using dual fuel turbines was also investigated. Turbine sizing for this project is more difficult than IC engine sizing since there are fewer turbine sizes available in the required electrical output range. Selecting a dual fuel turbine with an output of no more than <19-20 MWe is difficult. One available turbine (rated at 14,500 KW) would cost approximately the same as large bore IC engines on a per KW basis (approx. $380/KW). However, due to its limited output, this turbine could not meet the facility's load requirements. Smaller turbines, e.g., 7700 KW output, would mean using three units. The capital cost would be 30% more per KW than large IC engines (i.e., $495/KW vs. $380/KW); a total capital cost of about $4,200,000. As shown in Figure E and Table 2, the fuel cost at full load associated with a 14,500 KW turbine would be about 32% ($1,160,000 per day) more than a large bore dual fuel engine and the fuel cost penalty increases to 45% at 60% partial load. It should be noted that fuel costs at full load operation for smaller gas turbines would be 40% more than a large bore dual fuel with this fuel cost penalty increasing to more than 50% at 60% partial load operation. The additional capital and operating costs imposed by small bore engines or dual fuel gas turbines is tantamount to a no-project alternative.

Without this project, the future steam and electrical production needs for the Pratt & Whitney facility would be met by the existing electrical connection and either existing or new fossil steam generation. To evaluate the consequences of this alternative, the natural gas requirements for satisfying the facilities electric and thermal load, i.e., 15.5 MWe plus thermal lead, was calculated and is presented in Table 2.

As this table shows, the No-Project Alternative would require a 74% increase (321×10^6 ft^3) in natural gas in energy usage over the proposed project and additional annual fuel costs (based on natural gas) of $2,700,000.

COST PER NO_x REMOVED

Based on an average facility load of 15.5 MW, the total annualized cost (i.e., operational and annualized capital) for the small bore engine is over $1,325,000/yr. (For the gas turbine the annualized cost would be even greater.) The NO_x reduction from 5 g/Bhp-hr to 2 g/Bhp-hr is 626.6 tons at 15.5 MW. The cost for NO_x control is therefore in excess of $2,100/ton NO_x removed. The most recent EPA promulgation for NO_x control from new sources cites an acceptable range of $340/ton to $580/ton of NO_x removed (refer to Federal Register Vol. 51, No. 227 Tuesday, Nov. 25, 1986, page 42771, which is attached).

NOx EMISSIONS WITH RESPECT TO PRIME MOVER SELECTION

We have reviewed our selection of the large bore, dual fuel, compression ignited IC engine prime mover with the potential equipment suppliers to determine what emissions control levels and strategies are available. This review included clean burn technology and catalytic reduction of NOx. Based on the available technology and industry practice and supported by written responses from suppliers (refer to attached letters), these approaches to emissions control are not achievable for large bore dual fuel engines. The best NOx control technology available from these suppliers for this type of prime mover limits NOx emissions to 5.0 gm/bhp-hr.

This prime mover has been selected for similar projects and approved by air permitting districts throughout the country. Some of these recent installations are in Table 3.

Based on the host facility's requirements, the available and most practical fuel supplies, current prime mover technology, and the best industry standards for NOx emissions control, large bore dual fuel engines at 5.0 g/bhp-hr are the Best Available Control Technology for the Pratt & Whitney cogeneration project.

NO_2 IMPACT ANALYSES USING THE ISCLT MODEL

Air dispersion modeling analyses were performed for estimating annual average NO_2 concentrations due to the proposed facility and other NO_2 emission sources for determining total air quality impacts. Because the Florida and National Ambient Air Quality Standards (AAQS) for NO_2 concentrations have been established as an annual average (100 ug/m^3) and there are no short-term NO_2 AAQS, annual average concentrations were produced using the ISCLT model. This model is currently recommended and approved by the United States Department of Environmental Protection Agency (USEPA) and Florida Department of Environmental Regulation (FDER) for addressing annual average impacts from stack emissions, such as those from the proposed facility. Although results from other models such as the ISCST may be used for comparison to ambient standards, the use of the ISCLT model for determining compliance with AAQS is considered most appropriate for the following reasons:

1. The ISCLT was specifically developed to estimate long-term average concentrations, such as annual averages, based on the annual frequencies of meteorological conditions;

2. The ISCLT is currently recommended by the EPA in the "Guideline on Air Quality Models" (Revised) (EPA-450/2-78-027R, July 1986) as a preferred model for addressing long-term average impacts for industrial sources, with potential modeling complications due to building downwash; and

3. Other models may produce annual average concentrations but these models are designed specifically to address short-term episodic (i.e., 24-hours or less) air quality impacts. For example, the ISCST model produces concentrations for each hour in the meteorological database, and then sums the hourly concentrations to produce 3- or 24- hour average concentrations. Although an annual average can be produced by averaging all of the one hour concentrations, the USEPA modeling guideline recommends that when modeling for sources for which long-term standards alone are applicable, then the long-term model should be used.

The stack, operating and NO_2 emission data are the same as those presented in Application to Construct an Air Pollution Source (April 1987), with the exception of NO_2 emissions for the dual-fired units. For this case, the maximum emissions are assumed to be 387.7 lb/hr and 1562 TPY, assuming a 92 percent annual availability factor. The original proposed maximum emissions were 466.4 lb/hr and 1,879 TPY. Other model assumptions are the same as those considered in the application to construct, and the responses to DER comments (letter to Mr. C.H. Fancy, dated June 24, 1987) include:

1. Use of regulatory default options;

2. Receptor locations (to determine maximum impacts from the proposed facility, 155 receptors were located in a radial grid centered on the proposed facility, including 59 discrete receptors located at the nearest off-plant property. Also, to estimate the significant impact area, 180 receptors were located from 10 to 50 km from the proposed facility;

3. Five years meteorological data collected between 1970 and 1974 from the National Weather Station at the West Palm Beach Airport. (These data were converted to STAR format, i.e., joint frequencies of 16 wind direction classes by 6 wind speed classes by 6 atmospheric stability classes, for each year.);

4. Stack, operating, and NO_2 emission data from other NO_2 emission sources, including those at the P&W facility.

5. Annual average NO_2 background concentration (i.e., impacts from non-modeled sources) of 22 ug/m^3; and

6. Building downwash considerations for the proposed facility since the stack will be less than Good Engineering Practice (GEP).

A summary of the maximum predicted annual average NO_2 concentrations due to the proposed facility only is presented in Table 4. Under normal operating conditions when the proposed facility is firing dual fuel, the maximum annual average NO_2 concentration is predicted to be 14.7 ug/m^3. When firing diesel fuel, the maximum predicted concentration is 34.7 ug/m^3, which is a conservative estimate (i.e., higher than expected) since the proposed facility would not fire diesel fuel throughout the entire year.

Summaries of the maximum predicted total annual average NO_2 concentrations due to modeled sources added to a background concentration are presented in Tables 5 and 6, which include the proposed facility firing dual and diesel fuels, respectively. Based on these results, the maximum total air quality impacts are expected to be below the Florida and National AAQS of 100 ug/m^3. The maximum total NO_2 concentration of 40.3 ug/m^3 is predicted when the proposed facility is firing dual fuel under normal operating conditions. The proposed facility contributes 36 percent to the maximum total predicted concentration. When the proposed facility is firing diesel fuel, the maximum total NO_2 concentration is predicted to be 60.3 ug/m^3. The proposed facility contributes 58 percent to this maximum total concentration. However, this is an estimate of maximum impacts and should not be used for comparison with AAQS since the proposed facility will only use diesel fuel on an emergency basis, i.e., when natural gas is interrupted.

The maximum NO_2 concentrations predicted at the nearest monitoring station to the proposed facility (i.e., Water Treatment Plant, West Palm Beach) are expected to be well below 1 ug/m^3. A summary of the maximum NO_2 concentrations at that monitor location, due to the proposed facility firing dual and diesel fuels, is presented in Table 7.

SUMMARY

As the above demonstrated Power Ventures and its consultants have carefully evaluated the specific energy requirements for the Pratt & Whitney facility and the recommendation for BACT. We respectfully request if additional information or clarifications are required, please contact me or Ken Kosky of KBN Engineering and Applied Sciences, Inc.

Sincerely,

Tom Reedy

Tom Reedy
Vice President

POWER VENTURES

TABLE 1

COMPARISON OF PRIME MOVER CAPABILITIES TO PRATT & WHITNEY DESIGN REQUIREMENTS

Prime Mover	Cycle	Approximate Electricity Conversion Efficiency	Load Following Capability*	Fuel Capability
Boiler/Steam Turbine	Rankine	(20%)	Good	Natural Gas/Fuel Oil
Gas Turbine	Brayton	(31%)	Poor	Natural Gas/Fuel Oil
Spark IC Engine	Otto	(36%)	Fair	Natural Gas
Compression IC Engine	Diesel	(41%)	Good	Natural Gas/Fuel Oil

* See Figure E

Table 2. Energy Requirements Comparison of Dual Fuel IC Engine, Spark-Ignited IC Engine, Gas Turbine and No Project Alternative

Parameter	Dual Fuel IC Engine[A]	Spark Ignited IC Engine[B]	Gas Turbine[C]	No Project Alternative
1. Heat Rate (Btu/kw-hr)	8,660	9,917	11,426	10,000[D]
a. Differential from proposed	-0-	1,257	2,766	1,340
2. Additional Steam Requirements (10^6 Btu/hr)	-0-	-0-	-0-	79[E]
3. Natural Gas Usage (10^6 ft^3/yr)[F]	1,120	1,282	1,478	1,951
a. Differential from proposed (10^6 ft^3/yr)[G]	-0-	162	358	831
4. Annual Fuel Cost[H] Differential ($1,000)	-0-	525	1,160	2,700
5. Heat Balance[I]				
a. Useful energy(%)				
(1) Electricity	41	36	31	N/A
(2) Exhaust	13	11	26	N/A
(3) Jacket Water	6	6	0	N/A
(4) Lube Oil	3	3	0	N/A
(5) Total	63	56	57	N/A
b. Losses (%)				
(1) Exhaust/Mechanical	14	21	40	N/A
(2) Jacket Water	6	6	0	N/A
(3) Lube Oil	2	2	0	N/A
(4) Radiation	15	15	3	N/A
(5) Total	37	44	43	N/A

A. Cooper LSVB-20 (6300 kW).
B. Cooper 16SGTB (1875 kW).
C. Solar Jupiter (14500 kW).
D. This heat rate was used as a conservative estimate of the natural gas required to produce electric energy by the local utility. This heat rate is lower (i.e., conservative) than the average contained in the Florida Electric Power Coordinating Group's 10 year site plan.
E. Calculated using a steam generator efficiency of 70%.
F. Natural gas usage was calculated using the heat rate shwon in Figure E for 100% load. Therefore all differentials are conservative estimates. Calculations based on 1050 Btu/ft^3 for pipeline natural gas.
G. Based on an average of 15.5 MWe.
H. Based on a natural gas cost of $3.24/1000 ft^3 from Cost and Quality of Fuels for Electricity Plants, 1985 Department of Energy, July 1986.
I. As a percent of fuel energy.

Table 3. Recent Large Bore Installations and Permitted NO_x Emission Rates

Site	Operation Date	Engines	Fuel Type	NO_x Emissions
City of Easton, MO	late '88	2x6300 KW (cooper)	#2 oil of the backup	12 gm/bbp-hr
Harrisburg, PA (Steam Works)	Eng. #1-9/85 Eng. #2-6/87	2x6300 KW	Dual fuel	Permit levels of 6.0 gm/bhp-hr on duel fuel & 12.0 on 100% fuel oil. Currently, they have temporary permit for engines but have met emissions test. Final permit expected shortly. Facility contact: Jim Floyd (717) 231-3838.
South Texas Univ., TX	1988	1x6300 KW	Dual fuel	Guaranteed limits of 5.0 & 12.0 gm/bhp-hr for dual fuel & 100% fuel oil. Facility contact Jerry Smith or Tom Atlee, (713) 266-6900.
Trenton, NJ Dist. Heating	1984	2x6300 KW	Dual fuel	Guaranteed NO_x limits are 5 or 12.0 gm/bhp-hr. Facility Contact: Mr. Brody (609) 395-7837.
City of Cushing, OK	Mid 1988	1x6300 KW	Dual fuel	Guaranteed NO_x limits are 5.0 & 12.0 gm/bhp-hr. For dual fuel and 100% fuel oil firing, respectively. Permit conditions being reviewed. This is an addition to an existing facility permit. Permit expected in 1988.
3M Corp. Austin, TX	1988	2x6300 KW	Dual fuel	Guaranteed NO_x limits 5.0 & 12.0 gm/bhp-hr for dual fuel 100% fuel oil firing, respectively.
Indiana Univ. of Penn., PA	1988	4x6300 KW	Dual fuel	Same as above

Table 4. Maximum Predicted Annual Average NO_2 Concentrations Due to the Proposed Facility Only, Firing Dual and Diesel Fuels

Maximum Concentration* (ug/m^3)		Period
Dual Fuel	Diesel Fuel	Year
14.7	34.7	1970
10.8	25.3	1971
13.3	31.2	1972
11.5	27.0	1973
12.3	28.9	1974

* Based on a 92 percent annual availability factor.

Table 5. Maximum Predicted Total Annual Average NO_2 Concentrations for Comparison to AAQS (Proposed Facility Firing Dual Fuel)

Maximum Concentration (ug/m^3)				Receptor Location		
	Total Due To					
Total	Proposed Facility	Other Modeled Sources	Background	Direction (°)	Distance (km)	Period Year
40.3	14.7	3.6	22	250	1.250	1970
36.4	10.8	3.6	22	240	0.914	1971
38.6	13.3	3.3	22	240	0.914	1972
37.1	11.5	3.6	22	250	1.250	1973
37.6	12.3	3.3	22	240	0.914	1974

Note: Florida AAQS is 100 ug/m^3, annual average.

* Based on the proposed facility operating at a 92 percent annual availability factor.

Table 6. Maximum Predicted Total Annual Average NO_2 Concentrations for Comparison to AAQS (Proposed Facility Firing Diesel Fuel)

Maximum Concentration (ug/m^3)				Receptor Location		
	Total Due To					
Total	Proposed Facility	Other Modeled Sources	Background	Direction (°)	Distance (km)	Period Year
60.3	34.7	3.6	22	250	1.250	1970
50.9	25.3	3.6	22	240	0.914	1971
56.5	31.2	3.3	22	240	0.914	1972
52.6	27.0	3.6	22	250	1.250	1973
54.2	28.9	3.3	22	240	0.914	1974

Note: Florida AAQS is 100 ug/m^3, annual average.

* Based on the proposed facility operating at a 92 percent annual availability factor.

Table 7. Maximum Predicted Annual Average NO_2 Concentration at Nearest Monitoring Station* Due to the Proposed Facility Only, Firing Dual and Diesel Fuels

Concentration+ (ug/m^3)		Period
Dual Fuel	Diesel Fuel	Year
0.12	0.28	1970
0.09	0.22	1971
0.12	0.29	1972
0.09	0.23	1973
0.09	0.23	1974

* Palm Beach County monitor located at the Water Treatment Plant, First Street and Tamarind Avenue, West Palm Beach. This monitor is located approximately 41.2 km to the west-southwest (direction of 237 degrees) from proposed unit. Model results based on receptor located at a distance of 40 km along a radial of 240 degrees from proposed unit.

\+ Based on the proposed facility operating at a 92 percent annual availability factor.

Figure A

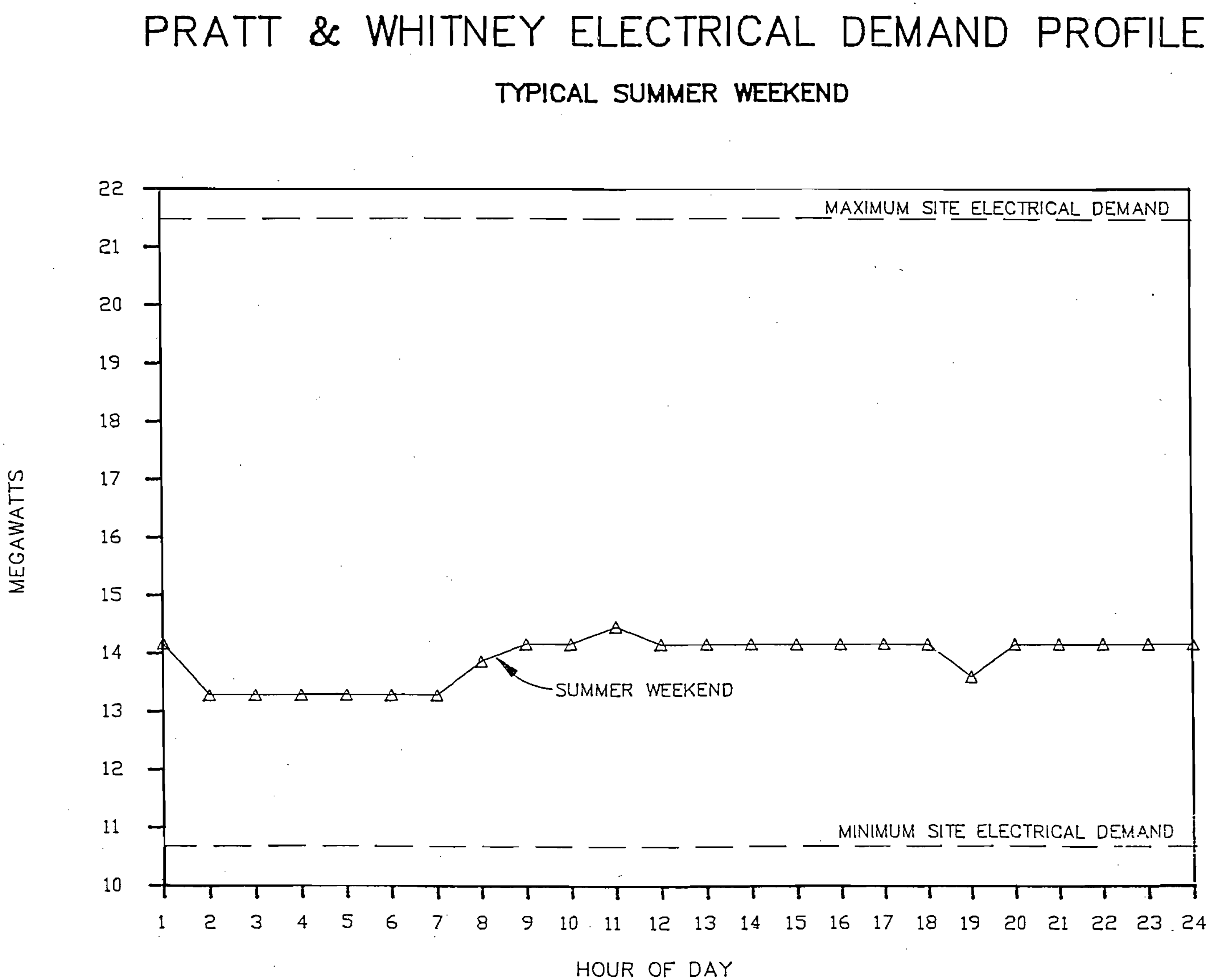
PRATT & WHITNEY ELECTRICAL DEMAND PROFILE
TYPICAL SUMMER WEEKEND
MAXIMUM SITE ELECTRICAL DEMAND
SUMMER WEEKEND
MINIMUM SITE ELECTRICAL DEMAND
MEGAWATTS
HOUR OF DAY
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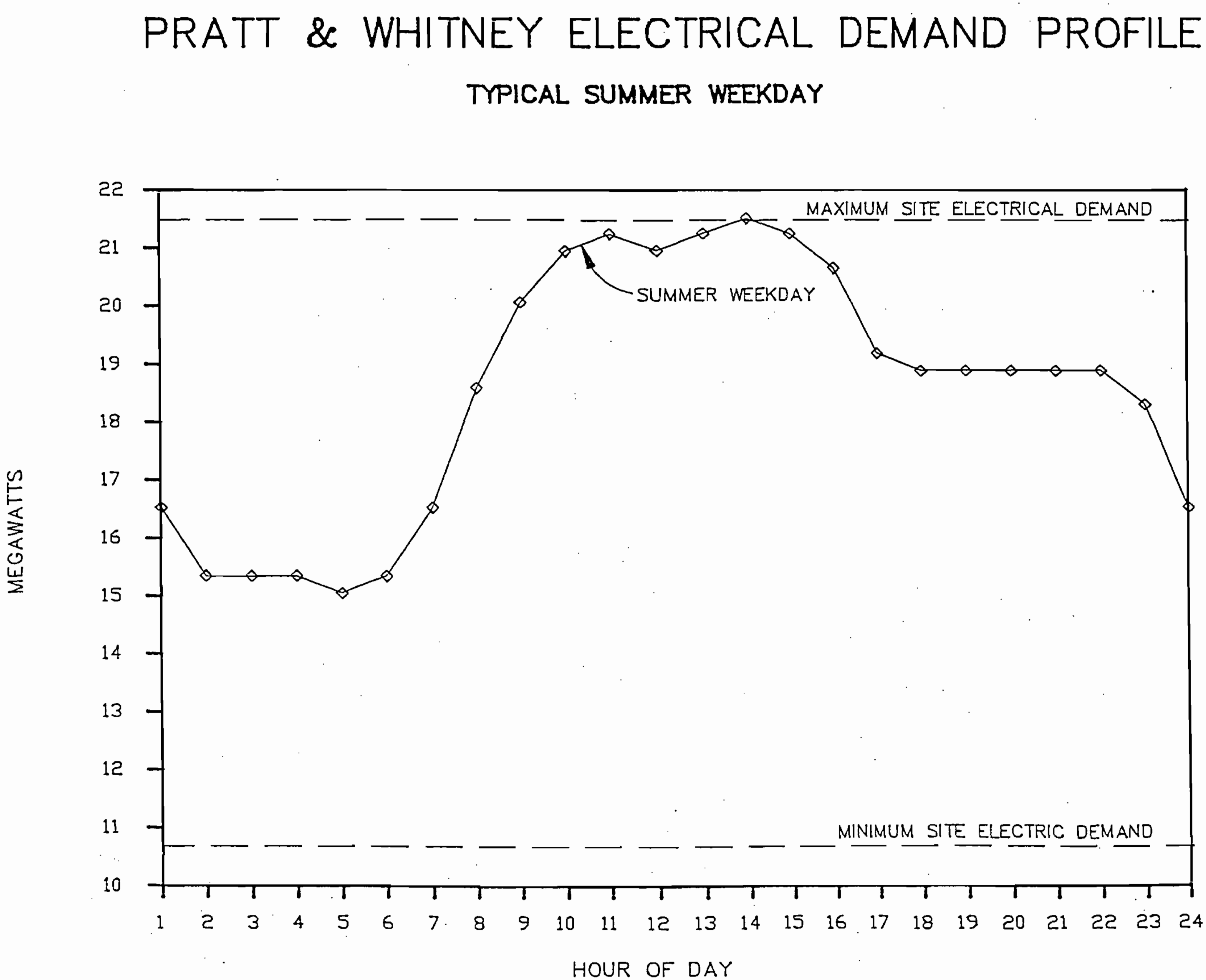
Figure B


PRATT & WHITNEY ELECTRICAL DEMAND PROFILE
TYPICAL SUMMER WEEKDAY
MAXIMUM SITE ELECTRICAL DEMAND
SUMMER WEEKDAY
MINIMUM SITE ELECTRIC DEMAND
MEGAWATTS
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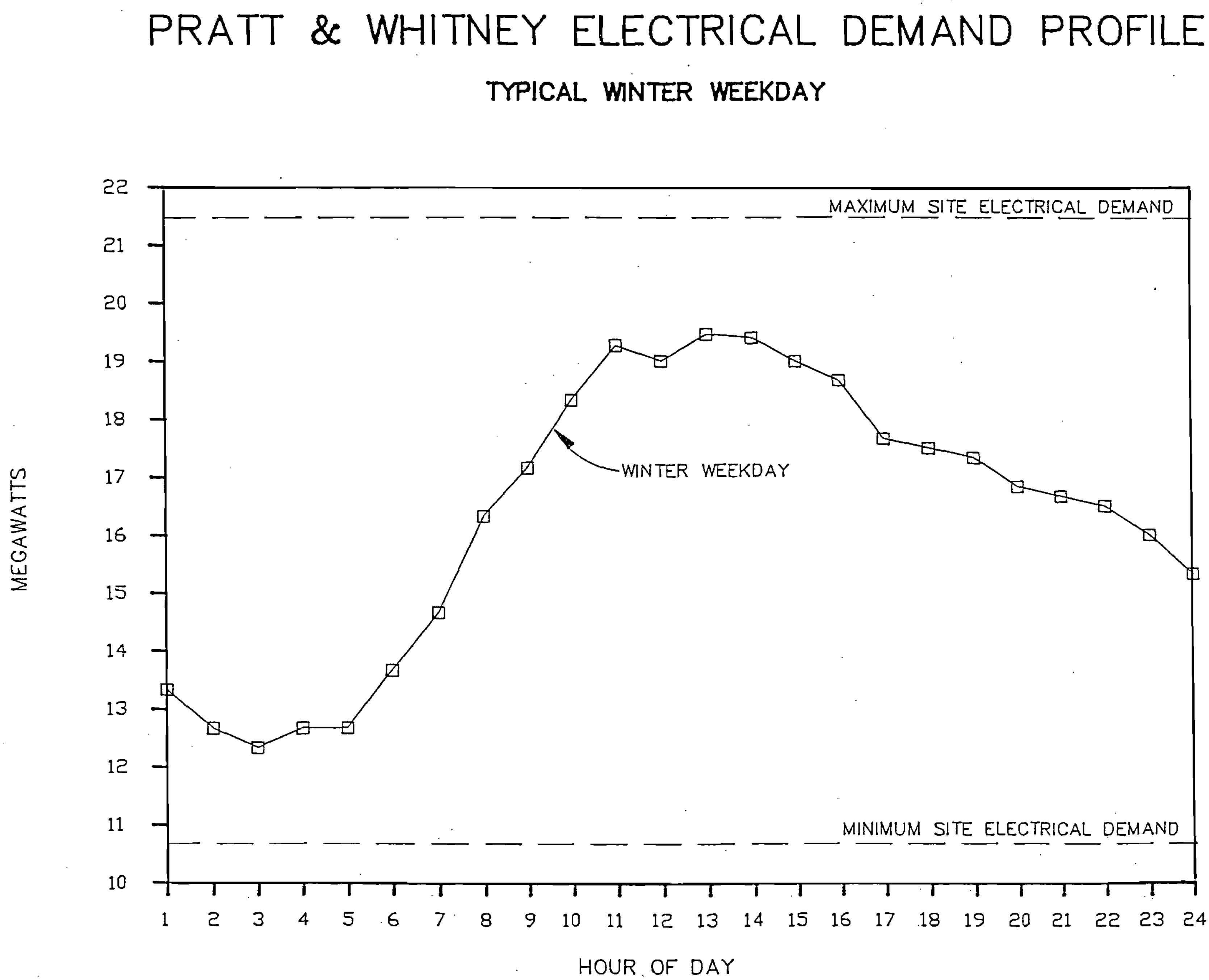
HOUR OF DAY

Figure C


PRATT & WHITNEY ELECTRICAL DEMAND PROFILE
TYPICAL WINTER WEEKDAY
MAXIMUM SITE ELECTRICAL DEMAND
MINIMUM SITE ELECTRICAL DEMAND
WINTER WEEKDAY
MEGAWATTS
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HOUR OF DAY

Figure D

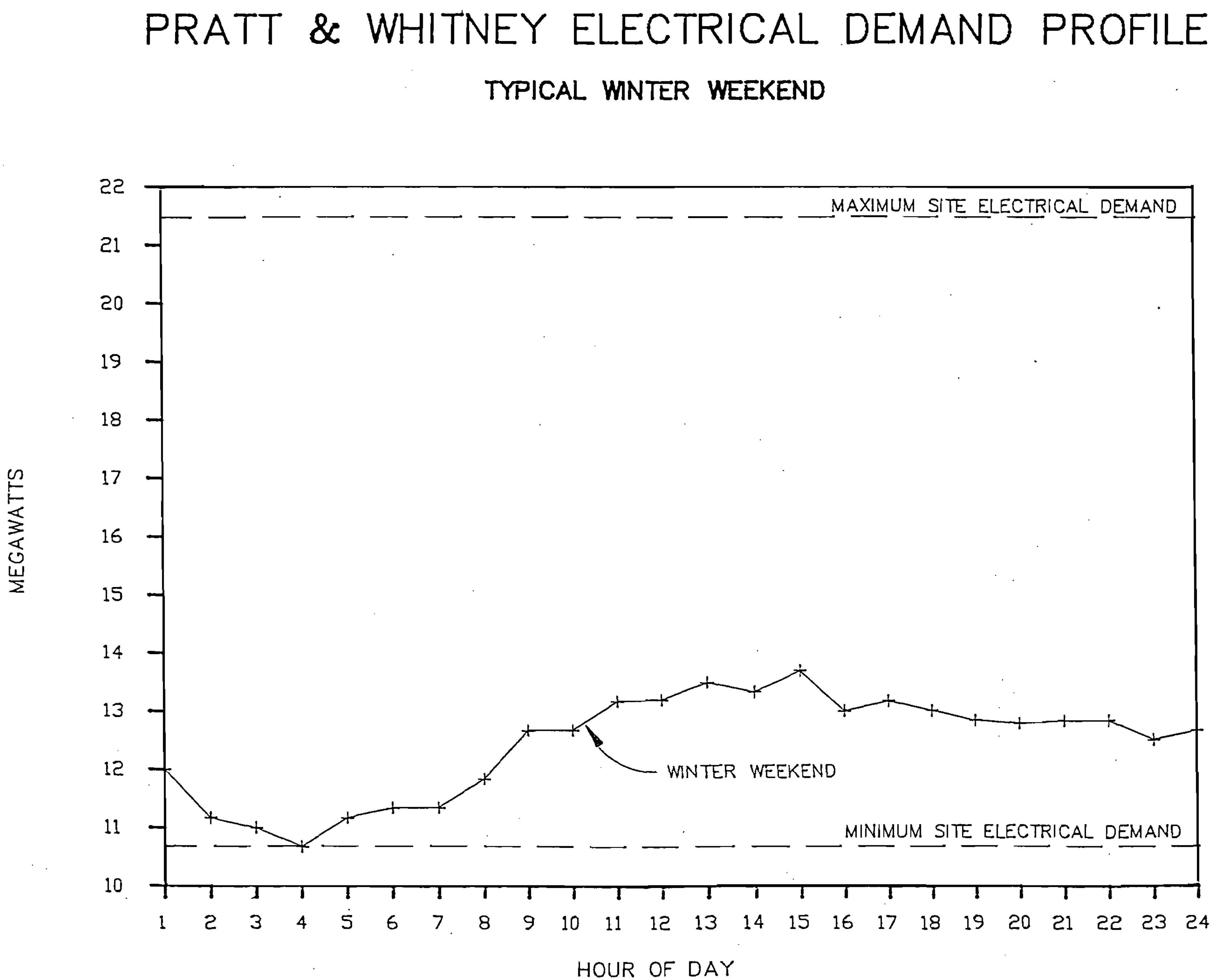
PRATT & WHITNEY ELECTRICAL DEMAND PROFILE
TYPICAL WINTER WEEKEND
MAXIMUM SITE ELECTRICAL DEMAND
WINTER WEEKEND
MINIMUM SITE ELECTRICAL DEMAND
MEGAWATTS
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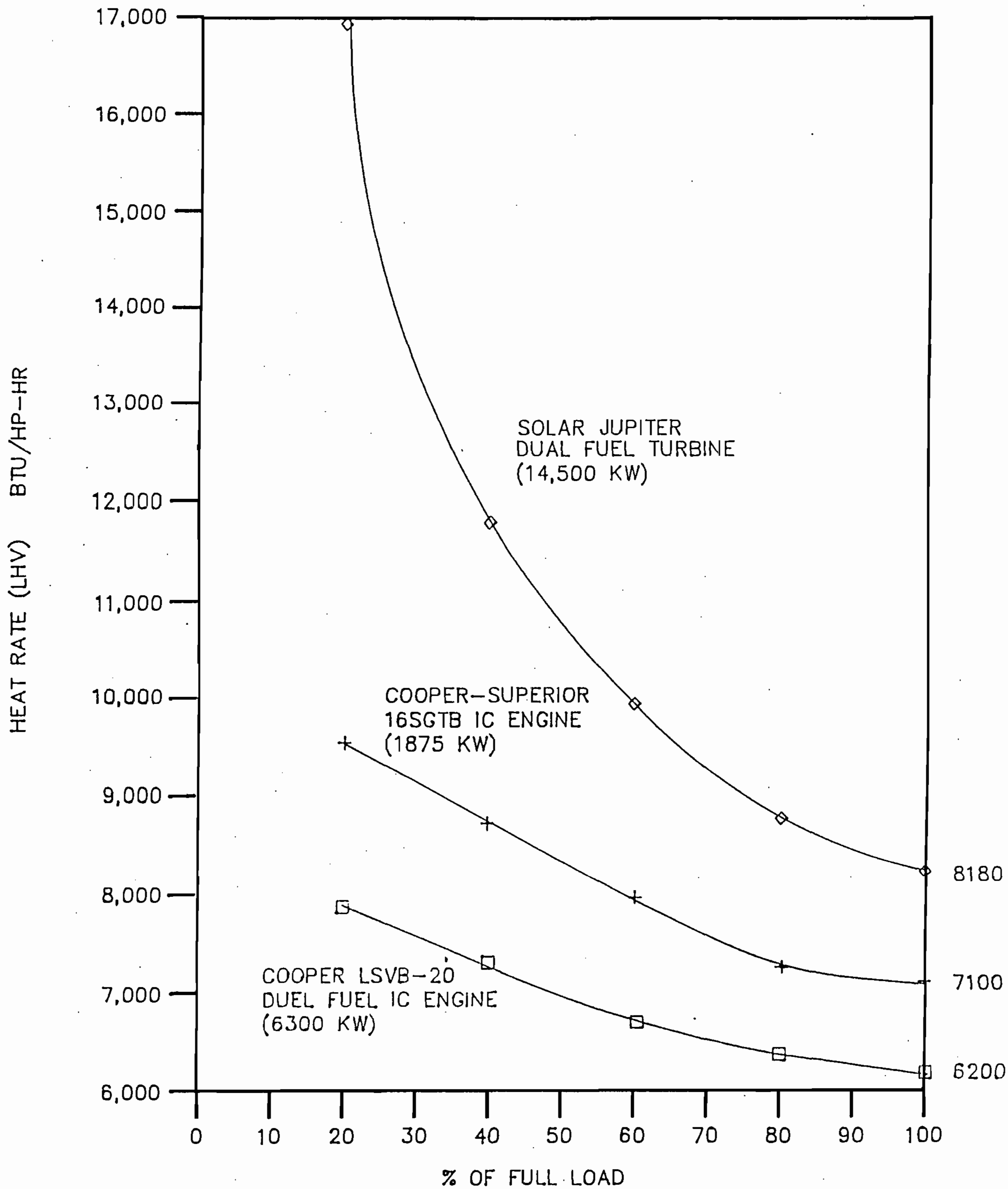
Figure E

PRATT & WHITNEY COGENERATION PROJECT

COMPARISON OF SPECIFIC FUEL CONSUMPTION (HEAT RATE) FOR PRIME MOVER OPTIONS



federal register

Tuesday
November 25, 1986

Part V

Environmental Protection Agency

40 CFR Part 60

Standards of Performance for New Stationary Sources: Industrial-Commercial-Institutional Steam Generating Units and Fossil-Fuel-Fired Steam Generating Units; Final Rules

the particulate matter or NO_x standards must submit results of the initial performance test and performance evaluation of the CEMS within 180 days of initial startup. For those facilities monitoring opacity, monitoring NO_x by CEMS, or monitoring NO_x by operating conditions, emissions reports must be submitted even if the standards were not exceeded during the reporting period. Also, units equipped with CEMS that are used for compliance determinations will be subject to the quality assurance requirements under 40 CFR Part 60, Appendix F, Procedure 1 when promulgated and shall submit CEMS quarterly quality assurance reports.

Environmental Impacts

The environmental impacts of the standards being adopted today are expressed as incremental differences in emissions between the current emission regulations (referred to as the baseline) and these standards. These impacts are based on the assumption that energy prices experienced in 1984/1985 will continue with only moderate price increases in future years. A consequence of this fuel price assumption is that a large proportion of the new industrial-commercial-institutional steam generating unit population (greater than 50 percent) will continue to fire natural gas or oil, and that coal-fired units are expected to be limited to principally base load units in the larger size range.

The new source performance standards for particulate matter and NO_x emission controls being adopted today will result in a range of emission reductions depending on the mix of fuels assumed to be fired. New source performance standards for SO_2 were recently proposed and affect the mix of fuel fired. The SO_2 standards, as proposed, are expected to increase the market share for natural gas-fired steam generating units from approximately 30 percent to about 55 percent. Because natural gas-fired steam generating units have lower particulate matter and NO_x emissions than either coal- or oil-fired units, decreased particulate matter and NO_x emissions result with the SO_2 standards in place.

A range of environmental impacts is presented. The lower estimate is based on the incremental change between the baseline regulations (State implementation plans and Subpart D new source performance standards) and the particulate matter and NO_x standards being adopted today. The upper estimate is based on the incremental change between the baseline regulations and the particulate matter and NO_x standards combined with the recently proposed new source performance standards for SO_2 (51 FR 22384, June 19, 1986), which would also apply to this category of steam generating units.

The primary environmental impacts resulting from the particulate matter and NO_x standards being adopted today are reductions in the quantity of particulate matter and NO_x emitted from steam generating units subject to these standards. It is estimated that between 1985 and 1990 approximately 725 new steam generating units will be constructed that would be subject to the standards. Baseline emissions from these new steam generating units will be 49,000 Mg (54,000 tons) of particulate matter per year and about 77,000 Mg (85,000 tons) of NO_x per year in 1990. The standards being adopted today are projected to reduce baseline particulate matter emissions by 16,000 to 22,000 Mg (18,000 to 24,000 tons) per year and NO_x emissions by 21,000 to 24,000 Mg (23,000 to 26,000 tons) per year in 1990. This represents about a 35 to 45 percent reduction in the growth of particulate matter emissions and about a 25 to 30 percent reduction in the growth of NO_x emissions from new steam generating units subject to these standards.

The solid and liquid waste impacts associated with the particulate matter and NO_x standards are minimal. Flyash disposal levels associated with existing State regulations and Subpart D new source performance standards are only incrementally increased as a result of the particulate matter standards adopted today. Further, the change in fuel use patterns resulting from the standards can actually reduce flyash levels where increased gas use displaces coal. Overall, the standards are projected to result in solid waste impacts ranging from a net reduction of about 9,000 Mg/year (10,000 tons/year) to a net increase of 13,000 Mg/year (14,000 tons/year). The liquid waste impacts associated with the particulate matter standards are minimal. Liquid waste production levels are projected to increase over baseline by about 19,000 m^3 (680,000 ft^3) per year, or approximately 1.5 percent.

Energy Impacts

The energy impacts of the standards have been analyzed in terms of the impact on demand for natural gas, oil, and coal and in terms of overall energy requirements of steam generating units covered by the standards. Steam generating units that would be affected by the standards are projected to demand approximately 525 million GJ (498 trillion Btu) of fossil fuels in 1990. It is projected that natural gas will comprise about 30 to 50 percent of the fuel used in steam generating units and residual oil will provide a substantial portion of the remainder. The particulate matter standards would increase the national electric energy requirements by about 146 GWh/year in 1990.

Cost Impacts

In analyzing the national cost impacts of the standards, only the costs resulting from the implementation of the particulate matter and NO_x standards have been considered in this rulemaking. On a national basis, the particulate matter and NO_x standards would increase the capital cost for new steam generating units by approximately 1 percent. The nationwide increase in annualized costs for producing steam from new steam generating units subject to the standards would be approximately $36 million in 1990. This represents an increase of less than 1 percent over baseline annualized costs for producing steam from new steam generating units. The magnitude of these cost impacts remains the same regardless of the SO_2 standards.

The national incremental cost effectiveness of the particulate matter standards over existing regulations is projected to range from approximately $1,025/Mg to $1,400/Mg ($930/ton to $1,270/ton) of particulate matter removed. The national incremental cost effectiveness of the NO_x standards over existing regulations is projected to range from $370/Mg to $640/Mg ($340/ton to $580/ton) of NO_x removed.

These impacts are presented as a range of values, showing the incremental cost effectiveness between the baseline and the particulate matter and NO_x standards adopted today, and between the baseline and the combined particulate matter, NO_x, and proposed SO_2 standards. Because of the fuel shifts which are projected to occur under the proposed SO_2 standards, different cost effectiveness levels result in each case.

Economic Impacts

The economic impacts of the standards have also been evaluated in terms of the nationwide capital expenditures for pollution control equipment, the increase in the annualized cost of producing steam, the resulting rise in the price of products produced by operators of steam generating units, and the impact on the availability of capital to the firms purchasing steam generating units.

In analyzing potential product price, profitability, and capital availability impacts associated with the standards,

ENERGY SERVICES GROUP

September 21, 1987

To: C-E Power Projects
320 Lennon Lane
Walnut Creek, CA 94598

Attn: Lubos Jarolimek

Subject: Pratt and Whitney Project

Gentlemen:

This is to confirm our conversation with you regarding emission control on Cooper Industry engines.

#1. The BACT for large bore dual fuel Cooper engines for NOX is 5 grams/HP-HR. This has been verified in our plant in production engines and follow-up tests in the field.

#2. There are no Commercial Cooper large bore clean burn spark engines manufactured. There has been R&D work on them and this is continuing.

#3. Cooper Industries also manufactures Superior Clean Burn engines which are in commercial operation. The largest engine we manufacture is rated at 1875KW. It would require 10 engines for your project.

#4. With your requirement of 18,900KW, the following relative comparisons can be made:

A) Cooper dual fuel large bore engine cost = 100
Cooper dual fuel large bore engine fuel usage = 100 *

B) Superior Clean Burn spark engine cost = 122 **
Superior Clean Burn spark engine fuel usage = 114.5 *

#5. Clean Burn engine cannot use standby diesel fuel. The smaller Superior Clean burn engines (with lower compression heads) can use propane as an alternate fuel (up to 1550KW). There are some loading restrictions on these also.

* at 100% load.
** 10 engines/generators (no construction comparison)

649 Mission Street, Room 223
San Francisco, California 94105
(415) 777-1020 Telex: 18-1159

#6. Cooper has never furnished a catalitic converter with a large bore dual fuel engine and we understand there are none in commercial operation. We are beginning to do some R&D work in our lab.

If you have any further questions please do not hesitate to contact this office.

Yours very truly,

Gene McElhattan
Branch Manager

Colt Industries

Fairbanks Morse
Engine Division
701 Lawton Avenue
Beloit, Wisconsin 53511-5492
Telephone: 608/364-4411
Telecopier: 608/364-0382

TELECOPIER:
(415-943-4521)

September 18, 1987

Combustion Engineering
320 Lennon Lane
Walnut Creek, CA 94598

Attention: Mr. Lubos Jarolimek
Senior Technical Specialist
Power Project Development

Subject: Pratt & Whitney Cogeneration Project
Invitation to Bid 3971-110-01
Engine Generator Sets
Exhaust Emissions

Gentlemen:

Per your request of our Mr. H.J. Decker we are providing the following information relative to the large bore dual fuel engines that we propose to furnish for the subject project.

1) The standard dual fuel engines we would offer to provide 6000 - 6300 KW (Net) generator sets will have 5.6 grams/bhp-hr of NO_x in the exhaust at 100% load in the dual fuel mode. This could be reduced to 5 grams/bhp-hr.

2) We do not have a large bore, clean burn, dual fuel engine in the required power range.

3) We do not have any experience with Catalytic conversion equipment on large bore engines.

We believe we have provided the information you require. If you have any questions, please let us know.

Very truly yours,

J.M. Moriarty

J.M. Moriarty
Manager, Marketing

JMM/jl

cc: H.J. Decker - Portland

2011 Matilda
Houston, Texas 77039

Telephone 713-449-2253
Telex 790-592

Mirrlees Blackstone (USA) Inc.
A HAWKER SIDDELEY COMPANY

September 18, 1987

CE Power Projects
320 Lennon Lane
Walnut Creek, California 94598

Attention: Mr. Lubos Jarolimek
Sr. Technical Specialist, Power Project Dev.

Reference: Pratt and Whitney Cogeneration Project
Engine Generator Sets
Exhaust Emissions

Gentlemen:

As you know, Mirrlees Blackstone manufactures a range of large bore, medium speed dual fuel engines known as the KP Major, the 16 cylinder version of which, we shall be offering for the above project, via our distributors Stewart and Stevenson Services Inc. The KVP16 has a nominal rating of 6 MW in generating set form. The KP Major range meets the US E.P.A. best available control technology (BACT) level for NOx emissions of 5 grams/bhp hr. This is achieved by retarding the injection timing of the engine by approximately 3-5 degrees.

Mirrlees Blackstone do not manufacture "clean burn" spark ignited gas engines and to our knowledge, such an engine, in large bore form, capable of 6 MW output, is not manufactured anywhere in the world.

We have carried out a detailed survey of the selective catalytic reduction system and catalytic convertor markets, and have been unable to find any company who offers such a device which is suitable for use with a large bore, lean burn, dual fuel engine such as the KP Major.

We trust that the above information will be of assistance to you.

Sincerely,

David Finn

David Finn
Sales Executive

DF/nm

cc: Mr. John H. C. Tidwell - Stewart and Stevenson

HOPPING BOYD GREEN & SAMS
ATTORNEYS AND COUNSELORS
SUITE 420, FIRST FLORIDA BANK BUILDING
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314
(904) 222-7500

CARLOS ALVAREZ
BRIAN H. BIBEAU
ELIZABETH C. BOWMAN
WILLIAM L. BOYD, IV
RICHARD S. BRIGHTMAN
PETER C. CUNNINGHAM
WILLIAM H. GREEN
WADE L. HOPPING
FRANK E. MATTHEWS
RICHARD D. MELSON
WILLIAM D. PRESTON
CAROLYN S. RAEPPLE
GARY P. SAMS
ROBERT P. SMITH, JR.

JAMES S. ALVES
KATHLEEN BLIZZARD
ANNE W. CLAUSSEN
C. TIMOTHY GRAY
ELEANOR M. HUNTER
DAVID L. POWELL
CHERYL G. STUART

OF COUNSEL
W. ROBERT FOKES

DER
SEP 30 1987
BAQM

September 29, 1987

HAND DELIVERED THIS DATE

Mr. Dale H. Twachtmann, Secretary
c/o Office of General Counsel
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Power Ventures
Air Construction Permits
DER File Nos. AC 50-133747,
50-133748, 50-133749, 50-133750;
PSD-FL-120

Dear Secretary Twachtmann:

On or about September 16, 1987, applicant, Power Ventures, received the Department's "Notice of Intent to Issue" the referenced air permits authorizing construction of four disel engines, along with the accompanying "Technical Evaluation and Preliminary Determination" dated September 14, 1987. The intent to issue was signed by Clair H. Fancy, Deputy Clerk of the Bureau of Air Quality Management. Pursuant to the Notice and F.A.C. Rule 17-103.155, Power Ventures has until September 30, 1987 to file a petition for administrative proceedings regarding the Department's proposed agency action on these permits.

I am writing on behalf of Power Ventures to request an extension of thirty (30) days, to and including October 30, 1987, in which to file a petition for administrative proceedings regarding the Department's proposed action on the referenced permits. This request is made pursuant to F.A.C. Rule 17-103.070, which provides that a timely request for extension of time shall toll the running of the time period in which a petition must be filed. As good cause for granting this extension of time for filing, Power Ventures would show the following:

HOPPING BOYD GREEN & SAMS
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314

C. H. Fancy, Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
2600 Blair Stone Road, Room 306
Tallahassee, FL 32301

1. The permits proposed by the Department would include limitations on emissions of nitrogen oxides from the diesel engines based upon the Bureau of Air Quality Management's Technical Evaluation and Preliminary Determination.

2. Power Ventures has serious concerns about the proposed nitrogen oxides emission limits and the preliminary determination underlying those limits.

3. Representatives of Power Ventures met with staff of the Bureau of Air Quality Management on September 25, 1987 to discuss the concerns of the applicant and its consultants regarding the proposed nitrogen oxides emission limits. As a result of that meeting, Power Ventures is preparing certain engineering information to be submitted to the Department in support of its position on the appropriate nitrogen oxide emission limitations.

4. This request is filed as a protective measure to avoid waiver of Power Ventures' right to challenge the Department's proposed agency action with respect to the referenced permits. Grant of this request will allow the parties an opportunity to discuss the applicant's concerns regarding the proposed permits, and to achieve a mutually acceptable resolution of the issues in question, without the initiation of formal administrative proceedings.

I hereby certify that I have spoken with Clair H. Fancy, Deputy Clerk of the Department's Bureau of Air Quality Management, and that he stated no objection to the grant of this request.

Accordingly, I respectfully request that you formally extend the time for filing of a petition for administrative proceedings in regard to the Department's proposed agency action on air construction permits Nos. AC 50-133747, 50-

133748, 50-133749, 50-133750 and PSD-FL-120 to and including October 30, 1987.

Sincerely,

Peter C. Cunningham
Counsel for Power Ventures

cc: Clair H. Fancy
Betsy Pittman, Esquire
Mr. Tom Reedy
Mr. Ken Koskey

Copied: Pradeep Raval
Max Linn
CHF/BT
June Sacco - WPB
H. Goldman
Betsy Pittman
10/2/87

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

AIR-4

SEP 30 '87

U.S. POSTAGE

Mr. Clair H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

20

PM
30 Sept '87
Atlanta, GA

Full Copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DER

OCT 2 1987

BAQM

4APT/APB-am

SEP 30 1987

Mr. C. H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32339

Re: Power Ventures (PSD-Fl-120)

Dear Mr. Fancy:

This is to acknowledge receipt of your September 14, 1987, PSD preliminary determination for the above referenced cogeneration facility in West Palm Beach, Florida. We have determined that this source will not be reviewed under the Region IV Overview of State Programs policy.

Please submit copies of the final determination and permits when they are issued.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Copied: Pradeep Raval
Max Linn
CHF/BT
Jerre Sarco-PBC
I. Goldman
Betty Pittman
10/5/87

August 24, 1987
87003

Mr. C.H. Fancy, P.E.
Deputy Chief, Bureau of Air Quality Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Application to Construct four diesel engines
Permit Nos. AC 50-133747, -48, -49 and -50 and
PSD-FL-120, (Pratt & Whitney site)

Dear Mr. Fancy:

Please find attached an additional copy of the application and responses requested by Mr. Raval of your staff. Please call if you have any questions.

Sincerely,

Kennard F. Kosky

Kennard F. Kosky, P.E.
Principal Engineer

cc: Tom Reedy
Wayne Ondler

DER
AUG 26 1987
BAQM

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604 904/375-8000

PS Form 3811, July 1983 447-845

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Mr. Tom Reedy
100 Australian Avenue Suite 304
West Palm Beach, FL 33406

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STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

September 17, 1987

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Tom Reedy
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, Florida 33406

Dear Mr. Reedy:

Re: Proposed Permit Nos. AC 50-133747, 48, 49, 50, PSD-FL-120

Attached are tables, part of the Air Quality Impact Analysis, which were inadvertently left out of the Technical Evaluation and Preliminary Determination mailed to you.

Sincerely,

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

CHF/PR/s

cc: S. Brooks, SE Dist.
G. Sacco, PBCHD
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
K. Kosky, KBN Engineering

Table 1
Power Ventures Cogeneration Facility
Maximum Emission Rates

Pollutant	(lb/hr)	(ton/yr)	PSD Significant Emission Rate (TPY)
PM	6.76	29.6	25
CO	160.8 (1)	704.3	100
NOx	944.4	4136.5	40
SO_2	70.6	309.2	40
VOC	33.4 (1)	146.3	40
Pb	.013	.006	.6
Be	.000015	.00006	.0004
Hg	.0024 (1)	.01	.1
As	.000056	.00025	—

(1) Based on facility firing dual fuel. All others based on firing diesel fuel.

Table 2
Power Ventures Cogeneration Facility's
Modeling Source Parameters

Source	UTM-E (km)	UTM-N (km)	Stack Height (m)	Exit Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	Emissions SO_2 (g/s)	Emissions NOx (g/s)	PSD Source
Power Ventures	565.6	2978.5	19.2	422	24.3	0.91	8.9	119.0	Y
Pratt and Whitney	565.3	2978.2	8.23	1366	8.35	0.66	6.2	—	
	559.0	2978.6	1.83	533	40.2	0.91	16.0	17.8	
	599.2	2978.3	15.2	533	40.2	0.91	47.9	17.8	
	558.1	2979.1	4.57	644	13.4	3.40	23.4	25.0	Y
	558.0	2978.3	4.57	533	6.93	0.76	9.02	0.9	
	565.5	2978.5	12.2	477	35.9	0.46	—	0.9	
FPL - Riviera	594.2	2960.6	45.7	430	6.30	4.57	108.4	16.5	
	594.2	2960.6	90.9	408	18.9	4.88	698.5	224.3	
Lake Worth	592.8	2943.7	18.3	434	6.2	1.52	72.6	14.5	
Utilities	592.8	2943.7	38.1	408	7.7	2.13	103.9	21.3	
	592.8	2943.7	38.1	408	9.7	2.29	133.9	27.5	
	592.8	2943.7	22.9	450	18.3	3.05	11.6	2.4	
Palm Beach RRF	585.8	2960.2	76.2	505	24.9	2.04	99.3	37.8	Y
FPL-Martin	543.1	3022.0	152.1	421	21.3	7.99	1583.0	593.7	Y
Osceola Sugar	544.2	2968.0	25.0	341	18.1	1.52	45.7	15.1	
	544.2	2968.0	25.0	341	15.0	1.52	21.6	7.0	Y
	544.2	2968.0	27.4	341	15.0	1.93	23.5	7.8	Y
Atlantic Sugar	552.9	2945.2	18.3	344	15.0	1.83	73.0	19.8	
	552.9	2945.2	27.4	339	15.7	1.68	11.8	5.9	Y
Sugar Cane Growers	534.9	2953.3	33.5	344	11.2	2.82	24.2	7.0	
	534.9	2953.3	24.4	344	15.2	1.40	44.8	15.7	
	534.9	2953.3	12.2	606	15.2	1.40	51.0	10.5	
	534.9	2953.3	47.2	344	10.6	3.05	26.7	11.9	Y

Table 3
Power Ventures Congeneration Facility
Maximum Air Quality Impacts For
Comparison to the Deminimus Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m^3)	Deminimus Ambient Impact Level (ug/m^3)
PM (24-hour)	4.37	10
SO_2 (24-hour)	45.59	13
NO_2 (Annual)	51.63	14
CO (8-hour)	168.18	575

Table 4
Monitoring Sites at Which Sulfur Dioxide and Nitrogen Dioxide Concentrations are Measured in Palm Beach County

SAROAD Site No.	Site Address	UTM Coordinates Zone	UTM Coordinates North (km)	UTM Coordinates East (km)	Relative Location from P&W Facilty* Direction (Degrees)	Relative Location from P&W Facilty* Distance (km)	Spatial Scale/ Monitoring Objective
Sulfur Dioixide							
3840-003-6	2030 Avenue L, Riviera Beach	17	2962.350	592.480	120	26.8	Neighborhood/ Maximum Concentration
Nitrogen Dioxide							
4760-001-6	First Street and Tamarind Avenue, West Palm Beach	17	2955.030	593.232	131	31.7	Neighborhood/ Maximum Concentration

* UTM Coordinates of P&W facility are 569.4 East and 2975.9 North

Table 5
Ambient SO_2 and NO_2 Air Quality Data for the Monitors Located in Palm Beach County 1983 - 1985

SAROAD Site No.	Year	Data Collection (%)	Measured Concentration (ug/m^3) 3-Hour*	24-Hour*	Annual
Sulfur Dioxide					
3840-003-6	1983	95.4	63	29	3
	1984	98.1	61	36	8
	1985	92.5	64	26	5
Nitrogen Dioxide					
4760-001-6	1983	82.8	NA	NA	19
	1984	93.0	NA	NA	27
	1985	84.0	NA	NA	22

NA = Not applicable for comparison to AAQS

* Second Highest Concentrations

Table 6
Power Ventures Cogeneration Facility
Comparison to PSD Class II Increments

Pollutant and Averaging Time	PSD Class II Increment (ug/m^3)	Max Concentration (ug/m^3)	Percent Class II Increment Consumed
SO_2 (3-hour)	512	119.25 (1)	23.29
SO_2 (24-hour)	91	47.09 (1)	51.75
SO_2 (Annual)	20	4.98	24.90

(1) Highest, second highest concentration for averaging period.

Note: Predicted maximum concentrations result from modeling all PSD sources in emissions inventory.

Table 7
Power Ventures Cogeneration Facility
Significant Impact Analysis

Pollutant and Averaging Time	Maximum Impact of Project (ug/m^3)	Significant Impact Level (ug/m^3)
SO_2 (3-hour)	119.08	25
SO_2 (24-hour)	45.59	5
SO_2 (Annual)	3.86	1
PM (24-hour)	4.37	5
PM (Annual)	0.37	1
NO_2 (Annual)	51.63	1
CO (1-hour)	340.50	2000
CO (8-hour)	168.18	500

Table 8
Power Ventures Cogeneration Facility
Comparison of Total Impacts with the AAQS

Pollutant and Averaging Time	Maximum Predicted Impact (all sources) (ug/m^3)	Existing Background (ug/m^3)	Maximum Total Impact (ug/m^3)	FL AAQS (ug/m^3)
SO_2 (3-hour)	295.70	64 (1)	359.70	1300
SO_2 (24-hour)	158.39	36 (1)	194.39	260
SO_2 (Annual)	23.77	8 (2)	31.77	60
PM (24-hour)	4.37 (3)	—	—	150
PM (Annual)	0.37 (3)	—	—	60
NO_2 (Annual)	54.94	27 (2)	81.94	100
CO (1-hour)	340.50 (3)	—	—	40,000
CO (8-hour)	168.18 (3)	—	—	10,000

(1) Existing background is estimated using the highest, second highest monitored concentrations from representive monitors in the area (1983-85).

(2) Existing background is estimated using the highest monitored concentrations from representive monitors in the area (1983-85).

(3) Less than significant; no further analysis necessary.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

JUL 27 1987

4APT/AB-aes

Mr. Clair Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Power Ventures (PSD FL-120)

Dear Mr. Fancy:

This is in reference to your submittals of June 16, 1987, July 15, 1987, and July 17, 1987. We have reviewed the contents of the company's responses to FDER and EPA comments on their application of April 17, 1987, and have no further questions or comments at this time. Please submit the preliminary determination and draft permits when they are issued.

Sincerely,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Copied: Pradeep Raval
Miguel Flores
Ray Linn
CHF/BT
Isidore Goldman, SE Dist.

7/31/87

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ENVIRONMENTAL PROTECTION AGENCY
REGION IV
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Mr. Clair H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

20

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

July 17, 1987

Mr. Wayne Aronson
Chief
Program Support Section
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Aronson:

RE: PSD Application
Additional Information Received
Power Ventures, PSD-FL-120

Enclosed you will find additional information related to the above referenced application. If you have any comments or questions, please contact Pradeep Raval or Max Linn by August 11, 1987, at the above address or at (904)488-1344.

Sincerely,

Margaret V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

July 17, 1987

Mr. Miguel Flores
Chief, Permit Review and Technical
Support Branch
National Park Service-Air
Post Office Box 25287
Denver, Colorado 80225

Dear Mr. Flores:

RE: PSD Application
Additional Information Received
Power Ventures, PSD-FL-120

Enclosed you will find additional information related to the above referenced application. The existing facility is within 100 kilometers of the Brighton Indian Reservation, the Loxahatchee National Wildlife Refuge, the Big Cypress Indian Reservation, and the Big Cypress Swamp. If you have any comments or questions, please contact Max Linn by August 11, 1987, at the above address or call him at (904)488-1344.

Sincerely,

Margaret V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

PM
7-16-87
Gainesville, FL

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KBN

DER
JUL 17 1987
BAQM

July 15, 1987

Mr. Max A. Linn
Meteorologist
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: Power Ventures Application to Construct Four Diesel Engines Permit Numbers AC 50-133747, -48, -49 and -50, and PSD FL-120

Dear Max:

Per your request (verbal) on July 14, 1987, I have prepared the following information that describes the impacts of the proposed project on additional growth in the area of project site.

Additional Growth Analysis

The proposed facility consists of 4 diesel generators for the purpose of providing electrical energy and cogeneration steam for the internal energy needs of the Pratt & Whitney facility. The electrical energy replaced by these generators (up to 24,450 kW/hr) is insignificant compared to the generation demands in Palm Beach County. The steam generated will replace existing sources. Production capacity of the Pratt & Whitney facility will not increase as a result of the proposed project. The proposed facility will require additional personnel to operate and maintain the diesel generators. This increase in personnel in the area is not a significant change from the number of personnel currently employed at the existing Pratt & Whitney facility, i.e., several thousand. As a result, no significant growth-related impacts will occur due to construction and operation of the proposed facility.

Please call me if you have any additional comments or questions about this project.

Sincerely,

Kennard F. Kosky for

Robert C. McCann, Jr.
Principal Scientist

copied: Max Linn
Wayne Aronson
Gene Sacco
Isidore Goldman
Pradeep Raval
Miguel Flores
7-17-87

cc: Tom Reedy
for Wayne Ondler

Reading File

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DEPARTMENT OF ENVIRONMENTAL REGULATION STATE OF FLORIDA

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

July 15, 1987

Mr. Miguel Flores
Chief, Permit Review and Technical
Support Branch
National Park Service-Air
Post Office Box 25287
Denver, Colorado 80225

Dear Mr. Flores:

RE: PSD Application
Additional Information Received
Power Ventures, PSD-FL-120

Enclosed for your review and comment is additional information (modeling) related to the submittal received on June 25, 1987, which was forwarded to you on June 26, 1987. Due to the intermittent mailing of information from the applicant, the official starting completeness review clock date is July 13, 1987. The existing facility is within 100 kilometers of the Brighton Indian Reservation, the Loxahatchee National Wildlife Refuge, the Big Cypress Indian Reservation, and the Big Cypress Swamp. If you have any comments or questions, please contact Max Linn by August 11, 1987, at the above address or call him at (904)488-1344.

Sincerely,

Margaret V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

File Copy

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

July 15, 1987

Mr. Wayne Aronson
Chief
Program Support Section
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Aronson:

RE: PSD Application
Additional Information Received
Power Ventures, PSD-FL-120

Enclosed for your review and comment is additional information related to the above referenced application. Due to intermittent mailing of information from the applicant, the official starting completeness review clock date is July 13, 1987. Therefore, if you have any comments or questions, please contact Pradeep Raval or Max Linn by August 11, 1987, at the above address or at (904)488-1344.

Sincerely,

Margaret V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

UPS #: 1419 8323 509
7-13-87
Gainesville, FL

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KBN

PSD-FL-120
AC 50-133747, 48, 49 & 50

July 10, 1987
87003

Ms. Margaret Janes
State of Florida
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Ms. Janes:

Enclosed please find two copies of the model output for Florida Power & Light Power Ventures. Please call if you have any questions.

Sincerely,

Robert C. McCann Jr.

Robert C. McCann, Jr.
Principal Scientist

copied:
Max Linn, DER
Wayne Aronson, EPA } 7-15-87 RAL
Miguel Flores, NPS

DER
JUL 13 1987
BAQM

DER
JUL 13 1987
BAQM

Jw

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

July 6, 1987

Mr. Miguel Flores
Chief, Permit Review and Technical
Support Branch
National Park Service-Air
Post Office Box 25287
Denver, Colorado 80225

Dear Mr. Flores:

RE: PSD Application
Additional Information Received
Power Ventures, PSD-FL-120

Enclosed for your review and comment is additional information related to the submittal received on June 25, 1987, which was forwarded to you on June 26, 1987. The existing facility is within 100 kilometers of the Brighton Indian Reservation, the Loxahatchee National Wildlife Refuge, the Big Cypress Indian Reservation, and the Big Cypress Swamp. If you have any comments or questions, please contact Max Linn by July 31, 1987, at the above address or call him at (904)488-1344.

Sincerely,

Margaret V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

cc: Pradeep Raval
Max Linn

File

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

July 6, 1987

Mr. Wayne Aronson
Chief
Program Support Section
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Aronson:

RE: PSD Application
Additional Information Received
Power Ventures, PSD-FL-120

Enclosed for your review and comment is additional information related to the submittal received on June 25, 1987, which was forwarded to you on June 26, 1987. If you have any comments or questions, please contact Pradeep Raval or Max Linn by July 31, 1987, at the above address or at (904)488-1344.

Sincerely,

Margaret V. Janes

Margaret V. Janes
Bureau of Air Quality
Management

/mj

enclosure

cc: Pradeep Raval
Max Linn

PM
3 Jul
Gainesville, FL

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July 2, 1987
87003

Mr. C.H. Fancy, P.E.
Deputy Chief, Bureau of Air Quality Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Application to construct four diesel engines,
Permit Nos. AC 50-133747, -48, -49 and -50 and PSD-FL-120
(Pratt & Whitney site)

Dear Clair:

Please find enclosed the modeling printout in support of the above referenced application as indicated by Mr. Reedy's letter of June 24, 1987. Please contact me or Bob McCann of KBN if you have any questions.

Sincerely,

Ken Kosky

Kennard F. Kosky, P.E.
Principal Engineer

KFK/lgs

Enc.

CC: Max Linn - 07/06/87
EPA/Wayne Aronson
NPS/Miguel Flores
CHF/LG - 07/06/87

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604 904/375-8000

PM
1 Jul
West Palm Bch, FL

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IMPELL POWER PROJECTS

FPL ENERGY SERVICES INC

POWER VENTURES

a Florida partnership

DER
JUL 2 1987
BAQM

July 1, 1987

Mr. C. H. Fancy, P.E.
Deputy Chief, Bureau of Air Quality Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Application to Construct Four Diesel Engines, Permit Nos. AC 50-133747, -48, -49, -50 and PSD-FL-120, (Pratt & Whitney Site)

Dear Mr. Fancy:

In our June 24, 1987 response to your request for additional information concerning the above permit applications, a formula was inadvertently left out of the response to question 16(a). The entire answer is included here for clarity.

16. (a) Explain why a building diagonal of 138 feet was used for modeling purposes.

To address the effects of building downwash in the ISC dispersion model, the building height, length, and width are input to the model. The model uses these dimensions to modify the dispersion parameters. The ISCST model calculates the area of the building using the length and width, assumes the area is representative of a circle, and then calculates a building width by determining the diameter of the circle. If a specific width is to be modeled, the model inputs of building length and width must be based upon the following formula:

$$W_m = \sqrt{\pi \left(\frac{W_a}{2}\right)^2}$$

where: W_m is the building length and width input to the model to produce a building width of W_a in the dispersion calculations.

W_a is the actual building width for which dispersion calculations are desired.

The proposed unit's building will have a building height, length, and width of 40, 120 and 100 feet, respectively. The diagonal of the building calculated from the length and width is 156 ft (not 138 ft as indicated in the report). To produce a W_a of 156 ft in the model calculations, a W_m of 138 ft was input to the model.

We apologize for any confusion this oversight may have caused. Please contact me if we can provide any further information.

Sincerely,

Tom Reedy

Tom Reedy
Vice President

TR/dh

cc: K. Kosky - KBN Engineering
W. Ondler - FPL

Copied: Pradeep Raval
Max Linn
Wayne [illegible]
[illegible]
[illegible]

[illegible]

Power Ventures

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2600 Blair Stone Road

CITY Tallahassee STATE FL ZIP CODE (REQUIRED) 32399-2400

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- [ ] RECEIVER
- [ ] 3RD PARTY ______ AIRBORNE EXPRESS ACCOUNT NO.
- [ ] PAID IN ADVANCE $ ______

CHECK NUMBER ______

TYPE OF SPECIAL SERVICE (EXTRA CHARGES MAY APPLY)

- [ ] SPECIAL PICKUP
- [ ] SATURDAY DELIVERY
- [ ] SPECIAL DELIVERY ______ TIME
- [ ] HOLD AT AIRBORNE FOR PICKUP (NO CHARGE)
- [ ]

AIRBORNE SIGNATURE DATE RECEIVED

file (gy)

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

June 26, 1987

Mr. Miguel Flores
Chief, Permit Review and Technical
Support Branch
National Park Service-Air
Post Office Box 25287
Denver, Colorado 80225

Dear Mr. Flores:

RE: PSD Application
Power Ventures, PSD-FL-120

Enclosed for your review and comment is the response from the applicant to a request for additional information pursuant to the above referenced PSD application. Please review the enclosed response and submit any comments or questions by July 23, 1987, to Max Linn at the above address or call him at (904)488-1344.

Sincerely,

R. Bruce Mitchell

R. Bruce Mitchell
Bureau of Air Quality
Management

/bm

enclosure

PM
No Date
West Palm Beach, FL

Airborne Express:
233075113 : Airbill No.

File Copy

IMPELL POWER PROJECTS

FPL ENERGY SERVICES INC

POWER VENTURES

a Florida partnership

June 24, 1987

DER
JUN 25 1987
BAQM

Mr. C. H. Fancy, P.E.
Deputy Chief, Bureau of Air Quality Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Application to Construct Four Diesel Engines, Permit Nos. AC 50-133747, -48, -49, -50 and PSD-FL-120, (Pratt & Whitney Site)

Dear Mr. Fancy:

Power Ventures is pleased to respond to your request for additional information dated May 28, 1987. For the sake of clarity, we have listed each of your questions with the response immediately following each question.

1. What is the main objective of the above referenced project?

Power Ventures is proposing to construct a cogeneration project on-site for Pratt & Whitney. To qualify as a cogeneration project, it must be capable of simultaneously producing electricity and useful thermal energy. The Federal Energy Regulatory Commission (FERC) is the agency charged with issuing Qualifying Facility (QF) status. The system we are proposing will produce electricity, steam for process use, hot water for domestic use, and chilled water for space conditioning. The application to FERC for QF status is currently being prepared. This project will provide Pratt & Whitney with on-site reliability as well as a reduced cost of energy.

2. Is Pratt & Whitney (P&W) affiliated with the above project in any way (e.g., capital investment, land investment, liability, etc)?

P&W will lease the land necessary to house the project to Power Ventures for a nominal sum and P&W will be obligated to purchase the energy produced by the plant, if tendered. P&W will not be affiliated with the project in any other way. Power Ventures assumes all developmental and operational risk.

copy
M. Flores
W. Aronson

To emphasize the "stand alone" nature of the project, we have petitioned the Florida PSC for a declaratory statement concerning public utility status of this project.

3. **Reconfirm the information provided in "part E, Fuels" of the application form. Note that permit conditions would reflect the maximum fuel quantities utilized and restrict the engines on the maximum heat input allowed.**

The maximum heat input operating on dual fuel will be 54.558 MMBtu/hr for each engine. This will consist of 51.83 MMBtu/hr from natural gas (95%) and 2.728 MMBtu/hr from diesel fuel. During operation of the engines, normal wear of the diesel injectors will cause some deviation (i.e., increase) in diesel fuel usage from the optimum, i.e., 5%. The overall heat input will, however, remain within the stated limits. In order to assure optimum engine performance, maintenance will be performed every 2000 hours. Please note that the maximum and average consumption for natural gas under dual-fuel firing is 49.36 MSCF/hr and 45.4 MSCF/hr, respectively, based on a heat capacity of 1050 Btu/scf; this replaces the information noted in the application.

The maximum heat input operating on diesel fuel is 55.881 MMBtu/hr for each engine. The higher heat input rate under diesel fuel firing is a performance characteristic of the engines on the different fuels.

4. **In "part H, Stack Data" of the application form, please state, if available, the water vapor content and velocity of the exiting gas stream.**

(a) Water vapor content of the stack exhaust will be approximately 10 percent.

(b) Stack gas velocity will be 74.4 ft/s at maximum conditions.

5. **Will the exhaust from all four engines be emitted through one stack?**

No, each engine will have a separate stack.

6. **Show the basis (provide copy of reference) and calculations for the emission estimates you have submitted. Note that these calculations should account for the maximum fuel input options and also the maximum operating hours (100% availability).**

The emission calculations are presented in Attachment 1. Maximum emissions are based upon 100% load, while annual average emissions are based on 92% availability or 8059 hrs/year at 100% load. The primary fuel is dual fuel and only during natural gas curtailment would diesel be used. Natural gas curtailments are considered very rare but if a curtailment occurred, it probably would not last more than one to two weeks. Therefore, annual emissions are expected to be as represented by dual-fuel firing.

For emissions of NO_x, CO and VOC, manufacturer information was used. These emissions represent levels consistently below AP-42 and are lower than the previously proposed NSPS for dual fired engines. For SO_2, PM and trace element emissions, standard emission factors were used, as published by EPA.

7. **Will the electricity generated by the engine be used at the P&W facility or will it be sold to a utility company?**

P&W will purchase, to the extent of their needs, all of the energy produced by the plant. In the event that the capability of the plant exceeds P&W's needs for a short period of time, Power Ventures plans to sell the excess to a utility company at "as-available" rates.

8. (a) **Please list all steam generating units (capacities) and the steam utilizing units (requirements) at P&W's complex.**

In the manufacturing area, there are two main steam generating units. Each of these steam boiler units has a maximum heat input rate of 54×10^6 Btu/hr and steam production of 45,000 lb/hr.

In the test area, there are 4 cyclotherm boilers, each rated at 2.0×10^6 Btu/hr; Scotch Marine boiler, rated at 41.8×10^6 Btu/hr, which can produce 34,500 lb/hr of steam; and a Clayton steam generator, rated at 5.0×10^6 Btu/hr.

The manufacturing area steam utilizing units are listed below with the maximum capacity for each unit shown. Please note that while the sum of the maximum capacities is approximately 48,000 pounds per hour, the average total steam used in the manufacturing area is only 5,000 pounds per hour.

	Max Capacity lb/hr
Steam Coils, Fan Room #1	12,830
Steam Coils, Fan Room #2	16,150
Steam Coils, Fan Room #3	11,400
Kitchen, incl. Water Heaters	1,500
Plating Area	2,400
Assembly Area	260
Machine Shop Area	200
West A/C Room	1,000
HVAC Unit #1	80
HVAC Unit #2	220
RTU #1	430
RTU #2	430

RTU #3	670
Fan Coil Units	1,000
Water Heater - Maint. Area	60

In the test areas, a 6,000,000 BTU/Hr using-unit capacity is in place for heating jet fuel and for fire suppression systems. A steam ejector has a capacity of approximately 90 pounds per second. This ejector is supplied from accumulators which are charged from cold conditions by running the boiler at full power for 12 hours. In Test Area C, steam cooled instrumentation probes in hot air ductwork are the using units. The capacity varies with the number of probes in use and for some tests is as high as the capacity of the boiler.

(b) What is the current excess steam capacity?

In the manufacturing area the current excess steam capacity is 41,370 pounds per hour. Total excess capacity in the test areas is 2,000,000 BTU per hour.

(c) Will the steam generated from this project be used in a new/expanded operation?

The steam/hot water generated by the plant will be used in both existing applications (see **"d"** below) and in a new application. The new application will consist of the addition of new absorption chillers. These chillers will supplant existing centrifugal chillers and will allow P&W to expand chilling capacity without the addition of new chillers.

(d) Will the steam from this project replace a current steam source?

The cogeneration plant will replace <u>all</u> current steam generation by P&W in the manufacturing area. On average, this is currently about 5,000 pounds per hour. P&W will use their boiler(s) as backup only.

(e) List all units to which steam from this project will be supplied.

Steam/hot water will be supplied to all the units listed in **"a"** above in the manufacturing area. Additionally, steam/hot water will be supplied to the new absorption chillers.

(f) Please account for the overall energy balance and distribution (steam and electricity) for this project.

Energy balance diagrams are included as Figure 5 and Figure 6.

9. **How do you intend to ensure and demonstrate consistent emission control performance of the four engines (monitoring)?**

Compliance with emission limitations proposed will be demonstrated in two ways. For emissions of PM, SO_2, CO, Pb, Be, As and Hg, certification of natural gas use will be provided since the emissions of these pollutants are extremely low on dual-fuel firing. Emissions will be tested using EPA Method 20, with modifications according to proposed subpart FF, for NO_x and EPA method 25A for VOC. Engine adjustments, such as ignition retard will be made to achieve the proposed standards. Engine settings and measurements will be supplied to FDER upon submittal of the construction certification to ensure and demonstrate emission control performance. Annually thereafter, emissions tests will be performed, as required by FDER, to ensure and demonstrate compliance.

Testing under diesel firing is not proposed since this is considered an emergency condition. Also, the testing period under diesel would likely be as long or longer than any expected natural gas curtailment.

10. **Please submit page 7-3 of the application package dated April 17,1987 (if there is meant to be one).**

Page 7-3 is included as Attachment 2.

11. **Submit the modeling output.**

Since a copy of the computer printout is several inches thick, KBN Engineering is sending a copy of the printout directly to your office under separate cover.

12. **The following sources should be considered, along with those originally modeled, in the modeling analysis:**

(a) Palm Beach Resource Recovery Facility
(b) Osceola Farms
(c) Atlantic Sugar
(d) Parkway Asphalt

Note: These sources also consume SO_2 PSD increment.

Additional air dispersion modeling was performed to determine the total air quality impacts due to all modeled sources and PSD Class II increment consumption due to PSD increment consuming sources. Because the proposed facility's impacts are predicted to be above the significance levels for SO_2 and NO_2 only, the additional modeling was performed only for these two pollutants.

An updated SO_2 and NO_2 emission inventory of sources within 50 km of the proposed facility is presented in Table 1. This table also identifies those sources considered in the modeling. The sources not considered in the analysis are those that are expected to have a less than significant impact, based on the North Carolina Division of Environmental Management's method of modeling sources. This method assumes that a source will have a less than significant impact with another source if the first source's emissions, tons per year, are less than 20 x D, where D is the distance separation, km, between the first source and the other source.

Because the sources considered in this modeling analysis are more than 25 km from the proposed facility, the analysis was performed in two phases. The first phase, a screening phase, considered the interaction of the sources along receptor locations that aligned each of the modeled sources downwind from the proposed facility. For this analysis, receptors were located along the following radials and distances downwind from the proposed facility:

Radial (degrees)	Distance from proposed facility
28	366, 750, 1100, 1500
57	366, 750, 1100, 1500
73	366, 750, 1100, 1500
150	564, 750, 1100, 1500
302	6680
315	1190, 1500
324	1190, 1500

These receptors were included because they represent the receptors that are generally along the P&W plant boundary and are located at distances at which the maximum concentrations from the proposed facility are expected to occur. For this analysis, concentrations were predicted for the 5 years of meteorological data (1970-1974) that were considered in the original modeling. A summary of the maximum predicted SO_2 and NO_2 concentrations for this analysis are presented in Tables 2 and 3, respectively. These results indicate that the maximum predicted concentrations for total air quality impacts and PSD Class II increment consumption are less than those presented in the original report. Therefore, a refined analysis was performed which included the emissions from this screening analysis but was based on the periods which produced the highest, second-highest 3- and 24- hour SO_2 concentrations and highest annual SO_2 and NO_2 concentrations from the PSD analysis submitted with the application. In general, the model results were the same or slightly higher than the previous modeling analysis. The total SO_2 air quality impact from all sources is predicted to be 360, 184 and 28.6 ug/m^3 for the 3-, 24- hour and annual averaging periods, respectively. The total annual NO_2 air quality impact is predicted to be 72.8 ug/m^3. For comparison to the SO_2 PSD Class II increments, the maximum predicted 3-, 24-hour and annual concentrations were 119, 47.1, and 4.7 ug/m^3, respectively. Based on these results, the maximum concentrations are predicted to be below the PSD Class II increments for SO_2 and the AAQS for SO_2 and NO_2.

13. **(a) Please explain why only sources with greater than 100 TPY (tons per year) emissions of SO_2 and NO_x were modeled?**

As indicated in the response to Comment 12, a review of the SO_2 and NO_2 emission sources within 50 km of the proposed facility was performed. Because the North Carolina DEM method was used to exclude sources from the modeling, there were no sources, other than P&W sources, within 5 km that had emissions of more than 100 tons per year. Therefore, only sources with emissions greater than 100 tons per year were modeled.

(b) Are there any other sources within or just outside the significant impact area that might be expected to have a significant impact within such area?

Based on the emission inventory of SO_2 and NO_2 sources within 50 km of the proposed facility that were identified and modeled in response to Comment 12, there are no other sources that are expected to have a significant impact within the significant impact area, and, more importantly, at the receptor of maximum impact of the proposed facility.

(c) Why were some of the P&W sources not modeled?

All permitted sources at the P&W facility with emissions greater than 5 tons per year were modeled in the analysis (see Appendix A of the PSD analysis submitted with the construction permit for a listing of the permitted P&W sources).

14. **A map indicating the significant impact area of each pollutant should be submitted or the diameter of each area should be stated.**

As indicated in Table 5-5 of the PSD analysis submitted with the construction permit, the proposed facility is expected to have impacts greater than the significance levels for SO_2 and NO_2 concentrations only. For these pollutants, the significant impact areas from the proposed facility are predicted to be as follows:

Pollutant	Averaging Period	Distance (km) of Significant Impact Area
SO_2	3-hour	6
	24-hour	7
	Annual	5
NO_2	Annual	30 - 40

It should be noted that the NO_2 significant impact area is based on the proposed facility burning diesel fuel. For dual-fuel firing, which is expected to be more typical of facility operation, the significant impact area would extend out to approximately 20 km.

15. (a) A map indicating the locations of the receptors used in the modeling would be helpful.

The receptor locations used in the screening modeling analysis are presented in Figures 1 through 3. The receptors are numbered 1 through 155. The proposed source is identified as number 1001. P&W sources are numbered 2001, 2002, 3001, 3002, 3003, and 3004.

(b) Please justify the selection of receptor locations.

For the screening analysis, receptors were located along and within the P&W boundary line. Additional receptors were placed 200 to 400 m further downwind from the boundary line receptors. Because maximum concentrations from the proposed facility were predicted at the boundary line receptors in the screening and refined analyses, the receptor grid was determined to be a good spatial distribution of receptor locations.

16. (a) Explain why a building diagonal of 138 feet was used for modeling purposes.

To address the effects of building downwash in the ISC dispersion model, the building height, length, and width are input to the model. The model uses these dimensions to modify the dispersion parameters. The ISCST model calculates the area of the building using the length and width, assumes the area is representative of a circle, and then calculates a building width by determining the diameter of the circle. If a specific width is to be modeled, the model inputs of building length and width must be based upon the following formula:

where: W_m is the building length and width input to the model to produce a building width of W_a in the dispersion calculations.

W_a is the actual building width for which dispersion calculations are desired.

The proposed unit's building will have a building height, length, and width of 40, 120 and 100 feet, respectively. The diagonal of the building calculated from the length and width is 156 ft (not 138 ft as indicated in the report). To produce a W_a of 156 ft in the model calculations, a W_m of 138 ft was input to the model.

(b) Submit drawings indicating the relationship between the generators and the unit building.

The relationship of the proposed facility's generators and building is presented in Figure 4. This design is a typical plant layout for a facility of this type as provided by vendor specifications.

17. An "additional impact analysis" is required for all PSD significant pollutants. Please submit for PM (particulate matter) and CO (carbon monoxide).

Particulate matter can interfere with plant metabolism when large enough quantities coat leaf surfaces causing the blockage of gas and light exchange mechanisms. The specific sensitivity of plants to particulate matter produced by facilities of this type is not known, nor have levels which produce plant injuries from other sources been documented.

The proposed facility will contribute a maximum annual average of 0.34 ug/m^3 of TSP, which will add an insignificant amount to existing air quality levels.

Carbon Monoxide. Plants appear to be resistant to high levels of CO. In most species tested, exposure to 115 ug/m^3 for up to three weeks did not produce visible injury (Zimmerman, et al., 1983). More recently, exposure to less than 27 ug/m^3 (Chakrabarti, 1976) also produce no visible injury.

The proposed facility will contribute a maximum annual concentration of less than 0.1 ug/m^3. Total concentrations, as a result of the operation of the proposed facility, will thus be considerably below concentrations causing visible injury to vegetation.

Chakrabarti, A.G. 1976. Effects of Carbon Monoxide and Nitrogen Dioxide on Garden Pea and String Bean, Bull Envir. Contam. Toxical. 15(2):214-222.

Zimmerman, P.W., et al. 1983. The Effect of Carbon Monoxide on Plants, Contribs. Boyce Thompson Institute, 5(2):195-211, Ithaca, N.Y.

18. Please submit the "Source Applicability Analysis" (Section 3.4).

The source applicability analysis was included in the PSD analysis submitted with the permit to construct; however, the headings for the analysis were not correctly labeled in the report. The source applicability section has been revised to reflect that the proposed facility will be a new major source and a major modification, as previously indicated. This change is a result of the independent ownership and operation of the proposed facility from the existing P&W facility and the applicability of definitions "modification" and "facility" contained in Chapter 17-2.100 F.A.C. Revised copies of the analysis with the proper heading are enclosed as Attachment 3.

If you have any further questions, please do not hesitate to contact me.

Sincerely,

Tom Reedy/dh

Tom Reedy
Vice President

TR/dh

cc: K. Kosky - KBN Engineering
W. Ondler - FPL

copied:

CHF
BT
Pradeep Raval
} 6-25-87 WMH
Max Linn
I. Goldman, SED(H)
M. Flores, NPS
W. Aronson, EPA
} 6-26-87 RAN

ATTACHMENT 1

Emissions Calculations and References
for Power Ventures
(also reference Tables 2-1 and 2-2 in Application to Construct
an Air Pollution Source)

SO_2

Dual Fuel:

1) Natural Gas (N.G.): 51.83×10^6 Btu/hr x 1/1050 Btu/ft^3
(S = Sulfur) x 2000 gr S/10^6 ft^3 N.G. x 1/7000 gr/lb
x 2 lb SO_2/lb S = 0.028 lb/hr

2) Diesel (D): 2.728×10^6 Btu/hr x 1/19,000 Btu/lbD x 0.003 lb S/lbD
x 2 lb SO_2/lb = 0.862 lb/hr

Total: (0.028 + 0.862)lb/hr = 0.89 lb/hr

Diesel:
55.881×10^6 Btu/hr x 1/19,000 Btu/lbD x 0.003 lb S/lbD x 2 lb SO_2/lb S
= 17.65 lb/hr

References:
Natural Gas - 2000 gr S/10^6 ft^3 maximum
Diesel - 0.3% S maximum

PM

Dual Fuel: 54.558×10^6 Btu/hr x 0.0133 lb/10^6 Btu = 0.73 lb/hr

Diesel: 55.881×10^6 Btu/hr x 0.0302 lb/10^6 Btu = 1.69 lb/hr

References:
Emission Assessment of Conventional Stationary Combustion Systems (EA CSCS); Volume 11 - Internal Combustion Sources, U.S. EPA Industrial Environmental Research Laboratory. Feb. 1979. EPA-600/7-79-029c.

Refer to attached Tables 1 and 2 from reference.
Note: 5.7 mg/J = 0.0133 lb/10^6 Btu (page 9)
13 mg/J = 0.0302 lb/10^6 Btu (page 10)

NO_x

Dual Fuel: 8.4 g/kw-hr x 6300 kw x 1/454 g/lb = 116.6 lb/hr

Diesel: 17 g/kw-hr x 6300 kw x 1/454 g/lb = 235.9 lb/hr

References:
Manufacturer information from Cooper-Bessemer, Colt Industries, Enterprise Division of IMD Delaval, and Minlees Blackstone.

Note: For dual fuel, the volumetric emissions compared to previously proposed NSPS are:

Volume of NO_x = 116.6 lb/hr x 1545 ft-lb / 46 lb mole ^oR
x 520 ^oR x 1/2116.8 lb/ft^3 x 1/60 m/hr = 16 ft^3/min

Relative volume of NO_x corrected to 12% O_2 = 16 ft^3/min x
1/21,600 ft^3/min = 7.41 x 10^{-4} or 741 ppm under STD conditions and
823 ppm under STD conditions dry

Relative volume of NO_x corrected to 12% O_2 =
823 ppm x (5.9/20.9 - 12) = 546 ppm @ 15% O_2
Previously proposed NSPS = (600 x 10.2/y) @ 15% O_2 dry
where y = brake specific fuel consumption in KJ/w-hr
y = 54.6 x 10^6 Btu/hr x 1/8800 bhp x 1.055 KJ/Btu x
1/745.7 watts/hp = 8.78 KJ/watt-hr

Previously proposed NSPS = (600 x 10.2/8.78) = 697 ppm @ 15% O_2

CO

Dual Fuel: 2.9 g/kw-hr x 6300 kw x 1/454 g/lb = 40.2 lb/hr

Diesel: 0.42 g/kw-hr x 6300 kw x 1/454 g/lb = 5.83 lb/hr

Reference: Manufacturer information

VOC

Dual Fuel: 0.6 g/kw-hr x 6300 x 1/454 g/lb = 8.33

Diesel: 0.34 g/kw-hr x 6300 x 1/454 g/lb = 4.72

Reference: Manufacturer information

Pb

Dual Fuel: Emissions based on diesel-fuel firing only, i.e., 5%, because there are no reported lead emissions for natural gas

2.728 x 10^6 Btu/hr x 6.04 x 10^{-5} lb/10^6 Btu = 1.65 x 10^{-4} lb/hr

Diesel: 55.881 x 10^6 Btu/hr x 6.04 x 10^{-5} lb/10^6 Btu = 3.37 x 10^{-3} lb/hr

Reference: EA CSCS; EPA, 1979 Table 52 page 137
Note: 26 pg/J = 6.04 x 10^{-5} lb/10^6 Btu

Be

Dual Fuel: Emissions based on diesel-fuel firing only because of no reported beryllium emissions for natural gas

2.728×10^6 Btu/hr x 7×10^{-8} lb/10^6 Btu = 1.9×10^{-7} lb/hr

Diesel: 55.881×10^6 Btu/hr x 7×10^{-8} lb/10^6 Btu = 3.9×10^{-6} lb/hr

Reference: EA CSCS; EPA, 1979 Table 52 page 137

Note: 0.03 pg/J = 7×10^{-8} lb/10^6 Btu

As

Dual Fuel: Emissions based on diesel-fuel firing only because of no reported Arsenic emissions for natural gas

2.728×10^6 Btu/hr x 5.1×10^{-6} lb/10^6 Btu = 1.4×10^{-5} lb/hr

Diesel: 55.881×10^6 Btu/hr x 5.1×10^{-6} lb/10^6 Btu = 2.8×10^{-4} lb/hr

Reference: EA CSC; EPA, 1979 Table 52 page 137

Note: 2.2 pg/J = 5.1×10^{-6} Btu

Hg

Dual Fuel:

a. Natural gas: 51.83×10^6 Btu/hr x 1.14×10^{-5} lb/10^6 Btu = 5.9×10^{-4} lb/hr
b. Diesel: 2.728×10^6 Btu/hr x 3×10^{-7} lb/10^6 Btu = 8.2×10^{-7} lb/hr
c. Total: 5.9×10^{-4} lb/hr + 0.0082×10^{-4} lb/hr = 5.9×10^{-4} lb/hr

Diesel: 55.881×10^6 Btu/hr x 3×10^{-7} lb/10^6 Btu = 1.7×10^{-5} lb/hr

References:

Natural Gas: Emission Assessment of Conventional Stationary Combustion Systems: Volume III External Combustion Sources for Electricity, U.S. EPA Industrial Environmental Research Laboratory. No. 1980. EPA-600/7-81-003a. Table 3 page 12.

Diesel: EA CSCS; EPA, 1979 Table 52 page 137.

Note: 0.0049 ng/J = 1.14×10^{-5} lb/10^6 Btu
0.13 pg/J = 3×10^{-7} lb/10^6 Btu

United States
Environmental Protection
Agency

Industrial Environmental Research
Laboratory
Research Triangle Park NC 27711

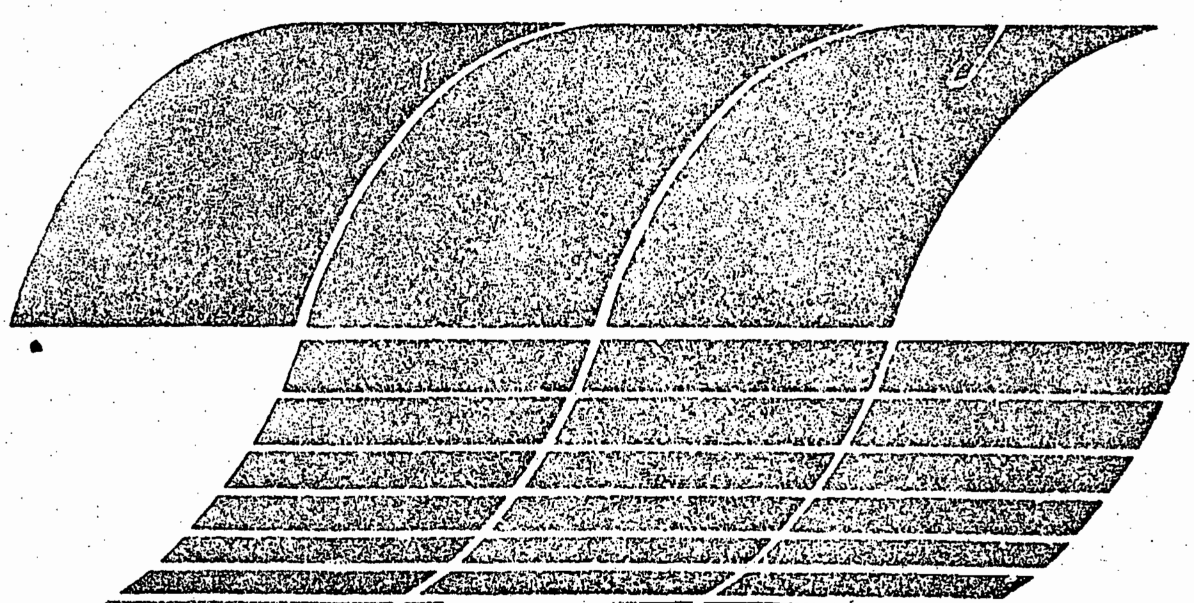
EPA-600/7-79-029c
February 1979

PB 296390

EPA

Emissions Assessment of Conventional Stationary Combustion Systems; Volume II. Internal Combustion Sources

Interagency Energy/Environment R&D Program Report



EPA-600/7-79-029c

February 1979

Emissions Assessment of Conventional Stationary Combustion Systems; Volume II. Internal Combustion Sources

by

C.C. Shih, J.W. Hamersma, D.G. Ackerman,
R.G. Beimer, M.L. Kraft, and M.M. Yamada

TRW, Inc.
One Space Park
Redondo Beach, California 90278

Contract No. 68-02-2197
Program Element No. EHE624A

EPA Project Officer: Ronald A. Venezia

Industrial Environmental Research Laboratory
Office of Energy, Minerals, and Industry
Research Triangle Park, NC 27711

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Washington, DC 20460

TABLE 1. SUMMARY OF RESULTS OF EMISSIONS ASSESSMENT FOR GAS-FUELED INTERNAL COMBUSTION SOURCES

Pollutant	Gas-Fueled Gas Turbines				Gas Reciprocating Engines			
	Elec. Gen.		Industrial		Elec. Gen.		Industrial	
	Emission Factor (ng/J)	Severity Factor	Emission Factor (ng/J)	Severity Factor	Emission Factor (ng/J)	Severity Factor	Emission Factor (ng/J)	Severity Factor
NO_x	168	0.17	130	0.52	1549	7.1	1549	5.7
Total hydrocarbons	23.2	0.020	8.6	0.025	528	1.7	528	1.3
CO	64.8	0.0003	48.8	0.0007	340	0.0051	340	0.0040
Particulate	5.1	0.0019	5.1	0.0062	5.7	0.0068	5.7	0.0055
SO_x	0.26	<0.0001	0.26	<0.0001	0.26	0.0002	0.26	0.0002

TABLE 52. COMPARISON OF TRACE ELEMENT EMISSION FACTORS FOR DISTILLATE OIL-FUELED GAS TURBINES AND DISTILLATE OIL ENGINES

	Mean Emission Factor, pg/J	
Trace Element	Distillate Oil Fueled Gas Turbine	Distillate Oil Reciprocating Engine
Aluminum	64	66
Antimony	9.4	12
Arsenic	2.1	2.2
Barium	8.4	14
Beryllium	0.14	0.03
Boron	28	11
Bromine	1.8	4.0
Cadmium	1.8	3.1
Calcium	330	237
Chromium	20	26
Cobalt	3.9	5.7
Copper	578	453
Iron	256	325
Lead	25	26
Magnesium	100	44
Manganese	145	16
Mercury	0.39	0.13
Molybdenum	3.6	12.5
Nickel	526	564
Phosphorus	127	97
Potassium	185	179
Selenium	2.3	2.1
Silicon	575	301
Sodium	590	1625
Tin	35	9.1
Vanadium	1.9	0.95
Zinc	294	178

TABLE 2. SUMMARY OF RESULTS OF EMISSIONS ASSESSMENT FOR OIL-FUELED INTERNAL COMBUSTION SOURCES

Pollutant	Distillate Oil-Fueled Gas Turbines				Distillate Oil Reciprocating Engines			
	Elec. Gen.		Industrial		Elec. Gen.		Industrial	
	Emission Factor (ng/J)	Severity Factor	Emission Factor (ng/J)	Severity Factor	Emission Factor (ng/J)	Severity Factor	Emission Factor (ng/J)	Severity Factor
NO_x	311	0.32	207	0.83	1392	6.4	1392	5.1
Total hydrocarbons	17.5	0.015	3.6	0.010	52	0.16	52	0.13
CO	43.8	0.0002	101	0.0014	266	0.0040	266	0.0032
Particulate	13.0	0.0049	13.0	0.016	14.1	0.019	14.1	0.015
SO_x	33.1	0.0089	33.1	0.029	101	0.097	101	0.077
SO_3	1.5	0.056	1.5	0.18	1.8	0.23	1.8	0.18
Trace Elements								
Copper	0.58	0.085	0.58	0.28	0.45	0.23	0.45	0.20
Nickel	0.53	0.16	0.53	0.51	0.56	0.60	0.56	0.48
Phosphorus	0.13	0.037	0.13	0.12	0.097	0.10	0.097	0.082

PB81-145195

EPA-600/7-81-003a
November 1980

EMISSIONS ASSESSMENT OF CONVENTIONAL STATIONARY COMBUSTION SYSTEMS: VOLUME III. EXTERNAL COMBUSTION SOURCES FOR ELECTRICITY GENERATION

November 1980

by:

C.C. Shih, R.A. Orsini, D.G. Ackerman, R. Moreno,
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TRW Environmental Engineering Division
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EPA Contract No.: 68-02-2197
EPA Program Element No.: C9K N1C
Project Officer: Michael C. Osborne

Industrial Environmental Research Laboratory
Office of Environmental Engineering and Technology
Research Triangle Park, N.C. 27711

Prepared for:

U.S. Environmental Protection Agency
Office of Research and Development
Washington D.C. 20545

TABLE 3. SUMMARY OF ASSESSMENT RESULTS FOR FLUE GAS EMISSIONS FROM RESIDUAL OIL- AND GAS-FIRED UTILITY BOILERS

Pollutant	Residual Oil				Natural Gas			
	Tangential Firing		Wall Firing		Tangential Firing		Wall Firing	
	Emission Factor (ng/J)	Source Severity Factor	Emission Factor (ng/J)	Source Severity Factor	Emission Factor (ng/J)	Source Severity Factor	Emission Factor (ng/J)	Source Severity Factor
NO_x	114	1.90	190	1.17	124	3.21	233	2.94
Total Hydrocarbons	4.6	0.060	4.6	0.022	2.4	0.047	2.4	0.024
CO	56	0.0035	56	0.0013	33	0.0031	33	0.0015
Particulates	30	0.17	30	0.061	0.25	0.0021	0.25	0.0010
SO_2 (Uncontrolled)	448	1.79	448	0.66	0.25	0.0015	0.25	0.0007
SO_3	13.8	7.43	13.8	2.76	ND	ND	ND	ND
Particulate Sulfate	3.3	1.48	3.3	0.55	ND	ND	ND	ND
Trace Elements								
Beryllium	0.0024	0.52	0.0024	0.19	BD	NA	BD	NA
Chlorine	3.1	0.20	3.1	0.072	2.9	0.29	2.9	0.14
Copper	0.35	0.77	0.35	0.29	0.021	0.069	0.021	0.034
Lead	0.034	0.098	0.034	0.036	BD	NA	BD	NA
Magnesium	2.4	0.18	2.4	0.065	BD	NA	BD	NA
Mercury	0.0015	0.013	0.0015	0.005	0.0049	0.064	0.0049	0.031
Nickel	0.43	1.90	0.43	0.71	0.042	0.28	0.042	0.14
Phosphorus	0.13	0.57	0.13	0.21	0.070	0.46	0.070	0.23
Selenium	0.025	0.056	0.025	0.021	BD	NA	BD	NA
Vanadium	3.7	3.22	3.7	1.19	BD	NA	BD	NA
POM								
Benzopyrenes/perylenes	6.25×10^{-7}	0.014	6.25×10^{-7}	0.005	BD	NA	BD	NA
Total POM	0.0047	NA	0.0047	NA	BD	NA	BD	NA

ND - No data.
BD - Below detection limit. Detection limit for POM was typically 0.3 $\mu g/m^3$ or approximately 0.0001 ng/J. However, lower detection limits were obtained for less complex samples with fewer interferences or closely eluting GC peaks.
NA - Not applicable.

7.2 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

Currently, there are no applicable emission-limiting standards for large bore gas, dual-fuel or diesel internal combustion engines. On July 23, 1979, USEPA proposed NSPS for NO_x emissions from stationary internal combustion engines (Federal Register, Volume 44, No. 142, July 23, 1979). For diesel or dual-fuel engines that have greater than a 560 cubic inch displacement per cylinder, the proposed emission standard is:

$$STD = 600(10.2/y)$$

where: STD = allowable NO_x emissions in ppm corrected to 15% O_2.

y = manufacturer's rated brake-specific fuel consumption in kilojoules/watt-hour

If the brake specific fuel consumption is greater than 10.2 kilojoules/watt-hour (7209.6 Btu/hp-hr) then an emission limiting standard of 600 ppm (corrected to 15% O_2) applies.

USEPA's action on these proposed NSPS were indefinitely postponed and withdrawn in October 1986 (Federal Register, Vol. 51, No. 207, October 27, 1986). Therefore, no NSPS for stationary internal combustion engines is proposed for this source.

7.3 BACT EVALUATION

Table 7-1 presented the emission rates proposed as BACT for the cogeneration facility.

7.3.1 Nitrogen Oxides

The proposed BACT emission rates for NO_x from each engine is equivalent to 741 ppm under standard conditions for the dual-fuel firing which is the primary fuel for the facility. When adjusted for expected engine efficiency (8.8 KJ/W-hr) and % O_2 in the gas stream (12%), the allowable emission rate as proposed in the withdrawn NSPS is 1,051 ppm. As a result, the emission rate proposed as BACT is about 30% lower than the previously proposed NSPS. This limit will be achieved by one or more of the following methods:
1) retarded ignition or fuel injection, 2) air-to-fuel ratio changes,
3) manifold air cooling, and 4) derating power output (at constant speed).

TABLE 1

Table 1. Updated SO_2 and NO_2 Emission Inventory of Sources Within 50 km of the Proposed Facility

Model Reference Number	Source	UTM Coordinates (km)		Maximum Allowable Emissions (TPY)		Relative location with respect to P&W Facility*			
						Polar Grid		Cartesian Grid	
		East	North	SO_2	NO_2	Direction (o)	Distance (km)	x (km)	y (km)
1	FP&L-Riviera	594.2	2,960.6	28,050	8,798	122	29.1	24.8	-15.3
2	Lake Worth Utilities	592.8	2,943.7	11,194	2,283	144	39.8	23.4	-32.2
7	Sugar Cane Growers	534.9	2,953.3	5,100	1,567	237	41.2	-34.5	-22.6
-	U.S. Sugar Corp. Bryant	538.8	2,968.1	314	364+	256	31.6	-30.6	-7.8
4	FP&L-Martin	543.1	3,022.0	55,034	20,639	330	53.1	-26.3	46.1
3	Palm Beach County Resource Recovery	585.82	2,960.2	2,957	1,314	134	22.7	16.4	-15.7
6	Atlantic Sugar	552.9	2,945.2	1,392	403	208	34.9	-16.5	-30.7
5	Osceola	544.2	2,968.0	1,228	406	253	26.4	-25.2	-7.9
-	Parkway Asphalt	583.3	2,951.3	62	96	151	28.3	13.9	-24.6

* Proposed facility UTM East and North coordinates are 569.4 and 2,975.9 km, respectively.
\+ Based on 1985 actual operating data (Palm Beach County Health Department, 1985).

TABLE 2

Table 2. Screening Analysis of the Interaction of the Proposed Facility with Other SO_2 Sources*

		PSD Sources			All Modeled Sources		
Averaging Period	Year	Concentration (ug/m^3)	Location Direction (o)	Location Distance (m)	Concentration (ug/m^3)	Location Direction (o)	Location Distance (m)
3-Hour+	1970	98.5	150	564	202	73	1100
	1971	91.8	57	366	191	73	750
	1972	91.8	73	366	172	324	1190
	1973	103.0	28	366	154	57	750
	1974	92.8	57	366	172	57	366
24-Hour+	1970	26.8	315	1190	59.2	57	366
	1971	29.4	57	366	68.5	57	366
	1972	46.9	57	366	82.7	73	366
	1973	26.7	315	1190	55.6	150	750
	1974	27.0	57	366	62.0	57	366
Annual**	1970	2.8	150	564	10.5	150	750
	1971	3.5	315	1190	11.1	315	1150
	1972	3.1	57	366	11.1	57	366
	1973	3.7	315	1190	11.4	150	750
	1974	3.6	315	1190	11.3	315	1190

* Receptors located along radials of 28, 57, 73, 150, 302, 315 and 324 degrees which are directions that align the other SO_2 sources downwind from the proposed source.

\+ Highest, second-highest concentration.

** Based on 100 percent annual availability factor for proposed facility. With projected annual factor of 92 percent, maximum predicted concentrations are expected to be lower.

TABLE 3

Table 3. Screening Analysis of the Interaction of the Proposed Facility with Other NO_2 Sources*

Averaging Period	Year	Proposed Only Concentration (ug/m^3)	Proposed Only Location Dir-Dis(m)	All Modeled Sources Concentration (ug/m^3)	All Modeled Sources Location Dir-Dis(m)
Annual**	1970	24.2	315 - 1190	26.8	315 - 1190
	1971	31.7	315 - 1190	34.6	315 - 1190
	1972	27.7	57 - 366	30.6	57 - 366
	1973	34.9	315 - 1190	37.6	315 - 1190
	1974	33.1	315 - 1190	36.0	315 - 1190

* Receptors located along radials of 28, 57, 73, 150, 302, 315, and 324 degrees which are directions that align the other NO_2 sources downwind from the proposed source.

** Based on 100 percent annual availability factor for proposed facility. With a projected annual factor of 92 percent, maximum predicted concentrations are expected to be lower.

FIGURE 1

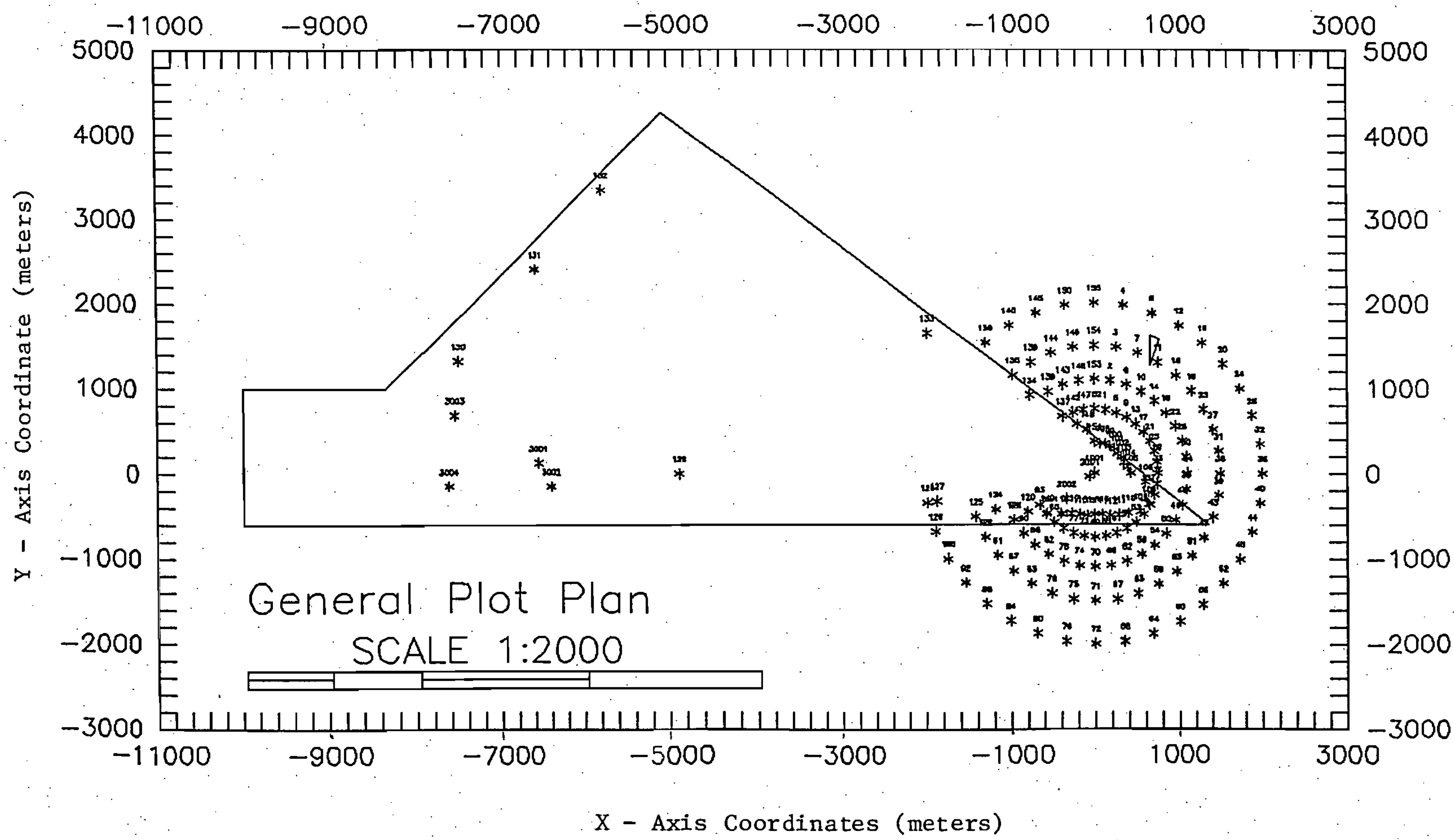


Figure 1 - General Receptor Locations and P&W Boundary Lines
(Note - Receptors numbered 1 to 155; Proposed Source,1001;
Other Sources, 2001 to 3004)

FIGURE 2

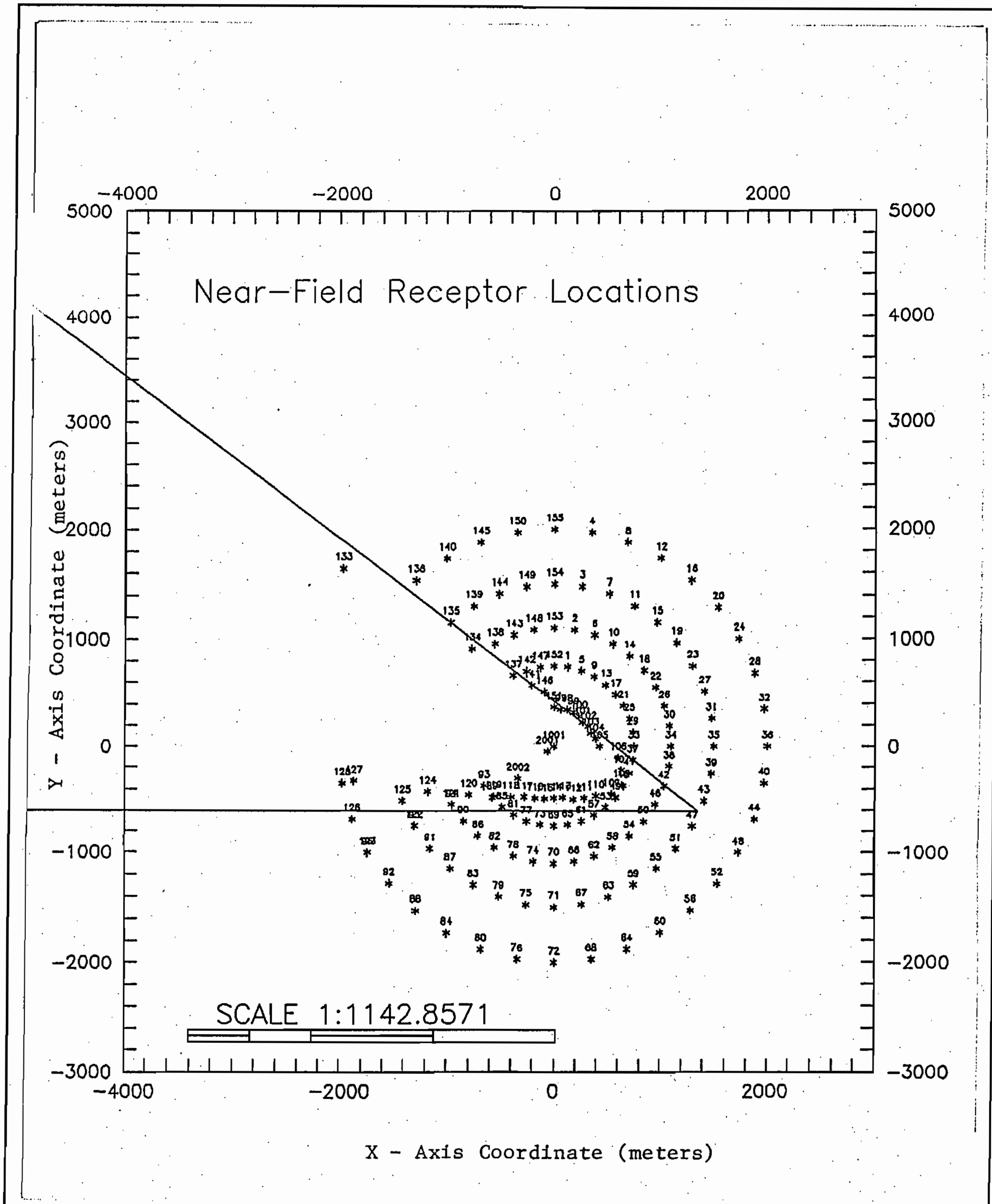


Figure 2 - Near-field Receptor Locations (Proposed Source, 1001)

KBN

FIGURE 3

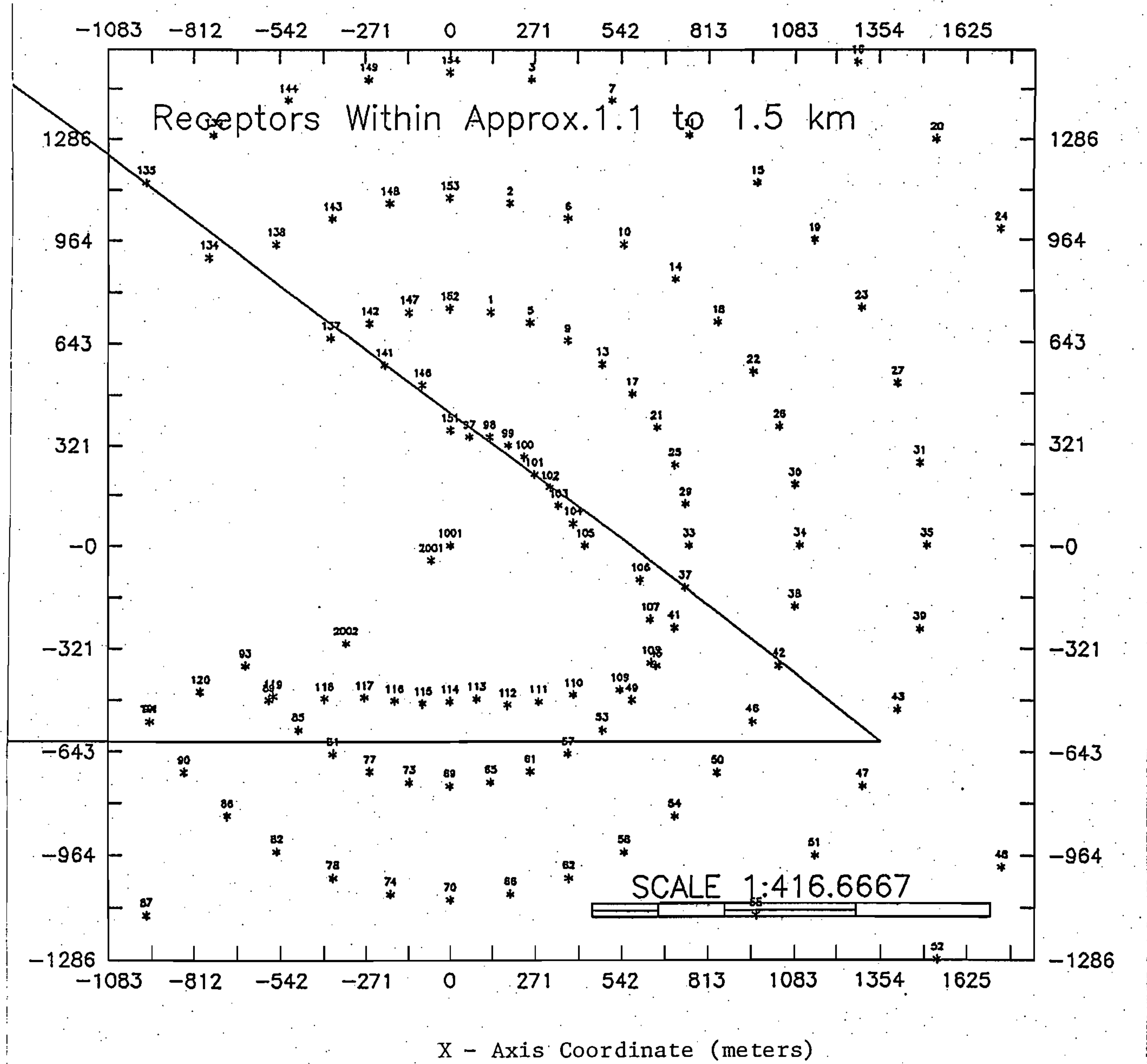
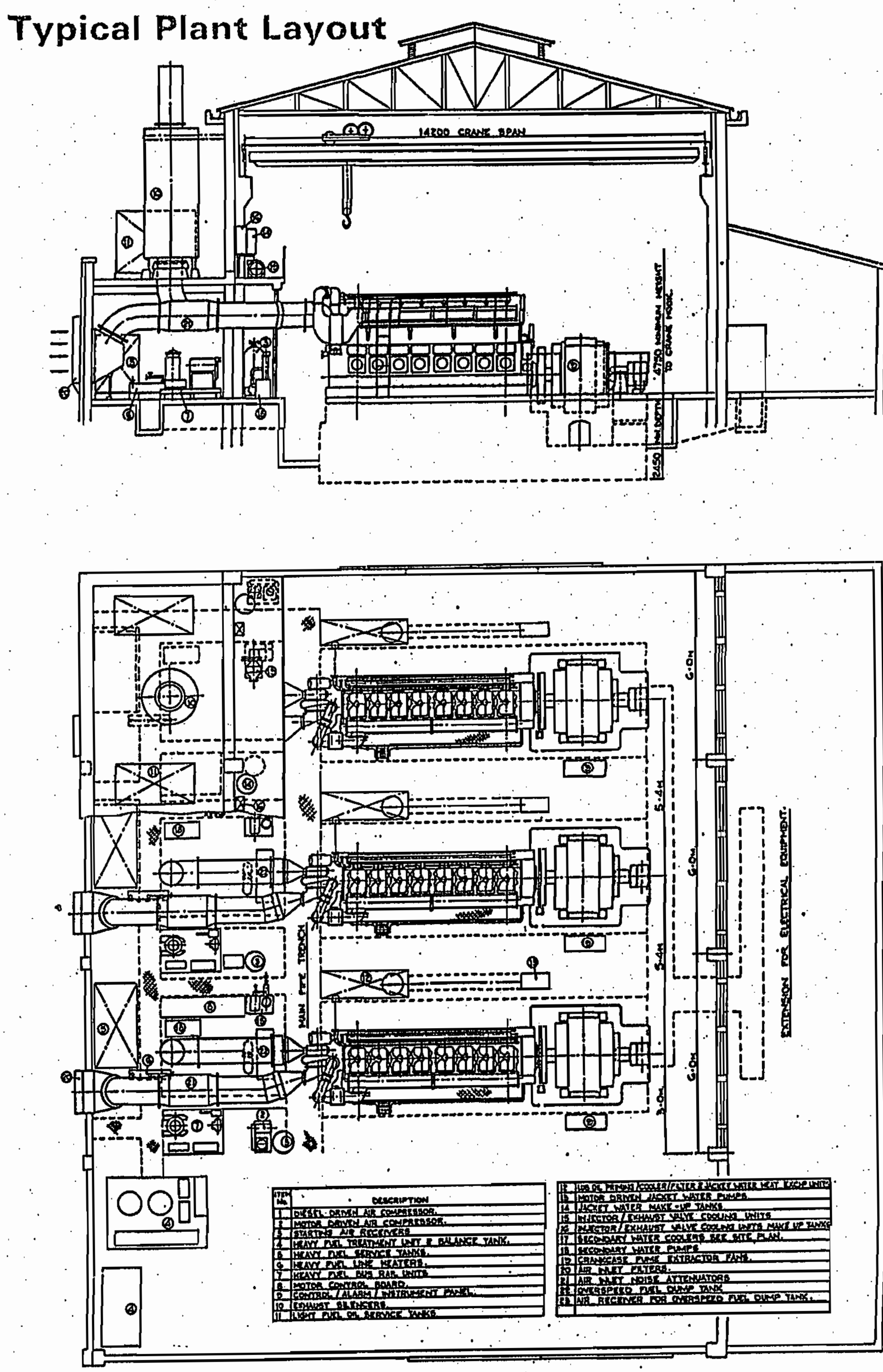


Figure 3 - Receptors Located Within 1.1 to 1.5 km. of Proposed Source (No.1001)

KBN

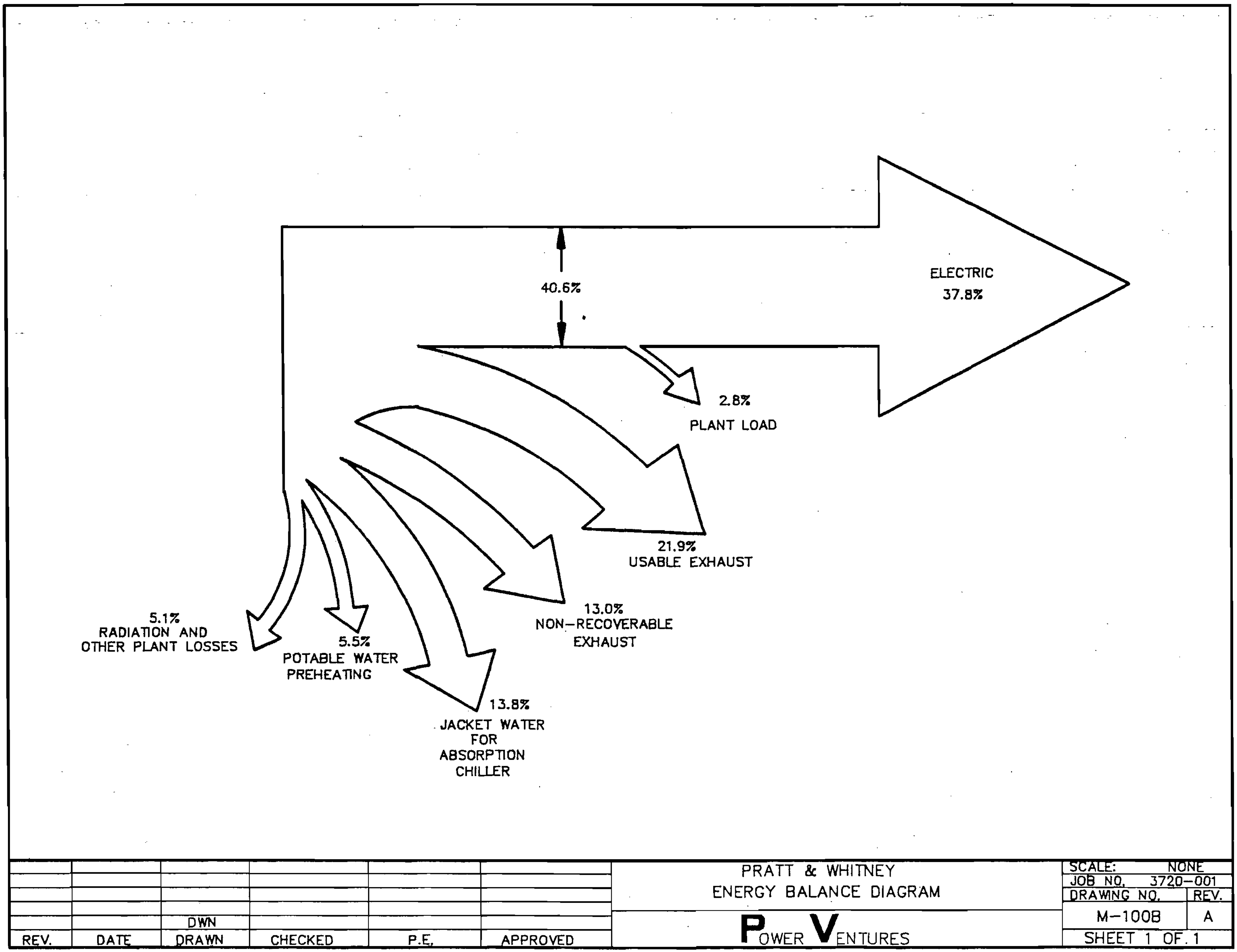
FIGURE 4



ITEM No.	DESCRIPTION
1	DIESEL DRIVEN AIR COMPRESSOR.
2	MOTOR DRIVEN AIR COMPRESSOR.
3	STARTING AIR RECEIVERS
4	HEAVY FUEL TREATMENT UNIT & BALANCE TANK.
5	HEAVY FUEL SERVICE TANKS.
6	HEAVY FUEL LINE HEATERS.
7	HEAVY FUEL BUS BAR UNITS
8	MOTOR CONTROL BOARD.
9	CONTROL / ALARM / INSTRUMENT PANEL.
10	EXHAUST SILENCERS.
11	LIGHT FUEL OIL SERVICE TANKS
12	LUB OIL PRIMING/COOLER/FILTER & JACKET WATER HEAT EXCH UNITS
13	MOTOR DRIVEN JACKET WATER PUMPS.
14	JACKET WATER MAKE-UP TANKS.
15	INJECTOR / EXHAUST VALVE COOLING UNITS
16	INJECTOR / EXHAUST VALVE COOLING UNITS MAKE UP TANKS
17	SECONDARY WATER COOLERS SEE SITE PLAN.
18	SECONDARY WATER PUMPS
19	CRANKCASE FUME EXTRACTOR FANS.
20	AIR INLET FILTERS.
21	AIR INLET NOISE ATTENUATORS
22	OVERSPEED FUEL DUMP TANK
23	AIR RECEIVER FOR OVERSPEED FUEL DUMP TANK.

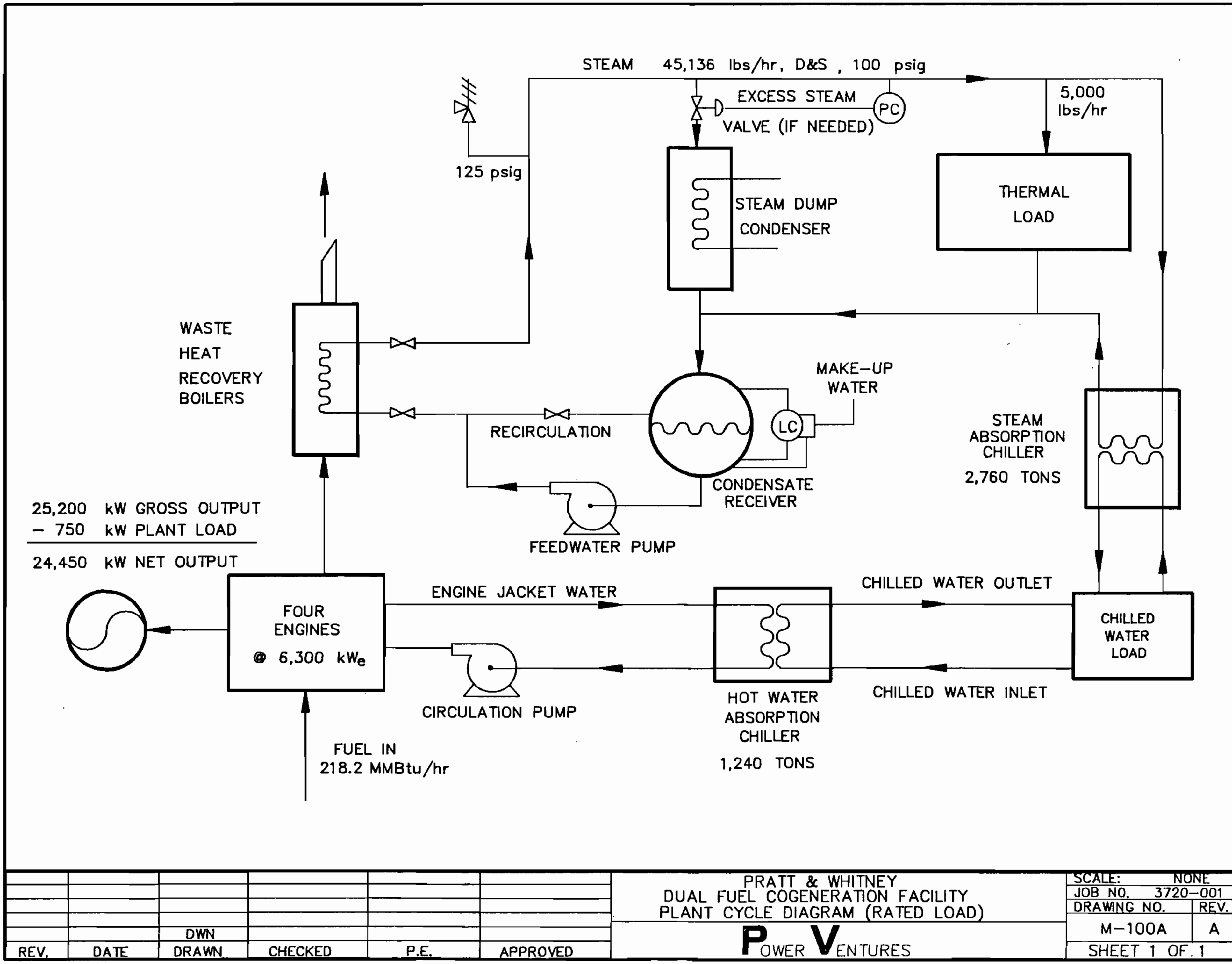
Figure 4 - Typical Plant Layout of Proposed Generators and Building

FIGURE 5



ELECTRIC
37.8%
40.6%
2.8%
PLANT LOAD
21.9%
USABLE EXHAUST
13.0%
NON-RECOVERABLE
EXHAUST
13.8%
JACKET WATER
FOR
ABSORPTION
CHILLER
5.5%
POTABLE WATER
PREHEATING
5.1%
RADIATION AND
OTHER PLANT LOSSES
REV.
DATE
DWN
DRAWN
CHECKED
P.E.
APPROVED
PRATT & WHITNEY
ENERGY BALANCE DIAGRAM
POWER VENTURES
SCALE: NONE
JOB NO. 3720-001
DRAWING NO.
REV.
M-100B
A
SHEET 1 OF. 1

FIGURE 6


STEAM 45,136 lbs/hr, D&S , 100 psig
EXCESS STEAM
VALVE (IF NEEDED)
PC
5,000 lbs/hr
125 psig
STEAM DUMP CONDENSER
THERMAL LOAD
WASTE HEAT RECOVERY BOILERS
MAKE-UP WATER
LC
RECIRCULATION
STEAM ABSORPTION CHILLER
2,760 TONS
CONDENSATE RECEIVER
FEEDWATER PUMP
25,200 kW GROSS OUTPUT
– 750 kW PLANT LOAD
24,450 kW NET OUTPUT
FOUR ENGINES
@ 6,300 kWe
ENGINE JACKET WATER
CHILLED WATER OUTLET
CHILLED WATER LOAD
CIRCULATION PUMP
CHILLED WATER INLET
HOT WATER ABSORPTION CHILLER
1,240 TONS
FUEL IN
218.2 MMBtu/hr
PRATT & WHITNEY
DUAL FUEL COGENERATION FACILITY
PLANT CYCLE DIAGRAM (RATED LOAD)
POWER VENTURES
SCALE: NONE
JOB NO. 3720-001
DRAWING NO.
REV.
M-100A
A
SHEET 1 OF 1
DWN
REV.
DATE
DRAWN
CHECKED
P.E.
APPROVED

1.0 INTRODUCTION

Power Ventures, a joint venture of FPL Engergy Services and C-E Power Projects, is proposing to construct and operate a cogeneration unit which will consist of four internal combustion engines and a heat recovery steam generator (HRSG). This facility will be located at the United Technologies Pratt & Whitney (P&W) site, which is in Palm Beach County, Florida (see Figure 1-1). P&W specializes in the research and development of both new and used commercial and military aircraft engines. The total heat input from the dual fuel will be based upon 95 percent heat input from natural gas and 5 percent from diesel fuel. The proposed unit will be capable of generating up to approximately 24.45 megawatts (MW) of electricity, and supplying the P&W facility with up to about 45,000 pounds per hour (lb/hr) of steam for process use. Under current federal and state air quality regulations, the proposed plant will constitute a new major stationary source.

This report addresses the requirements of the Prevention of Significant Deterioration (PSD) and nonattainment review procedures pursuant to rules and regulations implementing the Clean Air Act (CAA) Amendments of 1977. The Florida Department of Environmental Regulation (FDER) has review and approval authority in Florida. Because Palm Beach County is an attainment for all regulated pollutants except ozone, and based on the proposed emissions from the cogeneration unit, a PSD review is required for the following pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and arsenic (As). Because the county is classified as nonattainment for ozone, and based on the proposed unit's emissions of volatile organic compounds (VOCs) that will be greater than 40 tons per year (TPY), nonattainment review will also be required.

Descriptions of the existing permitted emission sources at the P&W facility and proposed cogeneration unit are presented in Section 2.0. The air quality review requirements and source applicability of the proposed unit to the regulations are discussed in Section 3.0. The air monitoring, air quality impact, and impacts on soil and vegetation analyses are summarized in

3.4 SOURCE APPLICABILITY

3.4.1 Area Classification

The proposed cogeneration unit will be located in Palm Beach County which is designated by FDER as an attainment area for all criteria pollutants except O_3, and a PSD Class II area for SO_2 and TSP. The nearest nonattainment area for any other criteria pollutant is located more than 100 km from the proposed source. The proposed cogeneration unit will also be located more than 150 km from the PSD Class I area of the Everglades National Park. Because impacts from the proposed source's emissions are not expected to be significant at such distances, potential impacts on the nearest nonattainment areas were not addressed in the analysis.

3.4.2 PSD Review

3.4.2.1 Pollutant Applicability

The proposed facility has the potential to emit more than 250 TPY of a pollutant regulated by the CAA (i.e., NO_x) and, therefore, is classified as a "major stationary source." The proposed cogenerating plant is a new major facility as defined in 17-2.500(2)(d)2.F.A.C. because the units (sources) emit more than 250 TPY of a regulated pollutant. For the cogeneration plant to be a major modification, the plant must have a significant net increase in emissions (as specified in 17-2.500(2)(e)2.F.A.C.) of any regulated pollutant and meet the definition of "modification" (as specified in 17-2.100(117). The definition of modification is:

> "Any physical change in, or change in the method of operation of, or addition to a stationary facility which increases the actual emissions of any air pollutant, regulated under this Chapter, including any not previously emitted, from any source within such facility."

The cogeneration plant, to be considered a modification of P&W facility, must meet the definition of "facility", as defined in 17.100(72)F.A.C.:

> All of the stationary sources which are located on one or more contiguous or adjacent properties and which are under the control of the same person (or persons under common control)."

The cogeneration plant will be a separate facility owned and operated by Power Ventures. As a result, the proposed cogeneration plant will not be a modification since the P&W facility and the proposed plant will be under different control. Therefore, the proposed facility will be a new major source for purposes of PSD review.

As presented in Table 3-6, the proposed source will have emissions of NO_2, SO_2, PM, CO, and As that will exceed the applicable PSD significant emission rates, which are presented in Table 3-2. Therefore, the proposed new major facility is subject to PSD review for these pollutants. It should be noted that the pollutant applicability was based on the fuel that would produce the maximum annual emissions if the fuel was the only fuel used throughout the year. For many of the regulated pollutants, the higher emissions occur with the use of diesel fuel only. This is a conservative approach (i.e., review for more pollutants than may actually be required) because the normal operation of the proposed cogeneration unit will be to burn a dual fuel consisting of mainly natural gas. For these conditions, the only pollutants subject to PSD review would be NO_2, CO, and As.

3.4.2.2 Emission Limiting Standards

There are no federal or state of Florida emission limiting standards that are currently applicable to the proposed cogeneration steam generating units. USEPA has proposed NSPS for NO_x emissions from new stationary dual-fuel internal combustion (IC) engines greater than 560 cubic inch displacement (CID) per cylinder. These standards were proposed in the Federal Register on July 23, 1979 (Vol. 44, No. 142, pg. 43152). These proposed NSPS would limit the concentration of NO_x in the exhaust gases to 0.0600 percent by volume (i.e., 600 ppm) at 15 percent oxygen on a dry basis. The emission limit is adjusted upward linearly for IC engines with thermal efficiencies greater than 35 percent. However, this proposed NSPS limit has been withdrawn by EPA.

3.4.2.3 Ambient Monitoring

Based upon the pollutant applicability determination presented in Section 3.3.2.1, NO_2, SO_2, PM, CO, and As require a PSD preconstruction ambient monitoring analysis. However, if the impact of the increase in these pollutant emissions due to the proposed modification is less than the de minimis levels (refer to Table 3-6), then an exemption from the preconstruction ambient monitoring requirement may be granted. The ambient monitoring analysis and exemptions are addressed in Section 5.0.

3.4.2.4 GEP Stack Height

The GEP stack height regulations allow any stack to be at least 65 meters high. The proposed stack for the cogeneration unit is 63 feet in height (19.2 meters) and therefore does not exceed the GEP stack height. The potential for downwash of the cogeneration unit emissions due to nearby structures is discussed in Section 5.0, Air Quality Impact Analysis.

3.4.3 Nonattainment Review

3.4.3.1 Requirements/Applicability

Nonattainment review applies only with respect to pollutants for which an area is designated nonattainment. Palm Beach County has been designated nonattainment for ozone. Maximum VOC emissions from the facility will be 134.4 tons/year for dual-fuel firing and 76.1 for diesel firing. The emission threshold that triggers nonattainment review is 100 tons/year for new sources, and a "significant" net emissions increase for modification of major existing sources. Since the proposed facility is a major modification of a major existing source nonattainment review for ozone is applicable since the proposed cogeneration facility would emit more than 40 tons/year of volatile organic compounds (VOCs). Each source subject to nonattainment review must control emissions of the affected air pollutant(s) through the employment of the "Lowest Achievable Emission Rate" (LAER). LAER is the most stringent control technology requirement under USEPA and FDER rules, and is determined on a case-by-case basis within prescribed limits. FDER's LAER determination must reflect

(1) Previous USEPA LAER determinations;

(2) The most stringent emissions limitation contained in any SIP for the source category, or the most stringent emission limitation that is achieved in practice, whichever is more strict.

In addition, LAER must, at a minimum, be as stringent as any applicable NSPS or NESHAPS.

FDER may not issue a nonattainment review permit for a new source or modification unless: (1) sufficient new source allowance (NSA) is available; (2) acceptable emission offsets are obtained, or (3) an adequate combination of both NSA and offsets are committed. FDER established initial new source allowances for the Palm Beach County nonattainment areas as 1,350 tons/year.

The NSA is available on a first-come, first-served basis, and is intended to allow for growth, despite an area's nonattainment status, in recognition of the anticipated effect of reductions in emissions of the affected pollutant by mobile sources and stationary sources subject to BACT requirements.

If sufficient NSA is not available to accommodate a proposed new source or modification, acceptable emission offsets must be obtained through reductions in emissions of other sources in accordance with Section 17-2.510(6), F.A.C. Among other requirements, emission offsets may be obtained only from other major sources in the same nonattainment area (or area of influence) as the proposed source or modification, and they must be reflected in the offsetting source's air permit.

Nonattainment review also requires the permit applicant to demonstrate to FDER that all major facilities owned or operated by the same person(s) or by any entity controlling, controlled by, or under common control with such person within the State of Florida are in compliance with all applicable emission limits and other permit conditions, or are on a FDER-approved compliance schedule.

3.4.3.2. Lowest Achievable Emission Rate (LAER)

The LAER emission limit proposed for the cogeneration facility is based on good combustion techniques consistent with the NO_x control as discussed in section 7.3. While there may be a potential to reduce VOC emissions through combustion modifications, there is a trade-off with NO_x control because of inherent engine characteristics. While there will generally be an increase in VOC emissions for decreases in NO_x, the VOC emission increase is much smaller than the decrease in NO_x, and is generally not significant. Indeed, VOC emission generally changes less than 0.25 g/hp-hr over an NO_x reduction of up to 50% (USEPA, 1979).

As discussed in Section 7.3.1, installation of catalytic controls, which could reduce VOC emissions by 45%, have not been demonstrated on large I.C. engines.

Application of VOC emission limitations beyond that proposed is currently not contained in any SIP or previous LAER or BACT determination. (Refer to BACT/LAER Clearinghouse. A compilation of Control Technology Determinations, June 1985 and May 1986). Therefore, the LAER limit is proposed as 0.43 g/hp-hr for dual-fuel firing and 0.24 g/hp-hr for diesel firing.

3.4.3.3 Emissions Offsets/New Source Allowance

The available new source allowance (NSA) for Palm Beach County is 1,350 tons. The estimated maximum VOC emissions from the cogeneration facility will be 134.4 tons/year or less than 10 percent of the NSA. It is likely that the actual emissions will be less. Therefore, it is proposed that an NSA of up to 135 ton/year be granted to the cogeneration facility.

3.4.3.4 Statewide Compliance

The permit applicant has no existing facilities under its control in the state of Florida. The P&W plant and proposed cogeneration facility will be separate facilities under different control.

PM
6-18-87
Atlanta, Ga.

File Copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

JUN 18 1987

DER

JUN 22 1987

BAQM

4APT/APB-ljf

Mr. Clair H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Power Ventures (PSD-120)

Dear Mr. Fancy:

This is in reference to Mr. Bruce Mitchell's letter of May 1, 1987, soliciting comments on the installation of 4-6300 KW internal combustion engine generators and a waste heat boiler in Palm Beach County, Florida by Power Ventures. The source will be subject to PSD for TSP, SO_2, NO_x, CO, and AS, and nonattainment review for VOC.

We have reviewed the company's application for the proposed generating facility and have one comment to add to those contained in your May 28, 1987, letter to Mr. Tom Reedy. The location of receptors in the analysis begins at property line and it cannot be determined if maximum concentrations are occurring on plant property. As we have determined that plant property which does not adequately preclude admittance by the general public is also ambient air, maximum impacts on plant property should also count toward increment consumption as well as in NAAQS analyses. An alternative to providing this analysis is to demonstrate that public access to the property is limited by physical boundary constraints.

If you have any questions or comments regarding this letter, you may contact me or Mr. Brandon of my staff at (404) 347-2864.

Sincerely,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

copied:
Pradeep Raval
Max Linn
Stephanie Brooks
Gene Sacco
} 6-25-87 RPM

July 01, 1987 Jefferson Smurfit AC 16-136371

At 11:35 a.m. I contacted David Buff of KBN Engineering and Applied Sciences, Inc. and requested that he send me three (3) more copies of the Jefferson Smurfit Corp. modeling packet as well as three (3) more copies of the permit application. He said that they only ran one (1) modeling packet and had sent that to the Corp. along with eight (8) copies of the application. He said that he would contact Jefferson Smurfit re: copies and he would run the copies needed of the modeling but it would take a few days.

July 6, 1987 Power Venture AC50-133747, 48, 49, 50

At approximately 2:00 I called Bob McCann of KBN Engineering and Applies Sciences, Inc. to request more copies of the modeling for Power Ventures. At the same time I asked how the run for the modeling was coming for Jefferson Smurfit Corp.? He said that they were in the process of running the printout for the modeling.. He then asked if he could send the floppy disc for us to send to the EPA and NPS. Bruce Mitchell then spoke to him and said he would investigate the possibility and let him know.

July 6, 1987

At 4:46 Bruce Mitchell contacted Bob McCann of KBN Engineering and told him that we needed the hard copies.

July 7, 1987

Second attempt to contact Bob McCann succeeded at 2:55 p.m. He said that they were still working on the runs for Power Venture and Jefferson Smurfit Corp. and the earliest they could get the modeling to us would probably be Thursday because the run ties up a computer for a long period of time.

PS Form 3811, July 1983 447-845

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:

Tom Reedy
Power Ventures
100 Australian Avenue, Suite 304
West Palm Beach, Florida 33406

4. Type of Service:	Article Number
☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail	P 408 531 213

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature – Addressee
X

6. Signature – Agent
X

7. Date of Delivery
6-1-87

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

P 408 531 213

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Tom Reedy	
Street and No. Power Ventures 100 Australian Ave., Suite 304	
P.O., State and ZIP Code West Palm Beach, FL 33406	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date 5/28/87 AC 50-133747, -48, -49, -50 PSD-FL-120	

PS Form 3800, Feb. 1982

Main File

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

May 28, 1987

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Tom Reedy
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, Florida 33406

Dear Mr. Reedy:

Re: Review of Application to Construct Four Diesel Engines, Permit Nos. AC 50-133747, -48, -49, -50 and PSD-FL-120, (Pratt & Whitney Site)

The Department has received your application package dated April 17, 1987, and has deemed it incomplete. To further process your application, please submit the following, including all calculations, assumptions and reference material:

1. What is the main objective of the above referenced project?

2. Is Pratt & Whitney (P&W) affiliated with the above project in any way (e.g., capital investment, land investment, liability, etc)?

3. Reconfirm the information provided in "part E, Fuels" of the application form. Note that permit conditions would reflect the maximum fuel quantities utilized and restrict the engines on the maximum heat input allowed.

4. In "part H, Stack Data" of the application form, please state, if available, the water vapor content and velocity of the exiting gas stream.

5. Will the exhaust from all four engines be emitted through one stack?

6. Show the basis (provide copy of references) and calculations for the emission estimates you have submitted. Note that these calculations should account for the maximum fuel input options and also the maximum operating hours (100% availability).

7. Will the electricity generated by the engines be used at the P&W facility or will it be sold to a utility company?

8. (a) Please list all steam generating units (capacities) and the steam utilizing units (requirements) at P&W's complex.

   (b) What is the current excess steam capacity?

   (c) Will the steam generated from this project be used in a new/expanded operation?

   (d) Will the steam from this project replace a current steam source?

   (e) List all units to which steam from this project will be supplied.

   (f) Please account for the overall energy balance and distribution (steam and electricity) for this project.

9. How do you intend to ensure and demonstrate consistent emission control performance of the four engines (monitoring)?

10. Please submit page 7-3 of the application package dated April 17, 1987 (if there is meant to be one).

11. Submit the modeling output.

12. The following sources should be considered, along with those originally modeled, in the modeling analysis:

    a) Palm Beach Resource Recovery Facility
    b) Osceola Farms
    c) Atlantic Sugar
    d) Parkway Asphalt

    Note: These sources also consume SO_2 PSD increment.

13. (a) Please explain why only sources with greater than 100 TPY (tons per year) emissions of SO_2 and NOx were modeled?

(b) Are there any other sources within or just outside the significant impact area that might be expected to have a significant impact within such area?

(c) Why were some of the P&W sources not modeled?

14. A map indicating the significant impact area of each pollutant should be submitted or the diameter of each area should be stated.

15. (a) A map indicating the locations of the receptors used in the modeling would be helpful.

(b) Please justify the selection of receptor locations.

16. (a) Explain why a building diagonal of 138 feet was used for modeling purposes.

(b) Submit drawings indicating the relationship between the generators and the unit building.

17. An "additional impact analysis" is required for all PSD significant pollutants. Please submit for PM (particulate matter) and CO (carbon monoxide).

18. Please submit the "Source Applicability Analysis" (Section 3.4).

If you have any questions, please call Pradeep Raval or Max Linn at (904)488-1344 or write to me at the above address.

Sincerely,

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

CHF/PR/s

cc: S. Brooks
G. Sacco
W. Aronson
M. Flores
W. Ondler
K. Kosky
B. Andrews

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

May 1, 1987

Mr. Gene Sacco
Palm Beach County Health Department
Division of Environmental Science
and Engineering
P.O. Box 29
West Palm Beach, Florida 33402

Dear Mr. Sacco:

RE: PSD Application
Power Ventures, PSD-FL-120

Enclosed for your review and comment is a copy of a PSD application from Power Ventures for a cogeneration facility consisting of four dual fuel fired internal combustion engines, each rated at 6300 KW. The proposed project is to be located at the existing United Technologies' Pratt & Whitney site on State Road 710 in Palm Beach County, Florida. If you have any comments or questions, please contact Pradeep Raval or Max Linn by May 30, 1987, at the above address or at (904)488-1344.

Sincerely,

R. Bruce Mitchell

R. Bruce Mitchell
Bureau of Air Quality
Management

/bm

enclosure

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

May 1, 1987

Mr. Miguel Flores
Chief, Permit Review and Technical
  Support Branch
National Park Service-Air
Post Office Box 25287
Denver, Colorado 80225

Dear Mr. Flores:

RE: PSD Application
Power Ventures, PSD-FL-120

The Bureau of Air Quality Management is reviewing an application from Power Ventures for a cogeneration facility consisting of four dual fuel fired internal combustion engines, each rated at 6300 KW. The proposed project is to be located at the existing United Technologies' Pratt & Whitney site on State Road 710 in Palm Beach County, Florida. The existing facility is within 100 kilometers of the Brighton Indian Reservation, the Loxahatchee National Wildlife Refuge, the Big Cypress Indian Reservation, and the Big Cypress Swamp. Please review the enclosed application and submit any comments or questions by May 30, 1987, to Max Linn at the above address or call him at (904)488-1344.

Sincerely,

R. Bruce Mitchell

R. Bruce Mitchell
Bureau of Air Quality
  Management

/bm

enclosure

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

May 1, 1987

Mr. Wayne Aronson
Chief
Program Support Section
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Aronson:

RE: PSD Application
Power Ventures, PSD-FL-120

Enclosed for your review and comment is a copy of a PSD application from Power Ventures for a cogeneration facility consisting of four dual fuel fired internal combustion engines, each rated at 6300 KW. The proposed project is to be located at the existing United Technologies' Pratt & Whitney site on State Road 710 in Palm Beach County, Florida. If you have any comments or questions, please contact Pradeep Raval or Max Linn by May 30, 1987, at the above address or at (904)488-1344.

Sincerely,

R. Bruce Mitchell

R. Bruce Mitchell
Bureau of Air Quality
Management

/bm

enclosure

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

FOR ROUTING TO OTHER THAN THE ADDRESSEE	
To:	Loctn:
To:	Loctn:
To:	Loctn:
From:	Date:

TO: Revenue Section
Bureau of Accounting and Budgeting

FROM Cost Center ____________ Air Quality

SUBJECT: Cash Listing Number #10 Dated 05-01-87

The cash listing received from your office has been checked and confirmed to be correct in all areas.

5/1/87
Date

R Bruce Mitchell
Signature of verifying party

The cash listing received from your office has been checked and found to contain one or more discrepancies. A corrected cash listing is attached. Please adjust your records accordingly.

Date

Signature of verifying party

Number of remittances in this cash listing 1.

Power Ventures
a Florida partnership

April 17, 1987

Mr. Clair Fancy, P.E., Deputy Bureau Chief
Bureau of Air Quality Management
Central Air Permitting Section
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Reference: Application to Construct an Air Pollution Source

Dear Mr. Fancy:

Please find enclosed five copies of an Application to Construct an Air Pollution Source and a Prevention of Significant Deterioration (PSD) analysis for a cogeneration facility consisting of four dual fuel fired internal combustion engines. Also enclosed is a check for $4,000.00 ($1,000 per engine) that corresponds to the permit processing fee for the facility.

The facility will be developed by Power Ventures, a Florida partnership of FPL Energy Services Inc and CE Power Projects. The cogeneration facility will be located at United Technologies' Pratt & Whitney site in Palm Beach County. This proposed facility will replace the existing steam load at the Pratt & Whitney site and generate 24.45 megawatts of electricity.

If you have any questions on this permit application or the accompanying PSD analysis, please contact either Mr. Wayne Ondler at (305) 694-3639, Mr. Kennard Kosky at (904) 375-8000, or me.

Sincerely,

Tom Reedy

Tom Reedy
Vice President

DER
APR 30 1987
BAQM

cc: Stephanie Brooks
Wayne C. Ondler
Kennard F. Kosky

Max –
pls handle –
your buddies

Harry,
Who will get this
pkg – <u>New</u>: PSD-FL-120.
Thanks!

IMPELL POWER PROJECTS FPL ENERGY SERVICES INC

POWER VENTURES
a Florida partnership

April 17, 1987

Mr. Clair Fancy, P.E., Deputy Bureau Chief
Bureau of Air Quality Management
Central Air Permitting Section
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

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If you have any questions on this permit application or the accompanying PSD analysis, please contact either Mr. Wayne Ondler at (305) 694-3639, Mr. Kennard Kosky at (904) 375-8000, or me.

Sincerely,

Tom Reedy

Tom Reedy
Vice President

cc: Stephanie Brooks
Wayne C. Ondler
Kennard F. Kosky

RECEIVED
DER - MAIL ROOM
1987 MAY -1 AM 10: 48

1031

100 Australian Ave. • Suite 304 W. Palm Beach • Florida 33406 • (305) 683-6996

FPL ENERGY SERVICES INC

SOUTHEAST BANK, NA
MIAMI, FL
63-58/660

1230

DATE	CHECK NO.	CHECK AMOUNT
4/22/87	1230	$4000.00

PAY Four Thousand Dollars and no/100------------------------------------

TO THE ORDER OF State of Florida Dept. of Environmental Regulation

[redacted]

FPL ENERGY SERVICES INC.

VENDOR NO. VENDOR NAME 1230

TRANSACTION DATE	REFERENCE	GROSS AMOUNT	DEDUCTION	NET AMOUNT
4/22/87	Letter	$4000.00		$4000.00

CHECK DATE	CHECK NO.	TOTAL GROSS	TOTAL DEDUCTION	CHECK AMOUNT
4/22/87	1230	$4000.00		$4000.00

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

№ 76158

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from FPL Energy Services INC. Date 5/1/87

Address 100 Australian Ave, Suite 304, W. Palm Beach, Fl 33406 Dollars $ 4000.00

Applicant Name & Address Power Ventures (Tom Reedy) Same Address As Above

Source of Revenue ✓ # 1230

Revenue Code 001031 Application Number AC50-133747, 48, 49 + 50

By K Bruce Mitchell

APPLICATION TO CONSTRUCT
AN
AIR POLLUTION SOURCE

POWER VENTURES

Submitted by:

Power Ventures
West Palm Beach, FL

Prepared by:

KBN Engineering and Applied Sciences, Inc.
Gainesville, FL

Project Number 87003
April 1987

PSD-FL-120

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Cogeneration Diesel Engines [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [x] Construction [ ] Operation [ ] Modification

COMPANY NAME: Power Ventures COUNTY: Palm Beach

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Diesel Engines Nos. 1-4

SOURCE LOCATION: Street SR 710 Beeline Highway City

UTM: East 569.4 km North 2975.9 km

Latitude 26 ° 54 ' 17 "N Longitude 80 ° 18 ' 4 "W

APPLICANT NAME AND TITLE: Power Ventures; T. Reedy, Vice President

APPLICANT ADDRESS: 100 Australian Ave., Suite 304, West Palm Beach, FL 33406

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Power Ventures

I certify that the statements made in this application for a Construction permit are true, correct and complete to the best of my knowledge and belief. Furthe I agree to maintain and operate the pollution control source and pollution contr facilities in such a manner as to comply with the provision of Chapter 403, Flori Statutes, and all the rules and regulations of the department and revisions thereof. also understand that a permit, if granted by the department, will be non-transferab and I will promptly notify the department upon sale or legal transfer of the permitt establishment.

*Attach letter of authorization

Signed: Tom Reedy

T. Reedy, Vice President
Name and Title (Please Type)

Date: 4/17/87 Telephone No. (305)683-6996

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project hav been ~~designed~~/examined by me and found to be in conformity with modern engineerin principles applicable to the treatment and disposal of pollutants characterized in th permit application. There is reasonable assurance, in my professional judgment, tha

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed: Kennard F. Kosky

Kennard F. Kosky
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, FL 32604
Mailing Address (Please Type)

Florida Registration No. 14996 Date: 14 April 87 Telephone No. (904) 375-8000

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

Construction of four 6300 KW diesel generators for the purpose of providing electrical energy and cogeneration steam for use in plant. See attached PSD report for further description.

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction Upon permit issuance Completion of Construction 15 months after permit is issued

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

Power Ventures has no previous DER permits. Pratt and Whitney has the following DER air operating permits: AO 50-110892, AO 50-111754 and AO 50-126581.

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr 8760 ; if seasonal, describe: ______

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes

   a. If yes, has "offset" been applied? New Source Allowance (NSA)

   b. If yes, has "Lowest Achievable Emission Rate" been applied? Yes

   c. If yes, list non-attainment pollutants. Ozone

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes

3. Does the State "Prevention of Significant Deteriorlation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. Yes

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

   a. If yes, for what pollutants? ______

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants Type	Contaminants % Wt	Utilization Rate - lbs/hr	Relate to Flow Diagram
	Not Applicable			

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): Not Applicable
2. Product Weight (lbs/hr): ~45,000 lb/hr steam from cogeneration

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary) (per engine)

Name of Contaminant	Emission[1] Maximum lbs/hr	Emission[1] Actual T/yr	Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/yr	Potential[4] Emission T/yr	Relate to Flow Diagram
PM	See Table 3-6 in PSD analysis						See
SO_2							Figure
NO_x							2-2
CO							in PSD analysis
VOC							

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4) See Section 7.0

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)

E. Fuels Note: All figures on a per engine basis

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Dual-Fuel (Primary Fuel)			54.558
95% Natural Gas	47.8 MSCF/hr	51.96 MSCF/hr	51.830
5% Diesel Fuel	18.35 gal/hr	19.94 gal/hr	2.728
Diesel Fuel (Secondary Fuel)*	376.3 gal/hr	408.5 gal/hr	55.881

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.
*When natural gas supply is interrupted

Fuel Analysis: Natural Gas/No. 2 Diesel

Percent Sulfur: 0.2 gr/scf / 0.5% max Percent Ash: Trace/Trace

Density: NA/7.2 lbs/gal Typical Percent Nitrogen: Trace/0.2

Heat Capacity: 1050 Btu/scf / 19,000 BTU/lb NA / 136,800 BTU/gal

Other Fuel Contaminants (which may cause air pollution): ____________________

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average Not Applicable Maximum ____________

G. Indicate liquid or solid wastes generated and method of disposal.

Boiler and cooling water blowdown will be disposed of in the existing P&W treatment facility.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 63 ft. Stack Diameter: 3 ft.

Gas Flow Rate: 31570 ACFM 21,600 DSCFM Gas Exit Temperature: 300 °F.

Water Vapor Content: ______ % Velocity: ______ FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste ______

Total Weight Incinerated (lbs/hr) ______ Design Capacity (lbs/hr) ______

Approximate Number of Hours of Operation per day ______ day/wk ______ wks/yr. ______

Manufacturer ______

Date Constructed ______ Model No. ______

	Volume (ft)^3	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______ ft. Stack Diamter: ______ Stack Temp. ______

Gas Flow Rate: ______ ACFM ______ DSCFM* Velocity: ______ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ______

Brief description of operating characteristics of control devices: ______________________

____

____

____

____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

____

____

____

____

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
   See Section 2.0*
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. See Section 7.0*
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   See Table 2-1*
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.) See Section 7.0*
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency). See Section 7.0*
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained. See Figure 2-1*
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
   See Figure 1-1*
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.
   See Figure 1-1*

* Refer to PSD analysis following this application

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY see Section 7.0

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [X] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[X] Yes [ ] No

Contaminant	Rate or Concentration
NO_x	600 ppm or greater dual-fuel corrected
	to 15% O_2 and 10.2 KJ/Watt-hr

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
See Table 7-1	

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary). See Section 7.0

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected: See Section 7.0

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data See Section 4.0

1. ____________no. sites ____________ TSP ____________( ) SO^2* ____________ Wind spd/dir

Period of Monitoring ______/______/______ to ______/______/______
month day year month day year

Other data recorded ____

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling See Section 5.0

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location)________________

3. Upper air (mixing height) data obtained from (location)________________

4. Stability wind rose (STAR) data obtained from (location)________________

C. Computer Models Used

1. ________________ Modified? If yes, attach description.

2. ________________ Modified? If yes, attach description.

3. ________________ Modified? If yes, attach description.

4. ________________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data See Section 5.0

Pollutant	Emission Rate	
TSP	________________	grams/sec
SO^2	________________	grams/sec

E. Emission Data Used in Modeling See Section 5.0

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review. See Section 5.0

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

PREVENTION OF SIGNIFICANT DETERIORATION ANALYSIS

POWER VENTURES

Prepared by:

KBN Engineering and Applied Sciences, Inc.
P.O. Box 14288
Gainesville, Florida 32604

April 1987

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1.0 INTRODUCTION

Power Ventures, a joint venture of FPL Engergy Services and C-E Power Projects, is proposing to construct and operate a cogeneration unit which will consist of four internal combustion engines and a heat recovery steam generator (HRSG). This facility will be located at the United Technologies Pratt & Whitney (P&W) site, which is in Palm Beach County, Florida (see Figure 1-1). P&W specializes in the research and development of both new and used commercial and military aircraft engines. The total heat input from the dual fuel will be based upon 95 percent heat input from natural gas and 5 percent from diesel fuel. The proposed unit will be capable of generating up to approximately 24.45 megawatts (MW) of electricity, and supplying the P&W facility with up to about 45,000 pounds per hour (lb/hr) of steam for process use. Under current federal and state air quality regulations, the proposed unit will constitute a major modification at a major stationary source.

This report addresses the requirements of the Prevention of Significant Deterioration (PSD) and nonattainment review procedures pursuant to rules and regulations implementing the Clean Air Act (CAA) Amendments of 1977. The Florida Department of Environmental Regulation (FDER) has review and approval authority in Florida. Because Palm Beach County is an attainment for all regulated pollutants except ozone, and based on the proposed emissions from the cogeneration unit, a PSD review is required for the following pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and arsenic (As). Because the county is classified as nonattainment for ozone, and based on the proposed unit's emissions of volatile organic compounds (VOCs) that will be greater than 40 tons per year (TPY), nonattainment review will also be required.

Descriptions of the existing permitted emission sources at the P&W facility and proposed cogeneration unit are presented in Section 2.0. The air quality review requirements and source applicability of the proposed unit to the regulations are discussed in Section 3.0. The air monitoring, air quality impact, and impacts on soil and vegetation analyses are summarized in

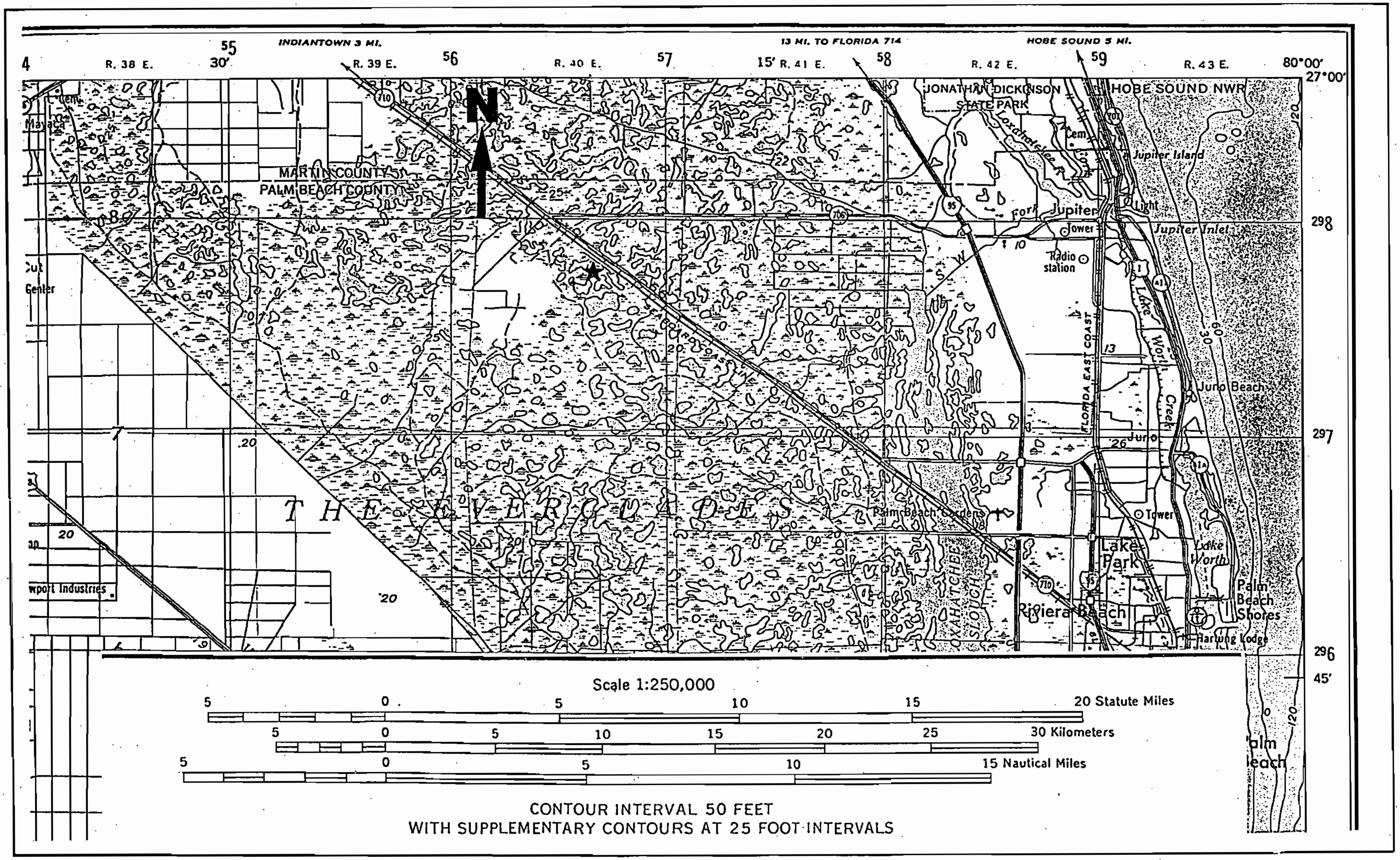

Figure 1-1. Regional Site Location of P&W

Sections 4.0, 5.0 and 6.0, respectively. The emission control analyses required under PSD review are given in Section 7.0. The maximum potential fuel consumption, and SO_2 and NO_2 emissions at the existing permitted P&W sources, are given in Appendix A. Information that describes the potential engines from various manufacturers is provided in Appendix B.

2.0 PROJECT DESCRIPTION

A plot plan of the P&W facility, showing the locations of the plant boundaries and proposed cogeneration facility, is presented in Figure 2-1. The following sections describe the existing operations at the P&W site that are potential sources of air pollutants, as well as a description of the proposed project.

2.1 EXISTING OPERATIONS

The existing P&W facility consists of the manufacturing, testing and Sikorsky helicopter areas in which potential air pollutants are likely to be emitted. These areas, which are designed to serve the aircraft engine research and development facility, have received permits from the FDER to operate air pollution sources. The permit numbers for the manufacturing, testing and Sikorsky helicopter areas are AO 50-110892, AO 50-111754, and AO 50-126581, respectively. The permits for the manufacturing and testing areas were issued in August 1986, and April 1986, respectively, and will expire April 1, 1991. The permit for the Sikorsky helicopter work area was issued in January 1987, and will expire January 30, 1992.

The permitted air pollution sources at the test area consist of:

- 12 air compressors/heaters
- 7 small boilers [i.e., less than 15 x 10^6 British Thermal Units, (Btu)/hr]
- 1 large boiler (i.e., 41.8 x 10^6 Btu/hr)
- 4 degreasers
- 1 solvent still
- 11 diesel storage tanks
- 10 jet propulsion fuel storage tanks
- 12 miscellaneous type fuel storage tanks
- 2 gasoline storage tanks
- 1 spray booth

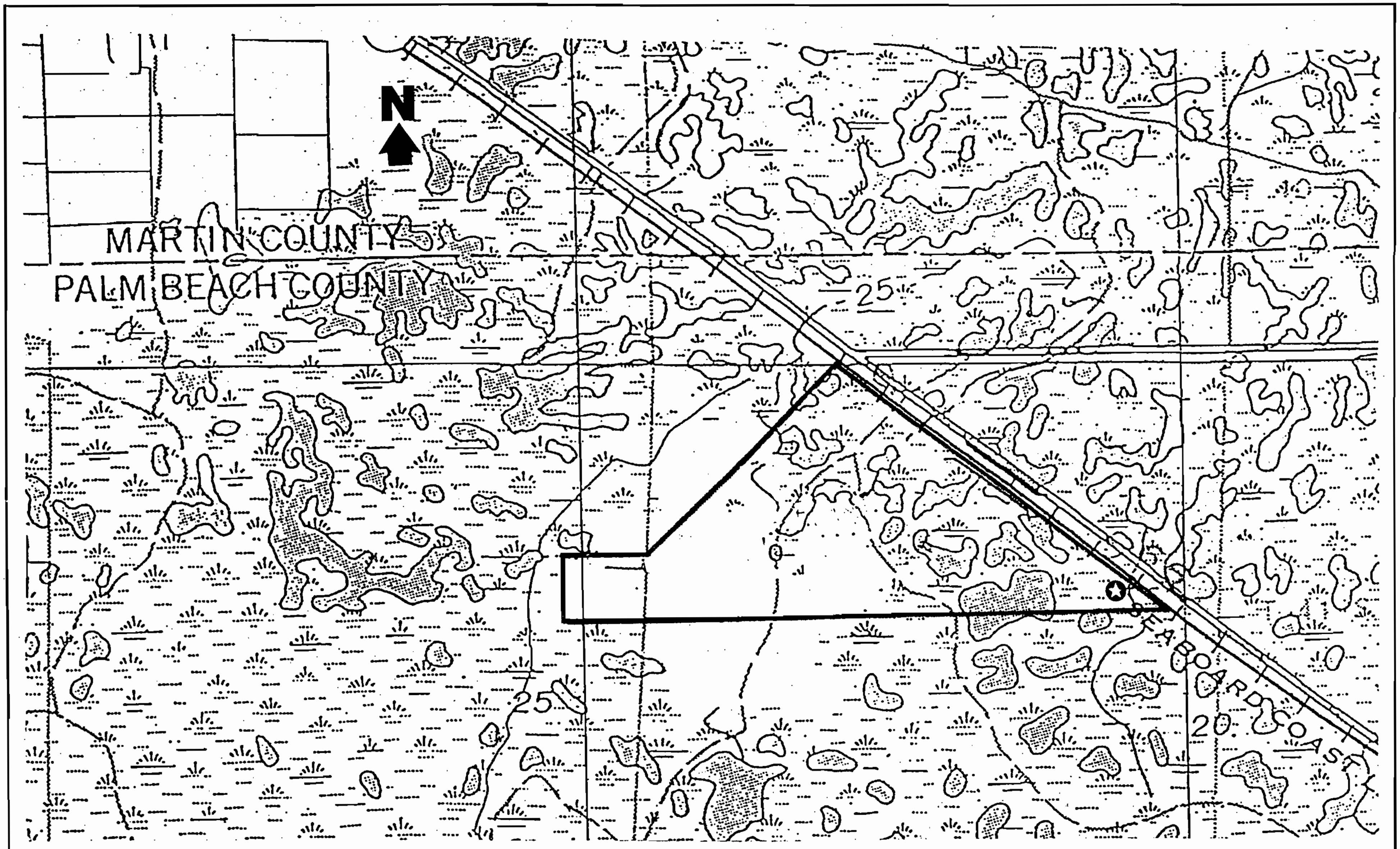

Figure 2-1 Plant Property Boundaries at the Existing P&W Facility and Location of Proposed Cogeneration Facility
(1" = 8800')

KBN

The permitted air pollution sources at the manufacturing area include:

- 14 scrubbers
- 2 small boilers
- 2 large boilers
- 11 degreasers
- 10 diesel storage tanks
- 3 jet fuel tanks
- 2 gasoline storage tanks
- 4 miscellaneous fuel tanks
- 2 Number 2 or 6 fuel storage tanks
- 5 furnaces
- 1 liquid incinerator
- 3 gas-fired ovens
- 2 electric ovens
- 1 infrared oven
- 6 spray booths
- 1 varsol booth
- 3 dust collectors

The permitted air pollution sources at the Sikorsky helicopter work area include:

- 1 downdraft work table equipped with a dust collection system
- 2 spray booths equipped with air filters

Based on information presented in the air permits, the sources covered by these permits are expected to emit the following amounts of pollutants:

Pollutant	Amount (tons/yr)
PM	59.0
SO_2	697.5
NO_x	1015.2
CO	84.7
VOC	44.5

Since these emissions are based on expected emissions, the maximum potential emissions will be higher. For this report, the maximum potential emissions * were estimated for each source based on the fuel use required to operate the source at maximum capacity for every hour in the year. If a source is capable of firing more than one fuel, emissions were calculated for both fuels. This review was conducted for SO_2 and NO_2 only, since maximum predicted impacts from the proposed unit were greater than the significance levels for only these pollutants. Therefore, additional modeling of other sources is required to determine compliance with air quality regulations.

A summary of the maximum potential fuel consumption and SO_2 and NO_2 emissions for each of the existing permitted P&W sources is presented in Appendix A. Based on the emission data presented in Appendix A, the air modeling analysis considered only those sources with maximum potential SO_2 * and NO_2 emissions greater than 100 and 10 TPY, respectively. As a result, more than 95 and 97 percent of the total SO_2 and NO_2 emissions, respectively, from the existing permitted P&W sources, were modeled in evaluating air quality impacts. The model parameters of stack, operating, and emission data used in the modeling analysis are given in Section 5.0.

2.2 *PROPOSED COGENERATION UNIT*

The cogeneration facility will consist of four nominal 8,800 brake horsepower engines with an electric generation capability of 6,300 KW each. Exit gases from the engines will go through a heat recovery steam generator to obtain about 45,000 lbs/hr steam at 100 psig (see Figure 2-2). The primary fuel will be a combination of natural gas (95% of heat input) and diesel fuel (5% of heat input) which is referred to as dual fuel. The total heat input under dual-fuel firing is 54,558,000 BTU/hr. If natural gas is interrupted, diesel fuel will be used. Under diesel operation, the engines will be fired at a rate of 55,881,000 BTU/hr with a heat rate of 8,870 BTU/kw-hr.

Each engine will be of a large bore type and would be similar to one of the following types of engines:

1) Cooper-Bessemen Reciprocating: LSV-20-6TD
2) Colt Industries: 16PC2.3V
3) Enterprise Division of IMO Delaval: RV-12-4
4) Mirrlees Blackstone: KVP-16

Appendix B contains some literature on the proposed engines. Final engine selection would be based on results of competitive bidding. The engine specifications presented in Table 2-1 cover the range of the expected engine performance and provide an estimate of maximum emissions from the facility. The maximum potential emissions firing of either dual or diesel fuels are given in Table 2-2.

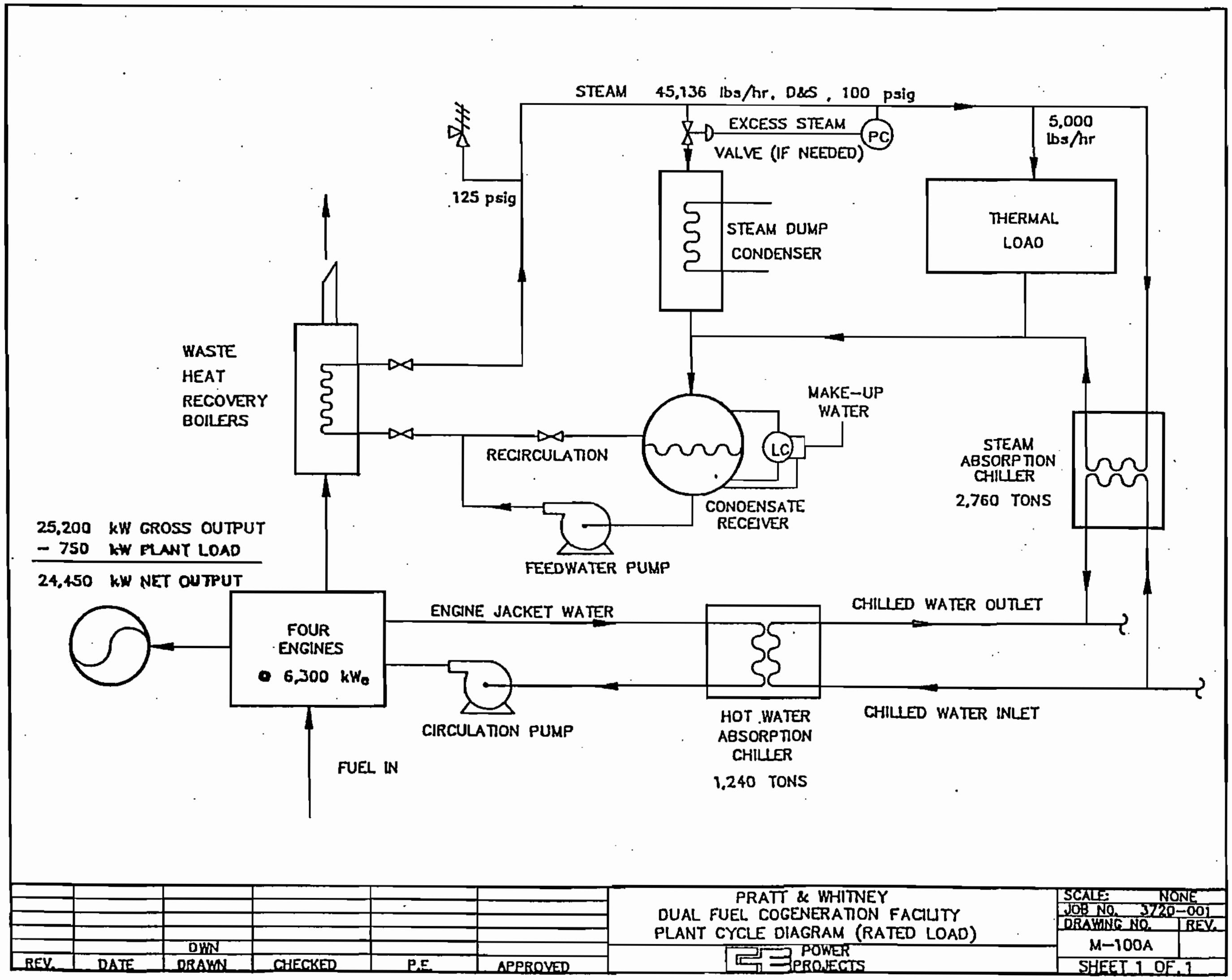

Figure 2-2. Pratt & Whitney Dual Fuel Cogeneration Facility Plant Cycle Diagram (Rated Load)

Table 2-1. Engine Performance Specifications

No. of Engines (units): 4
Unit size (BHP) : 8,800
Unit size (KWe) : 6,300

	Dual Fuel[a]	Diesel
Heat Rate (Btu/KW-hr):	8,660	8,870
Emissions (grams/KW-hr):		
SO_2[b]:	0.064	1.19
PM:	0.052	0.12
NO_x:	8.4[c]	17.0
CO:	2.9	0.42
VOC:	0.6	0.34
Trace Element Emission Factors[d]		
Lead (Pb):	1.3	26.0
Beryllium (Be):	0.0015	0.03
Mercury (Hg):	4.9	0.13
Inorganic Arsenic (As):	0.11	2.2
Stack Parameters:		
Height (ft):	63	63
Flow Rate (scfm):	21,600 (actual of 31,570 cfm)	23,200
Temperature (^oF):	300	300
Diameter (ft):	3.0	3.0

Building Dimensions:
Height (ft): 40
Width (ft): 120
Length (ft): 100

Availability (%): 92 (8059 hrs/yr operation at 100% load)

Footnotes:
a. 95% heat input from natural gas; 5% from diesel fuel
b. Based on sulfur in natural gas of 2,000 grains/10^6 ft^3 and in diesel of 0.3% max.
c. Equivalent to 6 grams/BHP-hr
d. Units = picograms/Joule

Sources: Emission Assessment of Conventional Stationary Combustion Systems; Volume 11 - Internal Combustion Sources, U.S. EPA Industrial Environmental Research Laboratory. Feb. 1979. EPA-600/7-79-029c
Engine Manufacturer Guarantees

Table 2-2. Maximum Potential Emissions from the Proposed Cogeneration Facility Firing Dual and Diesel Fuels

Pollutant	Maximum Potential Emissions			
	lb/hr		TPY*	
	Dual Fuel	Diesel Fuel	Dual Fuel	Diesel Fuel
NO_x	466.4	944.4	1,879	3,806 *
SO_2	3.56	70.6	14.4	284 *
PM	2.92	6.76	11.8	27.2 *
CO	160.8	23.3	648 *	93.9
VOC	33.4	18.9	135 *	76.2
As	5.56×10^{-5}	1.11×10^{-3}	2.24×10^{-4}	4.5×10^{-3} *
Pb	6.72×10^{-4}	0.013	2.71×10^{-3}	0.052 *
Be	7.6×10^{-7}	1.5×10^{-5}	3.06×10^{-6}	6.0×10^{-5} *
Hg	2.4×10^{-3}	6.8×10^{-5}	0.010 *	2.74×10^{-4}

* Based on a 92 percent annual availability factor.

Note: Emissions based on four engines.

3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussion pertains to the federal and state air regulatory requirements that must be satisfied before P&W can operate the proposed cogeneration units.

3.1 NATIONAL AND STATE AAQS

The existing applicable National and Florida ambient air quality standards (AAQS) are presented in Table 3-1. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse affects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements.

3.2 PSD REQUIREMENTS

3.2.1 General Requirements

Under federal PSD review requirements, all major new or modified sources of air pollutants regulated under The Clean Air Act (CAA) must be reviewed and approved by the U.S. Environmental Protection Agency (USEPA) (in this case, reviewed and approved by FDER since PSD review authority has been delegated to the state). A "major stationary source" is defined as any one of 28 named source categories which has the potential to emit 100 tons per year (TPY) or more, or any other stationary source which has the potential to emit 250 TPY or more, of any pollutant regulated under CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment.

A "major modification" is defined under PSD regulations as a change at an existing major stationary source which increases emissions by greater than "significant amounts." PSD significant emission rates are shown in Table 3-2.

Table 3-1. Federal and State of Florida Ambient Air Quality Standards (AAQS)

Pollutant	Averaging Time	AAQS (ug/m^3) Federal Primary Standard	Federal Secondary Standard	State of Florida
Suspended Particulate Matter	Annual Geometric Mean	75	60	60
	24-Hour Maximum*	260	150	150
Sulfur Dioxide	Annual Arithmetic Mean	80	N/A	60
	24-Hour Maximum*	365	N/A	260
	3-Hour Maximum*	N/A	1,300	1,300
Carbon Monoxide	8-Hour Maximum*	10,000	10,000	10,000
	1-Hour Maximum*	40,000	40,000	40,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100
Ozone	1-Hour Maximum+	235	235	235
Lead	Calendar Quarter	1.5	1.5	1.5

Notes: N/A = Not applicable.
ug/m^3 = micrograms per cubic meter

* Maximum concentration not to be exceeded more than once per year.
+ Maximum concentration not to be exceeded more than an average of 1 calendar day per year.

Sources: 40 CFR, Parts 50 and 52.
Florida Administrative Code (FAC), Chapter 17-2

Table 3-2. PSD Significant Emission Rates

Pollutant	Regulated Under	Significant Emission Rate (TPY)
Sulfur Dioxide	NAAQS, NSPS	40
Particulate Matter	NAAQS, NSPS	25
Nitrogen Oxides	NAAQS, NSPS	40
Carbon Monoxide	NAAQS, NSPS	100
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40
Lead	NAAQS	0.6
Sulfuric Acid Mist	NSPS	7
Total Fluorides	NSPS	3
Total Reduced Sulfur	NSPS	10
Reduced Sulfur Compounds	NSPS	10
Hydrogen Sulfide	NSPS	10
Asbestos	NESHAP	0.007
Beryllium	NESHAP	0.0004
Mercury	NESHAP	0.1
Vinyl Chloride	NESHAP	1
Benzene	NESHAP	0
Radionuclides	NESHAP	0
Inorganic Arsenic	NESHAP	0
Any Regulated Pollutant	--	Class I Impact*

* Any emission rate for a source located within 10 km of a Class I area which causes impacts of 1 ug/m^3, 24-hour average, or greater.

Notes: TPY = Tons per year.
NAAQS = National Ambient Air Quality Standards.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.

Source: 40 CFR 52.21.
FAC, Chapter 17-2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified source. PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. Major sources and modifications are required to undergo the following analysis related to PSD for each pollutant emitted in "significant" amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis (monitoring),
4. Source information, and
5. Additional impact analyses.

In addition to these analyses, a new source must also be reviewed with respect to Good Engineering Practice (GEP) stack height regulations. Discussions concerning each of these requirements are presented in the following sections.

3.2.2 Increments/Classifications

In promulgating the 1977 CAA Amendments, Congress specified that certain increases above an air quality "baseline concentration" level of SO_2 and PM concentrations would constitute "significant deterioration." The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or have an impact. Three classifications were designated based on criteria established in the CAA Amendments. Initially, Congress promulgated areas as Class I (international parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were also designated. EPA then promulgated as regulations the requirements for classifications and area designations. The Florida DER has adopted the EPA class designations and allowable PSD increments, which are presented in Table 3-3.

The term "baseline concentration" evolves from federal and state PSD regulations and denotes a fictitious concentration level corresponding to a

Table 3-3. Federal and State of Florida PSD Allowable Increments

Pollutant/Averaging Time	Allowable Increment (ug/m^3) Class I	Class II	Class III
Particulate Matter			
Annual Geometric Mean	5	19	37
24-Hour Maximum**	10	37	75
Sulfur Dioxide			
Annual Arithmetic Mean	2	20	40
24-Hour Maximum**	5	91	182
3-Hour Maximum**	25	512	700

** Maximum concentration not to be exceeded more than once per year.

Source: 40 CFR Part 52, Section 52.21.
Florida Administrative Code, Chapter 17-2

specified baseline date and certain additional baseline sources. By definition in the PSD regulations, as amended August 7, 1980, baseline concentration means the ambient concentration level which exists in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

1. The actual emissions representative of sources in existence on the applicable baseline date; and
2. The allowable emissions of major stationary sources which commenced construction before January 6, 1975, but were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and therefore affect PSD increment consumption:

1. Actual emissions from any major stationary source on which construction commenced after January 6, 1975; and
2. Actual emission increases and decreases at any stationary source occurring after the baseline date.

"Baseline date" means the earliest date after August 7, 1977, on which the first complete application under 40 CFR 52.21 is submitted by a major stationary source or major modification subject to the requirements of 40 CFR 52.21. The baseline date for the entire state of Florida, including Palm Beach County, has been set as December 27, 1977 (FAC, Chapter 17-2).

3.2.3 Control Technology Review

The control technology review requirements of the federal PSD regulations require that all applicable federal and state emission limiting standards be met and that Best Available Control Technology (BACT) be applied to control emissions from the source (40 CFR 52.21). The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the source or modification exceeds the significant emission rate (see Table 3-2).

BACT is defined in 40 CFR 52.21 as:

> An emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act...which the Administrator, 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 or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.... If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology.

The requirements for BACT were promulgated within the framework of PSD in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increments and thereby enlarge the potential for future economic growth without significantly degrading air quality (USEPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in USEPA's "Guidelines for Determining Best Available Control Technology (BACT)," (USEPA, 1978) and in the "PSD Workshop Manual" (USEPA, 1980). These guidelines were promulgated by USEPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area. According to USEPA (1980), "BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis."

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with NSPS for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgement, balancing environmental benefits with energy, economic, and other impacts (USEPA, 1978).

3.2.4 Air Quality Analysis

In accordance with requirements of 40 CFR 52.21(m), any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary source or major modification. For a new major source, the affected pollutants are those that the source would potentially emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 3-2).

According to CAA, ambient air monitoring for a period of up to 1 year is generally appropriate to satisfy the PSD monitoring requirements. A minimum of four (4) months of data is required. Existing data from the vicinity of the proposed source may be utilized if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in USEPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (USEPA, 1981).

The regulations include an exemption which excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that the Administrator may exempt a proposed major stationary source or major modification from the monitoring requirements of 40 CFR 52.21(m) with respect to a particular pollutant if the emissions increase of the pollutant from the source or modification would cause, in any area, air quality impacts less than the de minimis levels presented in Table 3-4.

The state of Florida has passed PSD air quality analysis requirements identical to the federal requirements. In February 1981, USEPA revised the de minimis levels and averaging times for three of the pollutants (USEPA, 1981). The averaging period for lead was changed to 3 months and the de minimis impact levels for beryllium and hydrogen sulfide were changed to 0.001 ug/m^3 and 0.2 ug/m^3, respectively. These revisions have been proposed in the Federal Register, but have not yet been promulgated. The state of Florida recently (August 1986) adopted the revised de minimis levels.

3.2.5 Source Impact Analysis

A source impact analysis must be performed by a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 3-2). The PSD regulations specifically require the use of atmospheric dispersion models in performing impact analysis, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated USEPA models must normally be used in performing the impact analysis. Specific applications for other than USEPA-approved models require USEPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the USEPA publications, "Guideline on Air Quality Models (Revised)" (USEPA, 1986) and "Regional Workshops on Air Quality Modeling: A Summary Report" (USEPA, 1983). The source impact analysis for criteria pollutants may be limited to only the new or modified source if the net increase in impacts due to the new or modified source is below significance levels, as presented in Table 3-5.

Table 3-4. EPA and Florida PSD *De Minimis* Impact Levels

Pollutant	De Minimis Air Quality Impact Level (ug/m^3) Code of Federal Regulations	EPA Ambient Monitoring Guidelines and state of Florida
Sulfur Dioxide	13, 24-hour	13, 24-hour
Particulate Matter	10, 24-hour	10, 24-hour
Nitrogen Oxides	14, annual	14, annual
Carbon Monoxide	575, 8-hour	575, 8-hour
Ozone	100 TPY*	100 TPY*
Lead	0.1, 24-hour	0.1, 3-month
Sulfuric Acid Mist	**	**
Total Fluoride	0.25, 24-hour	0.25, 24-hour
Total Reduced Sulfur	10, 1-hour	**
Reduced Sulfur Compounds	10, 1-hour	**
Hydrogen Sulfide	0.04, 1-hour	0.2, 1-hour
Asbestos	**	**
Beryllium	0.0005, 24-hour	0.001, 24-hour
Mercury	0.25, 24-hour	0.25, 24-hour
Vinyl Chloride	15, 24-hour	15, 24-hour
Benzene	**	**
Radionuclides	**	**
Inorganic Arsenic	**	**

* Increase in volatile organic compounds (VOC) emissions.
** No ambient air measurement method; no monitoring required.

Sources: 40 CFR 52.21(i)(8).
EPA, 1980.
EPA, 1981.

Table 3-5. Significance Levels for Criteria Pollutants

Pollutant	Average Period	Concentration (ug/m^3)
Sulfur Dioxide	3-Hour	25
	24-Hour	5
	Annual	1
Particulate Matter	24-Hour	5
	Annual	1
Nitrogen Dioxide	Annual	1
Carbon Monoxide	1-Hour	2,000
	8-Hour	500

Source: EPA, 1980

Various lengths of record for meteorological data can be utilized for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-highest" refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor must normally be used for comparison to air quality standards.

3.2.6 Additional Impact Analysis

In addition to air quality impact analyses, federal PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source. These analyses are to be conducted primarily for PSD Class I areas. Impacts due to general commercial, residential, industrial, and other growth associated with the source must also be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 3-2).

3.2.7 Good Engineering Practice Stack Height

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP, or any other dispersion technique. On July 8, 1985, USEPA promulgated final stack height regulations (USEPA, 1985).

GEP stack height is defined as the highest of:

1. 65 meters (m), or
2. A height established by applying the formula:
   $Hg = H + 1.5L$

where: H_g = GEP stack height,

H = Height of the structure or nearby structure, and

L = Lesser dimension (height or projected width) of nearby structure(s).

3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 km. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where "plume impaction" occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with "elevated terrain." "Elevated terrain" is defined as terrain which exceeds the height calculated by the GEP stack height formula. Because the terrain in the vicinity of the P&W facility is flat, plume impaction was not considered in determining the GEP stack height.

3.3 NONATTAINMENT REVIEW REQUIREMENTS

On August 7, 1980, USEPA promulgated rules for review of major new sources and major modifications in areas where air quality does not meet federal standards (i.e., dual definition). On October 14, 1981, USEPA deleted the dual definition and defined a source as an entire industrial plant (i.e., plant-wide or bubble definition). In an opinion in Natural Resources Defense Council versus Gorsuch on August 17, 1982, the Washington, D.C. Circuit Court (No. 81-2208) vacated the plant-wide definition and apparently reinstated the dual definition of source. Although no final decision has been reached, USEPA's guidance to regional offices concerning the court decision is to reinstate the dual definition of a source. This ruling not only affects the new source review (NSR) permit program as specified in 40 CFR 51.18(j), but also the Emission Offset Interpretative Ruling (40 CFR 51, Appendix S), which applies to new and modified major sources affecting nonattainment areas. Under Section IV.A of the Ruling, such sources are required to: (1) meet an emission limitation which specifies the lowest achievable emission rate for such sources, (2) certify that all existing major sources owned or operated by the applicant in the same state are in compliance with all applicable emission limitations and standards under the Act, (3) obtain emission offsets such that there will be reasonable progress toward attainment of the applicable national AAQS, and (4) demonstrate that the emission offsets would provide a positive net air quality benefit in the affected area [not applicable for volatile organic compounds (VOC) or NO_x]. Based on these current nonattainment provisions, all major new sources and modifications to existing major sources locating in the nonattainment area must undergo the nonattainment review procedures if the proposed pieces of equipment have the potential to emit 100 TPY or more of the nonattainment pollutant, or the major modification results in a significant net emission increase at the facility of the nonattainment pollutant. For major sources or major modifications which locate in an attainment or unclassifiable area, the nonattainment review procedures apply if the source or modification exceeds the significant impact levels at any locality that does not meet AAQS.

The FDER has adopted similar nonattainment review regulations which were promulgated in FAC Section 17-2.510, New Source Review for Nonattainment Areas. As part of the preconstruction review requirements, a new or modified source must meet the four criteria as stated in the USEPA Emission Offset Interpretive Ruling, but for VOC emissions, may also use either emission offsets or new source allowance, or a combination of both. The new source allowance is the amount of emissions that the FDER has reserved in an ozone nonattainment area, from sources that have shut down or curtailed operations. The proposed new emissions can be offset using the new source allowance emissions. For Palm Beach County, the initial new source allowance of VOC emissions is 1,350 tons per year. According to FAC 17-2.510(5)(a), new source allowance is equal to initial new source allowance plus the sum of emissions due to sources that curtailed hours of operation, shutdown, or lost previously assigned allowance, minus the emission allowance increments assigned to persons who have filed a complete application. The new source allowance is determined on the fiftieth day after the owner or operator has filed a complete application. Each year, the new source allowance is set to the initial value. At present, the entire new source allowance of 1,350 tons per year is available in Palm Beach County.

3.3.1 Area Classification

The proposed cogeneration unit will be located in Palm Beach County which is designated by FDER as an attainment area for all criteria pollutants except O_3, and a PSD Class II area for SO_2 and TSP. The nearest nonattainment area for any other criteria pollutant is located more than 100 km from the proposed source. The proposed cogeneration unit will also be located more than 150 km from the PSD Class I area of the Everglades National Park. Because impacts from the proposed source's emissions are not expected to be significant at such distances, potential impacts on the nearest nonattainment areas were not addressed in the analysis.

3.3.2 PSD Review

3.3.2.1 Pollutant Applicability

The permitted P&W sources in Palm Beach County have current maximum allowable emissions of SO_2, NO_2 and CO that exceed 250 TPY, and, therefore, is classified as an "existing major stationary source." The proposed cogeneration unit would be considered a "major modification" if the increase in regulated pollutant emissions exceed the PSD significant emission rates presented in Table 3-2. As presented in Table 3-6, the proposed source will have emissions of NO_2, SO_2, PM, CO, and As that will exceed the applicable PSD significant emission rates. Therefore, the proposed modification is a major modification at a major existing facility and is subject to PSD review. It should be noted that the pollutant applicability was based on * the fuel that would produce the maximum annual emissions if the fuel was the only fuel used throughout the year. For many of the regulated pollutants, the higher emissions occur with the use of diesel fuel only. This is a conservative approach (i.e., review for more pollutants than may actually be required) because the normal operation of the proposed cogeneration unit will be to burn a dual fuel consisting of mainly natural gas. For these conditions, the only pollutants subject to PSD review would be NO_2, CO, and * As. But all must be considered

Not subject to PSD

Table 3-6. Potential Emissions and Predicted Impacts Compared to PSD Significant Emission Rates and De Minimis Air Quality Impacts

	Emissions (TPY)			Impacts (ug/m^3)	
	Potential From Proposed Source++				
Pollutant	Dual Fuel	Diesel Fuel	Significant Emission Rate	Predicted Impacts	De Minimus Air Quality Impact Level
Sulfur Dioxide	14.4	284	40	45.0, 24-hour	13, 24-hour
Particulate Matter	11.8	27.2	25	4.3, 24-hour	10, 24-hour
Nitrogen Dioxide	1879	3806	40	48.0, Annual	14, Annual
Carbon Monoxide	648	93.9	100	165, 8-hour	575, 8-hour
Lead	0.0027	0.052	0.6	**	0.1, Calendar quarter
Sulfuric Acid Mist	NA	NA	7	**	*
Total Fluorides	NA	NA	3	**	0.25, 24-hour
Total Reduced Sulfur	NA	NA	10	**	10, 1-hour
Reduced Sulfur Compounds	NA	NA	10	**	10, 1-hour
Hydrogen Sulfide	NA	NA	10	**	0.2, 1-hour
Asbestos	NA	NA	0.007	**	*
Beryllium	3.1×10^{-6}	6.0×10^{-5}	0.0004	**	0.001, 24-hour
Mercury	0.010	2.7×10^{-4}	0.1	**	0.25, 24-hour
Vinyl Chloride	NA	NA	1	**	15, 24-hour
Benzene	NA	NA	0	**	*
Radionuclides	NA	NA	0	**	*
Inorganic Arsenic	2.2×10^{-4}	0.0045	0	+	*

Note: NA = Not applicable.

* No acceptable ambient measurement method has been developed and, therefore, de minimis levels have not been established by EPA.

\+ Predicted impacts are presented in Section 6 to assess effects on soils and vegitation.

** Predicted impacts are not required because emissions are less than significant emission rates.

++ Based on a 92 percent annual availability factor. 8059.2

3.3.2.2 Emission Limiting Standards

There are no federal or state of Florida emission limiting standards that are currently applicable to the proposed cogeneration steam generating units. USEPA has proposed NSPS for NO_x emissions from new stationary dual-fuel internal combustion (IC) engines greater than 560 cubic inch displacement (CID) per cylinder. These standards were proposed in the Federal Register on July 23, 1979 (Vol. 44, No. 142, pg. 43152). These proposed NSPS would limit the concentration of NO_x in the exhaust gases to 0.0600 percent by volume (i.e., 600 ppm) at 15 percent oxygen on a dry basis. The emission limit is adjusted upward linearly for IC engines with thermal efficiencies greater than 35 percent. However, this proposed NSPS limit has been withdrawn by EPA.

3.3.2.3 Ambient Monitoring

Based upon the pollutant applicability determination presented in Section 3.3.2.1, NO_2, SO_2, PM, CO, and As require a PSD preconstruction * ambient monitoring analysis. However, if the impact of the increase in these pollutant emissions due to the proposed modification is less than the de minimis levels (refer to Table 3-6), then an exemption from the preconstruction ambient monitoring requirement may be granted. The ambient monitoring analysis and exemptions are addressed in Section 5.0.

3.3.2.4 GEP Stack Height

The GEP stack height regulations allow any stack to be at least 65 meters high. The proposed stack for the cogeneration unit is 63 feet in height (19.2 meters) and therefore does not exceed the GEP stack height. The potential for downwash of the cogeneration unit emissions due to nearby structures is discussed in Section 5.0, Air Quality Impact Analysis.

3.3.3 Nonattainment Review

3.3.3.1 Requirements/Applicability

Nonattainment review applies only with respect to pollutants for which an area is designated nonattainment. Palm Beach County has been designated nonattainment for ozone. Maximum VOC emissions from the facility will be

134.4 tons/year for dual-fuel firing and 76.1 for diesel firing. The emission threshold that triggers nonattainment review is 100 tons/year for new sources, and a "significant" net emissions increase for modification of major existing sources. Since the proposed facility is a major modification of a major existing source nonattainment review for ozone is applicable since the proposed cogeneration facility would emit more than 40 tons/year of volatile organic compounds (VOCs). Each source subject to nonattainment review must control emissions of the affected air pollutant(s) through the employment of the "Lowest Achievable Emission Rate" (LAER). LAER is the most stringent control technology requirement under USEPA and FDER rules, and is determined on a case-by-case basis within prescribed limits. FDER's LAER determination must reflect

(1) Previous USEPA LAER determinations;

(2) The most stringent emissions limitation contained in any SIP for the source category, or the most stringent emission limitation that is achieved in practice, whichever is more strict.

In addition, LAER must, at a minimum, be as stringent as any applicable NSPS or NESHAPS.

FDER may not issue a nonattainment review permit for a new source or modification unless: (1) sufficient new source allowance (NSA) is available; (2) acceptable emission offsets are obtained, or (3) an adequate combination of both NSA and offsets are committed. FDER established initial new source allowances for the Palm Beach County nonattainment areas as 1,350 tons/year.

The NSA is available on a first-come, first-served basis, and is intended to allow for growth, despite an area's nonattainment status, in recognition of the anticipated effect of reductions in emissions of the affected pollutant by mobile sources and stationary sources subject to BACT requirements.

If sufficient NSA is not available to accommodate a proposed new source or modification, acceptable emission offsets must be obtained through reductions in emissions of other sources in accordance with Section 17-2.510(6), F.A.C. Among other requirements, emission offsets may be obtained only from other major sources in the same nonattainment area (or area of influence) as the proposed source or modification, and they must be reflected in the offsetting source's air permit.

Nonattainment review also requires the permit applicant to demonstrate to FDER that all major facilities owned or operated by the same person(s) or by any entity controlling, controlled by, or under common control with such person within the State of Florida are in compliance with all applicable emission limits and other permit conditions, or are on a FDER-approved compliance schedule.

3.3.3.2. Lowest Achievable Emission Rate (LAER)

The LAER emission limit proposed for the cogeneration facility is based on good combustion techniques consistent with the NO_x control as discussed in section 7.3. While there may be a potential to reduce VOC emissions through combustion modifications, there is a trade-off with NO_x control because of inherent engine characteristics. While there will generally be an increase in VOC emissions for decreases in NO_x, the VOC emission increase is much smaller than the decrease in NO_x, and is generally not significant. Indeed, VOC emission generally changes less than 0.25 g/hp-hr over an NO_x reduction of up to 50% (USEPA, 1979).

As discussed in Section 7.3.1, installation of catalytic controls, which could reduce VOC emissions by 45%, have not been demonstrated on large I.C. engines.

Application of VOC emission limitations beyond that proposed is currently not contained in any SIP or previous LAER or BACT determination. (Refer to BACT/LAER Clearinghouse. A compilation of Control Technology Determinations, June 1985 and May 1986). Therefore, the LAER limit is proposed as 0.43 g/hp-hr for dual-fuel firing and 0.24 g/hp-hr for diesel firing.

3.3.3.3 Emissions Offsets/New Source Allowance

The available new source allowance (NSA) for Palm Beach County is 1,350 tons. The estimated maximum VOC emissions from the cogeneration facility will be 134.4 tons/year or less than 10 percent of the NSA. It is likely that the actual emissions will be less. Therefore, it is proposed that an NSA of up to 135 ton/year be granted to the cogeneration facility.

3.3.3.4 Statewide Compliance

The permit applicant has no existing facilities under its control in the state of Florida.

4.0 AIR QUALITY ANALYSIS

4.1 GENERAL MONITORING REQUIREMENTS

The CAA requires that an air quality analysis be conducted for each pollutant subject to regulation under the act before a major stationary source or major modification is constructed. This analysis may be performed by the use of modeling and/or monitoring the air quality. The use of monitoring data refers to either the use of representative air quality data from existing monitoring stations or establishing a monitoring network to monitor existing air quality. Monitoring must be conducted for a period up to 1 year prior to submission of a construction permit application. In addition to establishing existing air quality, the air quality data are useful for determining background concentrations (i.e., concentrations from sources not considered in the modeling). The background concentrations can be added to the concentrations predicted for the sources considered in the modeling to estimate total air quality impacts. These total concentrations are then evaluated to determine compliance with the AAQS.

For the criteria pollutants, continuous air quality monitoring data must be used to establish existing air quality concentrations in the vicinity of the proposed source or modification. However, preconstruction monitoring data will generally not be required if the ambient air quality concentration before construction is less than the *de minimis* impact monitoring concentrations, (refer to Table 3-4 for *de minimis* impact levels). Also, if the maximum predicted impact of the source or modification is less than the *de minimis* impact monitoring concentrations, the source would generally be exempt from preconstruction monitoring.

For noncriteria pollutants, EPA recommends that an analysis based on the air quality modeling should generally be used instead of monitoring data. The permit-granting authority has discretion in requiring preconstruction monitoring data when:

1. The state has an air quality standard for the noncriteria pollutant and emissions from the source or modification pose a threat to the standard;

2. The reliability of emission data used as input to modeling existing sources is highly questionable; or
3. Air quality models have not been validated or may be suspect for certain situations, such as complex terrain or building downwash conditions.

However, before a permit granting authority requires preconstruction monitoring, EPA recommends that an acceptable measurement method approved by EPA should be available and the maximum concentrations due to the major source or major modification are predicted to be above the significant monitoring concentrations.

The EPA "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (PSD) (USEPA, 1980) sets forth guidelines for preconstruction monitoring. The guidelines allow the use of existing air quality data in lieu of additional air monitoring, if the existing data are "representative." The criteria used in determining the representativeness of data are: 1) monitor location, 2) quality of data, and 3) currentness of data.

For the first criteria, monitor location, the existing monitoring data should be representative of three types of areas: (1) the location(s) of maximum concentration increase from the proposed source or modification, (2) the location(s) of the maximum air pollutant concentration from existing sources, and (3) the location(s) of the maximum impact area, i.e., where the maximum pollutant concentration would hypothetically occur based on the combined effect of existing sources and the proposed new source or modification. Basically, the locations and size of the three types of areas are determined through the application of air quality models. The areas of maximum concentration or maximum combined impact vary in size and are influenced by factors such as the size and relative distribution of ground level and elevated sources, the averaging times of concern, and the distances between impact areas and contributing sources.

In situations such as for the P&W facility where there is no existing monitor in the above areas, monitors located outside these three types of areas may be used. Each determination must be made on a case-by-case basis.

For isolated sources located in flat terrain, which describes the general situation of the P&W facility, the USEPA Ambient Monitoring Guidelines state that:

> If the proposed source or modification will be constructed in an area that is generally free from the impact of other point sources and area sources associated with human activities, then monitoring data from a "regional" site may be used as representative data. Such a site could be out of the maximum impact area, but must be similar in nature to the impact area. This site would be characteristic of air quality across a broad region including that which the proposed source or modification is located. The intent of EPA is to limit the use of these "regional" sites to relatively remote areas, and not to use them in areas of multisource emissions or areas of complex terrain.

For the second criteria, data quality, the monitoring data should be of similar quality as would be obtained if the applicant were monitoring according to PSD requirements. As a minimum, this would mean:

- Use of continuous instrumentation
- Production of quality control records that indicate the instruments' operations and performances
- Operation of the instruments to satisfy quality assurance requirements
- Data recovery of at least 80 percent of the data possible during the monitoring effort.

For the third criteria, currentness of data, the monitoring data must have been collected within a 3-year period preceding the submittal of permit application and must still be representative of current conditions.

4.2 PROJECT MONITORING APPLICABILITY

As determined by the source applicability analysis, described in Section 3.4, an ambient monitoring analysis is required by PSD regulations for SO_2, NO_2, PM, As, and radionuclide emissions. Although As and radionuclides are required to undergo air quality analyses, these pollutants may be exempt from monitoring requirements because no acceptable monitoring techniques have been established. *

Power Ventures desires to submit existing representative SO_2 and NO_2 air quality data in lieu of additional monitoring to satisfy the preconstruction requirements.

The P&W facility site is located in a flat terrain area that is generally free from the impact of other point sources. Therefore, the criteria presented in Section 4.1 are applicable. Because of the remoteness of the P&W site, Power Ventures proposes to satisfy the monitoring location criterion by using monitoring data from regional sites located in Palm Beach County. A list of the ambient SO_2 and NO_2 monitors located in Palm Beach County is presented in Table 4-1. A summary of the ambient SO_2 and NO_2 data recorded at these monitoring sites since 1983 is presented in Table 4-2.

The second criterion for representativeness is data quality. The monitoring network is operated by the Air Pollution Section of the Palm Beach County Health Department and meets all quality assurance requirements. As shown in Table 4-2, all data recoveries have exceeded the requirement of 80 percent recovery.

The third criterion is the currentness of data. This generally means that the data have been gathered within the last 3 years, provided the data are still representative of current conditions. Since Table 4-2 presents the data available from 1983 up to the present time (these monitors are

Table 4-1. Monitoring Sites at Which Sulfur Dioxide and Nitrogen Dioxide Concentrations are Measured in Palm Beach County

SAROAD Site No.	Site Address	UTM Coordinates Zone	UTM Coordinates North (km)	UTM Coordinates East (km)	Relative Location from P&W Facility* Direction (Degrees)	Relative Location from P&W Facility* Distance (km)	Spatial Scale/ Monitoring Objective	
Sulfur Dioxide								
3840-003-6	2030 Avenue L, Riviera Beach	17	2962.350	592.480	120	26.8	Neighborhood/ Maximum Concentration	Downtown
Nitrogen Dioxide								
4760-001-6	First Street and Tamarind Avenue, West Palm Beach	17	2955.030	593.232	131	31.7	Neighborhood/ Maximum Concentration	Downtown

* UTM Coordinates of P&W facility are 569.4 East and 2975.9 North

Table 4-2. Ambient SO_2 and NO_2 Air Quality Data for the Monitors Located in Palm Beach County 1983 - 1986.

SAROAD Site No.	Year	Data Collection (%)	Measured Concentration (ug/m^3) 3-Hour*	24-Hour*	Annual
Sulfur Dioxide					
3840-003-6	1983	95.4	63	29	3
	1984	98.1	61	36*	8*
	1985	92.5	64*	26	5
	1986**	87.3	52	20	5**
Nitrogen Dioxide					
4760-001-6	1983	82.8	NA	NA	19
	1984	93.0	NA	NA	27*
	1985	84.0	NA	NA	22
	1986**	90.0	NA	NA	22**

NA = Not applicable for comparison to AAQS

* Second Highest Concentrations
** Based on data collected from January to June

Source: Florida DER, 1983; 1984; 1985; 1986.

currently operating), the data are considered to be representative of current conditions.

The data presented are considered to meet all of the requirements for PSD preconstruction monitoring. Power Ventures is therefore submitting these data in lieu of additional monitoring.

4.3 BACKGROUND CONCENTRATIONS

Background SO_2 and NO_2 concentrations must be estimated to account for sources which are not explicitly included in the atmospheric dispersion modeling analysis. The available ambient SO_2 and NO_2 data presented in Table 4-2 were used for this purpose.

A summary of the highest annual 24- and 3- hour average SO_2 and annual average NO_2 concentrations are shown in Table 4-2. Since these monitors are located in an area of multisource emissions, these concentrations are expected to include contributions from sources in the area. Potential major contributing sources are also explicitly included in the modeling analysis. For the short-term averaging times, these measured concentrations would not be representative of background concentrations which would be expected to occur in conjunction with the worst-case meteorology. For the annual averaging period, the actual background concentration would be significantly lower than the annual values shown in Table 4-2.

For this modeling analysis, the background concentrations were based directly on the maximum concentrations measured during 1985, the last year during which a full year of data were available. This conservative approach was used because the predicted impacts due to all modeled sources are expected to be low with the result of producing a higher-than-expected total air quality impact. The measured concentrations potentially include impacts from sources considered in the modeling. For SO_2 concentrations, the second-highest 3- and 24- hour and highest annual average concentrations of 64, 26, and 5 ug/m^3, respectively, were selected to represent background concentrations. For NO_2 concentrations, the highest annual average concentration of 22 ug/m^3 was selected to represent background concentration.

5.0 SOURCE IMPACT ANALYSIS

5.1 ANALYSIS APPROACH AND ASSUMPTIONS

5.1.1 General Modeling Approach

The general modeling approach followed USEPA and FDER modeling guidelines for determining compliance with AAQS and PSD increments. In general, when model predictions are used to determine compliance with AAQS and PSD increments, current USEPA and FDER policies stipulate that the highest annual average and highest, second-highest short-term (i.e., 24 hours or less) concentrations can be compared to the applicable standard. If concentrations are predicted with only 1 year of meteorological data, the highest short-term concentration calculated among the field of receptors should be compared with the standard. The use of a 5-year meteorological database allows comparison of the predicted highest, second-highest short-term concentrations with short-term AAQS and PSD increments. The highest, second-highest concentration is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with the air quality standards, which permit a short-term average concentration to be exceeded once per year at each receptor.

Model predictions for all averaging periods were performed using the Industrial Source Complex Short-Term (ISCST) model. A brief description of the ISCST model is given in Section 5.1.2. To develop the maximum short-term SO_2 concentrations for the proposed cogeneration facility, the general modeling approach was divided into screening and refined phases to reduce the computation time required to perform the modeling analysis. The basic difference between the two phases is the receptor grid used when predicting concentrations, the number of emission points, and the number of meteorological periods evaluated. In general, concentrations for the screening phase were predicted using a coarse receptor grid, limited number of major sources, and a 5-year meteorological record.

After a final list of highest, second-highest short-term concentrations was developed, the refined phase of the analysis was conducted by predicting concentrations for a refined receptor grid centered on the receptor at which the highest, second-highest concentration from the screening phase was produced. The ISCST model was executed for the meteorological periods during which both the highest and second-highest concentrations were predicted to occur at that receptor, based on the screening phase results. This approach was used to ensure that valid highest, second-highest concentrations were obtained. More detailed descriptions of the emission inventory and receptor grids used in the screening and refined phases of the analysis are presented in Sections 5.1.4 and 5.1.5, respectively.

5.1.2 Model Selection

The ISC dispersion model (USEPA, 1986a) was used to evaluate the SO_2 emissions from the proposed cogeneration and P&W facilities. This model is contained in USEPA's User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 6 (USEPA, 1986b). The ISC model was selected primarily for the following reasons:

1. USEPA and FDER have approved the general use of the model for air quality dispersion analysis because the model assumptions and methods are consistent with those in the Guideline on Air Quality Models (USEPA, 1986c).
2. The ISC model is capable of predicting the impacts from stack, area, and volume sources that are spatially distributed over large areas and located in flat or gently rolling terrain.
3. The results from the ISC model are appropriate for addressing compliance with AAQS and PSD increments.

The ISC model consists of two sets of computer codes which are used to calculate short- and long-term ground level concentrations. The main differences between the two codes are the input format of the meteorological data and the method of estimating the plume's horizontal dispersion.

The first model code, the ISCST model, is an extended version of the single-source (CRSTER) model (USEPA, 1977). The ISCST model is designed to calculate hourly concentrations based on hourly meteorological parameters (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The hourly concentrations are processed into non-overlapping, short-term and annual averaging periods. For example, a 24-hour average concentration is based on twenty-four 1-hour averages calculated from midnight to midnight of each day. For each short-term averaging period selected, the highest and second-highest average concentrations are calculated for each receptor. As an option, a table of the 50 highest concentrations over the entire field of receptors can be produced.

The second model code of the ISC model is the ISC long-term (ISCLT) model, which is an extension of the Air Quality Display Model (AQDM) and the Climatological Dispersion Model (CDM). The ISCLT model uses joint frequencies of wind direction, wind speed, and atmospheric stability to calculate seasonal and/or annual average ground-level concentrations. Because the input wind directions are for 16 sectors, with each sector defined as 22.5 degrees, the model calculates concentrations by assuming that the pollutant is uniformly distributed in the horizontal plane within a 22.5-degree sector.

In this analysis, the ISCST model was used to calculate both short-term and annual average concentrations because these concentrations are readily obtainable from the model output.

Major features of the ISCST model are presented in Table 5-1. Concentrations due to stack and volume sources are calculated by the ISCST model using the steady-state Gaussian plume equation for a continuous

Table 5-1. Major Features of the ISCST Model

ISCST Model Features
o Polar or Cartesian coordinate systems for receptor locations
o Rural or one of three urban options which affect wind speed profile exponent, dispersion rates, and mixing height calculations
o Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions (Briggs, 1969, 1971, 1972, and 1975)
o Procedures suggested by Huber and Snyder (1976) and Huber (1977) for evaluating building wake effects
o Procedures suggested by Briggs (1974) for evaluating stack-tip downwash
o Separation of multiple point sources
o Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations
o Capability of simulating point, line, volume and area sources
o Capability to calculate dry deposition
o Variation with height of wind speed (wind speed-profile exponent law)
o Concentration estimates for 1-hour to annual average
o Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm
o Consideration of time-dependent exponential decay of pollutants
o The method of Pasquill (1976) to account for buoyancy-induced dispersion
o A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used)
o Procedure for calm-wind processing

Source: EPA, 1986b

source. The area source equation in the ISCST model is based on the equation for a continuous and finite crosswind line source.

The ISC model has rural and urban options which affect the wind speed profile exponent law, dispersion rates, and mixing-height formulations used in calculating ground level concentrations. The criteria used to determine when the rural or urban mode is appropriate are based on land use near the proposed plant's surroundings (Auer, 1978). If the land use is classified as heavy industrial, light-moderate industrial, commercial, or compact residential for more than 50 percent of the area within a 3 km radius circle centered on the proposed source, the urban option should be selected. Otherwise, the rural option is more appropriate.

For modeling analyses that will undergo regulatory review, such as PSD permit applications, the following model features are recommended by USEPA (1986c) and are referred to as the regulatory options in the ISCST model:

1. Final plume rise at all receptor locations,
2. Stack-tip downwash,
3. Buoyancy-induced dispersion,
4. Default wind speed profile coefficients for rural or urban option,
5. Default vertical potential temperature gradients,
6. Calm wind processing, and
7. Reducing calculated SO_2 concentrations in urban areas by using a decay half-life of 4 hours (i.e., reduce the SO_2 concentration emitted by 50% for every 4 hours of plume travel time).

Some of the above model features have been recommended for use by USEPA over the last 5 years. These assumptions include the use of final plume rise, default wind speed profile coefficients, default vertical potential temperature gradients, and calm wind processing of maximum ground level concentrations. The recently revised USEPA modeling guidelines recommend use of the remaining features, including the use of calm wind processing regardless if impacts are expected to occur under such meteorological conditions. The effect of using these options to predict maximum ground level concentrations from elevated point sources is to produce higher concentrations than if these options were not used by:

- o Lowering the effective plume height (stack-tip downwash),
- o Increasing the plume width such that the plume may have an impact over areas where it previously would not (buoyancy-induced dispersion), and
- o Mathematically adjusting the longer term averaging concentration (i.e., 24 hours or more) by the number of non-calm hours (calm wind processing).

In this analysis, the USEPA regulatory options were used to address maximum impacts from the P&W facility. Based on a review of the land use around the P&W facility, the rural mode was selected because of the general lack of, or minimal, residential, industrial and commercial development.

5.1.3 Meteorological Data

Meteorological data used in the ISCST model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations from the National Weather Service (NWS) station at West Palm Beach Airport and twice-daily upper air soundings from the NWS station at Miami, Florida. The 5-year period of meteorological data consisted of 1970 to 1974.

The NWS station in West Palm Beach, located approximately 38 km to the southeast of the P&W site, and the NWS station in Miami, located approximately 130 km to the south of the plant site, were selected for use in the study because they are the closest primary weather stations to the study area with similar surrounding topographical features and land-water boundaries. These stations also have the most readily available and complete database which is representative of the proposed plant site. The surface observations included wind direction, wind speed, temperature, cloud cover, and cloud ceiling. The wind speed, cloud cover, and cloud ceiling values were used in the ISCST meteorological preprocessor program to determine atmospheric stability using the Turner stability scheme. Based on the temperature measurements at West Palm Beach, Florida, morning and afternoon mixing heights were calculated with the radiosonde data at Miami using the Holzworth approach (1972). Hourly mixing heights were derived from the morning and afternoon mixing heights using the interpolation method developed by USEPA (Holzworth, 1972). The hourly surface data and mixing heights were used to develop a sequential series of hourly meteorological data (i.e., wind direction, wind speed, temperature, stability, and mixing heights). Because the observed hourly wind directions were classified into one of thirty-six 10-degree sectors, the wind directions were randomized within each sector using a USEPA preprocessing program to account for the expected variability in air flow.

5.1.4 Emission Inventory

The emission inventory used in the modeling analyses was based on emission inventories provided by the FDER Air Pollution Inventory System (APIS) for Palm Beach County, and previous air quality modeling analyses performed in Palm Beach County. A listing of the sources in the inventory with associated maximum allowable emissions and distances from the P&W facility is presented in Table 5-2. Because most of the sources are more than 30 km from the P&W plant site, these sources are not expected to have a significant contribution during periods and at receptors for which the P&W facility produces a maximum concentration. Used or not? *

The model parameters for permitted P&W sources are presented in Table 5-3. These sources were considered both in the screening and refined analyses. It should be noted that the emission data are the maximum allowable emissions which are based on the fuel that each source is capable of firing and produced the higher emission rate. The model parameters for the proposed cogeneration facility are given in Section 2.2. For modeling purposes, the higher emissions from firing dual and diesel fuel were used to assess impacts. As a result, the model parameters and emissions for diesel fuel were used in the NO_2, SO_2, and TSP concentration analyses while those parameters for dual fuel were used for the CO concentration analysis. *

Table 5-2. SO_2 and NO_2 Emission Inventory* of Sources Within 50 km of the P&W Facility

		UTM Coordinates (km)		Maximum Allowable Emissions (TPY)		Relative location with respect to P&W Facility+	
APIS Number	Source	East	North	SO_2	NO_2	Direction (°)	Distance (km)
	Palm Beach RRF	585.82	2960.47	1314	1314		
50-50-0042	FP&L-Riviera ✓	594.2	2,960.6	7,655	8,798	122	33.7
50-50-0045	Lake Worth Utilities ✓	592.8	2,943.7	1,836	2,330	142	44.2
50-50-0086	Glades Correctional Institution	523.4	2,955.2	515	4,019	241	48.2
-	Sugar Cane Growers	534.9	2,953.3	6,872	380**	231	39.7
-	U.S. Sugar Corp.-Bryant ✓	538.8	2,968.1	314	364**	249	28.8
-	FP&L-Martin	543.1	3,022.0	55,034	30,700	333	48.9

ND = No data.
* Sources with maximum potential SO_2 or NO_2 emissions greater than 100 TPY.
\+ P&W Facility UTM East and North coordinates are 565.6 and 2,978.5 km, respectively.
** Based on 1985 actual operating data (Palm Beach County Health Department, 1985).

Table 5-3. Model Parameters of Stack Operating, and Emission Data for Permitted Pratt and Whitney Sources

Source	Coordinates, ft(m) X	Coordinates, ft(m) Y	Stack Data, ft(m) Height	Stack Data, ft(m) Diameter	Exit Gas Data Flow acfm	Exit Gas Data Velocity f/s(m/s)	Exit Gas Data Temperature °F(K)	Emissions NO_2 lb/hr (g/s)	Emissions NO_2 TPY (g/s)	Emissions SO_2 lb/hr (g/s)	Emissions SO_2 TPY (g/s)
Manufacturing Area											
BO-1-MBH,	-200	-150	40	1.5	12,500	117.9	400	14.6	31.9	NM	
BO-2-MBH	(-61.0)	(-45.7)	(12.2)	(0.46)		(35.9)	(477)	(1.84)	(4.03)		
LI-1-MW	-1100	-1000	27	2.17	6,077	27.4	2000	NM		49.1	215.0
	(-335)	(-305)	(0.23) 8.23	(0.66)		(8.35)	(1366)			(6.19)	(6.19)
Testing Area											
ACHR-1-A1	-21,500	400	6	3	56,000	132	500	141.0	617.4	126.6	554.5
	(-6555)	(122)	(1.83)	(0.91)		(40.2)	(533)	(17.8)	(17.8)	(16.0)	(16.0)
ACHR-2-B2	-21,000	-500	50	3	56,000	132	500	141.0	617.4	379.8	1664.0
	(-6402)	(-152)	(15.2)	(0.91)		(40.2)	(533)	(17.8)	(17.8)	(47.9)	(47.9)
ACHR-3-C21**	-24,750	2250	15	11.1*	256,000	44.1	700	198.3	868.7	185.9	814.2
	(-7546)	(686)	(4.57)	(3.38)		(13.4)	(644)	(25.0)	(25.0)	(23.4)	(23.4)
BO-12-E	-25,000	-500	15	2.5	6,690	22.7	500	6.72	29.4	71.6	313.6
	(-7622)	(-152)	(4.57)	(0.75)		(6.93)	(533)	(0.85)	(0.85)	(9.02)	(9.02)

NM = Not modeled

* Effective diameter for a circle based on the area of an 8 ft by 12 ft rectangle.
** PSD increment consuming

Table 5-3. Model Parameters of Stack Operating, and Emission Data for Pratt and Whitney Sources

Source	Coordinates, ft(m) X	Coordinates, ft(m) Y	Stack Data, ft(m) Height	Stack Data, ft(m) Diameter	Exit Gas Data Flow acfm	Exit Gas Data Velocity f/s(m/s)	Exit Gas Data Temperature °F(K)	Emissions NO_2 lb/hr (g/s)	Emissions NO_2 TPY (g/s)	Emissions SO_2 lb/hr (g/s)	Emissions SO_2 TPY (g/s)
Manufacturing Area											
BO-1-MBH, BO-2-MBH	-200 (-61.0)	-150 (-45.7)	40 (12.2)	1.5 (0.46)	12,500	117.9 (35.9)	400 (477)	14.6 (1.84)	31.9 (4.03)	NM	
LI-1-MW	-1100 (-335)	-1000 (-305)	27 (0.23)	2.17 (0.66)	6,077	27.4 (8.35)	2000 (1366)	NM		49.1 (6.19)	215.0 (6.19)
Testing Area											
ACHR-1-A1	-21,500 (-6555)	400 (122)	6 (1.83)	3 (0.91)	56,000	132 (40.2)	500 (533)	141.0 (17.8)	617.4 (17.8)	126.6 (16.0)	554.5 (16.0)
ACHR-2-B2	-21,000 (-6402)	-500 (-152)	50 (15.2)	3 (0.91)	56,000	132 (40.2)	500 (533)	141.0 (17.8)	617.4 (17.8)	379.8 (47.9)	1664.0 (47.9)
ACHR-3-C21**	-24,750 (-7546)	2250 (686)	15 (4.57)	11.1* (3.38)	256,000	44.1 (13.4)	700 (644)	198.3 (25.0)	868.7 (25.0)	185.9 (23.4)	814.2 (23.4)
BO-12-E	-25,000 (-7622)	-500 (-152)	15 (4.57)	2.5 (0.75)	6,690	22.7 (6.93)	500 (533)	6.72 (0.85)	29.4 (0.85)	71.6 (9.02)	313.6 (9.02)

NM = Not modeled

* Effective diameter for a circle based on the area of an 8 ft by 12 ft rectangle.
** PSD increment consuming

5.1.5 Receptor Locations

As discussed in Section 5.1.1, the general modeling approach considered screening and refined phases to address compliance with maximum allowable PSD Class II increments and AAQS. For the screening phase, concentrations were predicted for one main receptor grid, using a limited number of receptors and sources for each receptor grid. The locations of the receptors were based on identifying the areas in which maximum concentrations would be expected due to the proposed cogeneration unit.

A description of the receptor locations for determining compliance with PSD Class II increments and AAQS is as follows:

1. 155 receptors located in a radial grid centered on the proposed unit,
2. For directions from north (i.e., 360 degrees) clockwise through southwest (i.e., 230 degrees), 96 receptors were located along 24 radials separated by 10 degree increments. Along each radial, receptors were located at 0.75, 1.1, 1.5, and 2.0 km from the P&W facility, and
3. To account for plant boundaries in all directions and for directions from the southwest clockwise through north, 59 discrete receptors were located along radials separated by 10 degree increments. These discrete receptors were located at the nearest off-plant area for each direction. The locations of the discrete receptors are given in Table 5-4.

After the screening modeling was completed, refined short-term modeling was conducted considering all sources in the modeling using a receptor grid centered on the receptor which had the highest, second-highest short-term concentrations. The receptors were located at intervals of 100 m between the distances considered in the screening phase along 7 radials, at 2 degree increments, centered on the radial which the maximum concentration was produced. For example, if the maximum concentration was produced along the 90 degree radial at a distance of 1.1 km, the refined receptor grid would consist of receptors at the following locations:

Table 5-4. Discrete Receptors Used in Screening Analysis

Direction	Distance (km)	Direction	Distance (km)
10	0.350	190	0.503
20	0.366	200	0.518
30	0.366	210	0.549
40	0.366	220	0.625
50	0.350	230	0.732
60	0.366	240	0.914, 1.1, 1.5, 2.0
70	0.366	250	1.25, 1.5, 2.0
80	0.396	260	1.89, 2.0
90	0.427	270	4.88
100	0.610	280	7.62
110	0.671	290	7.01
120	0.732	300	6.68
130	0.701	310	2.56
140	0.610	320	1.19, 1.5, 2.0
150	0.564	330	0.762, 1.1, 1.5, 2.0
160	0.533	340	0.610, 0.75, 1.1, 1.5, 2.0
170	0.488	350	0.518, 0.75, 1.1, 1.5, 2.0
180	0.488	360	0.366, 0.75, 1.1, 1.5, 2.0

Directions (degrees)	Distance (km)
84, 86, 88, 90, 92, 94, 96	0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, per direction

To ensure that a valid highest, second-highest concentration was calculated, concentrations were predicted for the refined grid for the periods that produced both the highest and second-highest concentration from the screening receptor grid.

Refined modeling analysis was not performed for the annual average period, because the spatial distributions of annual average concentrations are not expected to vary significantly from those produced from the screening analysis.

5.1.6 Background Concentrations

To estimate total air quality concentrations, a background concentration must be added to the modeling results. The background concentration is considered to be the air quality concentration contributed by sources not included in the modeling evaluation.

The derivation of the background concentration for the modeling analysis was presented in Section 4.0. Based on this analysis, the background 3-, 24- hour, and annual average SO_2 concentrations were assumed to be 64, 26, and 5 ug/m^3, respectively. For NO_2 concentrations, the annual average background concentration was assumed to be 22 ug/m^3. These background levels were added to model-predicted concentrations to estimate total air quality levels for comparison to AAQS.

5.1.7 Building Downwash Considerations

Based on the building dimensions of the proposed unit, the stack for the proposed unit will be less than Good Engineering Practice (GEP). Therefore, the potential for building downwash to occur must be considered in the modeling analysis.

The procedures used for addressing the effects of building downwash are those recommended in the ISC Dispersion Model User's Guide. The building height, length, and width are input to the model which are used to modify the dispersion parameters. The ISCST model calculates the area of the building using the length and width, assumes the area is representative of a circle, and then calculates a building width by determining the diameter of the circle. If a specific width is to be modeled, then the value input to the model must be adjusted according to the following formula:

$$M_W = \sqrt{\left(\frac{H_W}{2}\right)^2 \pi}$$

where M_W is input to the model to produce a building width of H_W used in the dispersion calculation.
H_W is the actual building width for which dispersion calculations are performed.

The proposed unit's building will have a building height, length and width of 40, 120, and 100 ft, respectively. The diagonal of the building calculated from the length and width is 138 ft. For modeling purposes, the building height and diagonal of 40 and 138 ft, respectively, were used in model calculations.

5.2 MODEL RESULTS

5.2.1 Proposed Modification Only

For the screening analysis, a summary of the maximum SO_2, NO_2, TSP and CO concentrations due to the proposed cogeneration unit only is presented in Table 5-5. As discussed in Section 5.1.4, the model parameters and emissions for the proposed cogeneration facility were based on firing diesel fuel for the NO_2, SO_2, and TSP concentration analyses whose parameters for dual fuel were used for the CO concentration analysis. Because the predicted increase in maximum annual average NO_2 and 24-hour SO_2 concentrations are greater than the de minimis monitoring levels of 14 and 13 ug/m^3, respectively, preconstruction monitoring data must be submitted as part of the PSD permit application. As indicated in Section 4.0, existing monitoring data, collected by the Palm Beach County Health Department, are being used in this application to satisfy the preconstruction monitoring requirement. The maximum predicted 8-hour average CO and 24-hour average

Table 5-5. Maximum SO_2, NO_2, TSP, and CO Concentrations due to the Proposed Cogeneration Unit Only Predicted in the Screening Analysis

Averaging Period	Concentration (ug/m^3)	Receptor Location: Direction (°)	Receptor Location: Distance (km)	Period: Julian Day	Period: Hour Ending	Period: Year	Air Quality Requirements (ug/m^3): Significance Levels	Air Quality Requirements (ug/m^3): Monitoring De minimis Levels
SO_2 Concentration Analysis								
3-Hour*	94.5	50	0.350	220	12	1970	25	NA
	95.7	60	0.366	118	21	1971		
	119.0*	50	0.350	38	15	1972		
	92.5	30	0.366	350	15	1973		
	101.0	220	0.625	278	18	1974		
24-Hour*	32.5	130	0.701	8	24	1970	5	13
	37.2	230	0.732	101	24	1971		
	45.0*	60	0.366	173	24	1972		
	40.5	220	0.625	295	24	1973		
	37.2	230	0.732	284	24	1974		
Annual+	3.6*	250	1.250	-	-	1970	1	NA
	2.5	240	0.914	-	-	1971		
	3.0	240	0.914	-	-	1972		
	2.7	250	1.250	-	-	1973		
	2.9	240	0.914	-	-	1974		
NO_2 Concentration Analysis								
Annual+	47.6*	250	1.250	-	-	1970	1	14
	32.9	240	0.914	-	-	1971		
	40.4	240	0.914	-	-	1972		
	35.6	250	1.250	-	-	1973		
	37.9	240	0.914	-	-	1974		
TSP Concentration Analysis								
24-Hour*	3.1	130	0.701	8	24	1970	5	10
	3.6	230	0.732	101	24	1971		
	4.3*	60	0.366	173	24	1972		
	3.9	220	0.625	295	24	1973		
	3.6	230	0.732	284	24	1974		

45 (4.36 / 20.16)

Table 5-5. Maximum SO_2, NO_2, TSP, and CO Concentrations due to the Proposed Cogeneration Unit Only Predicted in the Screening Analysis (Continued, Page 2 of 2)

Averaging Period	Concentration (ug/m^3)	Receptor Location: Direction (°)	Receptor Location: Distance (km)	Period: Julian Day	Period: Hour Ending	Period: Year	Air Quality Requirements (ug/m^3): Significance Levels	Air Quality Requirements (ug/m^3): Monitoring De minimis Levels
Annual+	0.34*	250	1.250	-	-	1970	1	NA
	0.24	240	0.914	-	-	1971		
	0.29	240	1.250	-	-	1972		
	0.26	250	1.250	-	-	1973		
	0.28	240	0.914	-	-	1974		
CO Concentration Analysis								
1-Hour*	335*	50	0.350	92	17	1970	2000	NA
	335	50	0.350	114	16	1971		
	329	50	0.350	172	17	1972		
	328	30	0.366	117	10	1973		
	326	60	0.366	89	19	1974		
8-Hour*	165*	140	0.610	31	8	1970	500	575
	146	230	0.732	241	16	1971		
	157	50	0.350	172	24	1972		
	140	220	0.625	294	16	1973		
	164	50	0.350	132	24	1974		

Note: SO_2, NO_2, and TSP concentration analyses based on firing diesel fuel. CO concentration analysis was based on firing dual fuel.

* Highest, second-highest concentration for this averaging period.
\+ Based on a 92 percent annual availability factor.

TSP concentrations are less than the de minimis monitoring levels of 575 ug/m^3. Therefore, preconstruction monitoring will not be required for these pollutants. Also, because the maximum predicted CO and TSP concentrations are less than the significance levels, the proposed unit has a less than significant impact for these pollutants and requires no additional modeling.

5.2.2 PSD Class II Increment Consumption

A summary of the maximum SO_2 concentrations predicted in the screening analysis for comparison to the PSD Class II increments is presented in Table 5-6. These results show that maximum SO_2 concentrations, due to all PSD sources, are below the maximum allowable PSD Class II increments for all averaging periods.

The refined analysis was based on modeling the meteorological periods during which the overall highest, second-highest and associated highest 3- and 24- hour concentrations were predicted in the screening analysis. Modeling was also performed for the meteorological periods in the year which produced the next highest, second-highest and associated highest concentrations. A summary of the maximum SO_2 concentrations predicted in the refined analysis is presented in Table 5-7. The maximum 3-hour average PSD increment consumption is predicted to be 119 ug/m^3, which is 23 percent of the maximum allowable PSD Class II increment of 512 ug/m^3, not to be exceeded more than once per year. All of this concentration is due to the emissions from the proposed unit.

The maximum 24-hour average PSD increment consumption is predicted to be 45.7 ug/m^3, which is 50 percent of the maximum allowable PSD Class II increment of 91 ug/m^3, not to be exceeded more than once per year. Again, all of this concentration is due to the SO_2 emissions from the proposed unit.

Table 5-6. Maximum Predicted SO_2 Concentrations in the Screening Analysis for Comparison to PSD Class II Increments

Allowable Averaging Period	Maximum Concentration (ug/m^3)	Receptor Location Direction (°)	Receptor Location Distance (km)	Period Julian Day	Period Hour Ending	Period Year	PSD Class II Increment (ug/m^3)
3-Hour*	94.5	50	0.350	220	12	1970	512
	95.7	60	0.366	118	21	1971	
	119.0	50	0.350	38	15	1972	
	92.5	30	0.366	350	15	1973	
	101.0	220	0.625	278	6	1974	
24-Hour*	32.8	130	0.701	8	24	1970	91
	37.2	230	0.732	101	24	1971	
	45.1	60	0.366	173	24	1972	
	40.5	220	0.625	295	24	1973	
	37.2	230	0.732	284	24	1974	
Annual	3.7	250	1.250	-	-	1970	20
	2.7	240	0.914	-	-	1971	
	3.2	240	0.914	-	-	1972	
	2.9	250	1.250	-	-	1973	
	3.0	240	0.914	-	-	1974	

* Highest, second-highest concentrations predicted for this averaging period.

Table 5-7. Maximum Predicted SO_2 Concentrations in the Refined Analysis for Comparison to PSD Class II Increments

Averaging Period	Maximum Concentration (ug/m^3)	Receptor Location Direction (°)	Receptor Location Distance (km)	Period Julian Day	Period Hour Ending	Period Year	Maximum Allowable PSD Class II Increment (ug/m^3)
3-Hour*	119	50	0.350	38	15	1972	512
	101	220	0.625	278	18	1974	
24-Hour	45.7	58	0.366	173	24	1972	91
	40.5	220	0.625	295	24	1973	

Note: Concentration analysis based on the proposed cogeneration facility firing diesel fuel

* Highest, second highest concentrations for each averaging period.

No refined analysis was performed for the annual average concentrations. From the screening analysis (see Table 5-6), the maximum annual average PSD increment consumption is predicted to be 3.7 ug/m^3, which is 19 percent of the maximum allowable PSD Class II increment of 20 ug/m^3. Approximately 97 percent of this predicted concentration is due to the SO_2 emissions from the proposed unit.

5.2.3 Total Air Quality Impact

A summary of the maximum 3-hour, 24-hour, and annual average total SO_2 concentrations predicted in the screening analysis is presented in Table 5-8. The total concentrations are determined from the impacts of the P&W facility and other modeled sources, added to the background concentration determined from monitoring data. These results show that the maximum SO_2 concentrations due all sources are below the AAQS for all averaging periods.

Similar to the PSD Class II increment analysis, the refined analysis was based on modeling the meteorological periods during which the overall highest, second-highest and associated highest 3- and 24- hour concentrations were predicted in the screening analysis. Modeling was also performed for the meteorological periods in the year which produced the next highest, second-highest and associated highest concentrations. A summary of the maximum SO_2 concentrations predicted in the refined analysis is presented in Table 5-9.

The maximum 3-hour average concentration due to all sources is predicted to be 359 ug/m^3, which is 28 percent of the Florida AAQS of 1300 ug/m^3, not to be exceeded more than once per year. Approximately 15 percent of this concentration is due to the proposed unit.

The maximum 24-hour average concentration due to all sources is predicted to be 184 ug/m^3, which is 71 percent of the Florida AAQS of 260 ug/m^3, not to be exceeded more than once per year. Approximately 19 percent of this concentration is due to the proposed unit.

Table 5-8. Maximum Predicted Total SO_2 Concentrations in the Screening Analysis for Comparison to AAQS

	Concentration (ug/m^3)				Receptor Location		Period			
		Total Due To								
Averaging Period	Total	P&W Proposed Unit	Other Modeled Sources	Background	Direction (°)	Distance (km)	Julian Day	Hour Ending	Year	AAQS (ug/m^3)
3-hour*	333	64.9	204.1	64	230	0.750	141	18	1970	1300
	355	66.6	224.4	64	230	0.732	152	15	1971	
	339	45.7	229.3	64	230	0.732	100	21	1972	
	346	77.9	204.1	64	230	0.750	294	24	1973	
	359	55.0	240.0	64	230	0.732	277	15	1974	
24-hour*	140	13.3	100.7	26	240	0.914	121	24	1970	260
	133	44.7	62.3	26	230	0.732	268	24	1971	
	150	24.5	99.5	26	230	0.732	285	24	1972	
	137	17.9	93.1	26	240	0.914	111	24	1973	
	167	31.4	109.6	26	230	0.750	285	24	1974	
Annual	24.4	2.9+	16.5	5	240	0.914	-	-	1970	60
	19.2	2.7+	11.5	5	240	0.914	-	-	1971	
	20.0	3.2+	11.8	5	240	0.914	-	-	1972	
	20.0	2.4+	12.6	5	240	0.914	-	-	1973	
	19.9	2.9+	12.0	5	240	0.914	-	-	1974	

Note: Concentration analysis based on the proposed cogeneration facility firing diesel fuel.

* Highest, second-highest concentrations predicted for this averaging period.
+ Based on a 92 percent annual availability factor.

16.5
2.9
19.4

Table 5-9. Maximum Predicted Total SO_2 Concentrations in the Refined Analysis for Comparison to AAQS

	Concentration (ug/m^3)				Receptor Location		Period			
		Total Due To								
Averaging Period*	Total	P&W Proposed Unit	Other Modeled Sources	Background	Direction (°)	Distance (km)	Julian Day	Hour Ending	Year	AAQS (ug/m^3)
3-hour	355	66.6	224.4	64	230	0.732	152	15	1971	1300
	359	55.0	240.0 55 295.0	64	230	0.732	277	15	1974	
24-hour	150	24.5	99.5	26	230	0.732	285	24	1972	260
	184	35.7	122.3 35.7 158.0	26	232	0.750	285	24	1974	

Note: Concentration analysis based on proposed cogeneration facility firing diesel fuel.

* Highest, second-highest concentrations predicted for each averaging period.

No refined analysis was performed for the annual average concentrations. From the screening analysis (see Table 5-8), the maximum annual average concentration due to all sources is predicted to be 24.4 ug/m^3, which is 41 percent of the Florida AAQS of 60 ug/m^3. Approximately 13 percent of this concentration is due to the proposed unit.

A summary of the maximum annual average total NO_2 concentrations predicted in the screening analysis is presented in Table 5-10. No refined analysis was performed for this averaging period since annual average concentrations are not expected to vary using refined modeling techniques. These results show that the maximum annual average NO_2 concentrations of 71.6 ug/m^3 due to all sources is below the Florida AAQS of 100 ug/m^3. Approximately 48 percent of the concentration is due to the proposed unit.

Table 5-10. Maximum Predicted Total Annual Average NO_2 Concentrations in the Screening Analysis for Comparison to AAQS

Maximum Concentration (ug/m^3)							
	Total Due To			Receptor Location			
Total	P&W Proposed Unit*	Other Modeled Sources	Background	Direction (°)	Distance (km)	Period Year	AAQS (ug/m^3)
71.6	47.6	2.0	22	250	1.250	1970	100
56.7	32.9	1.8	22	240	0.914	1971	
64.3	40.4	1.9	22	240	0.914	1972	
59.5	35.6	1.9	22	250	1.250	1973	
61.4	37.9	1.5	22	240	0.914	1974	

Note: Concentration analysis based on the proposed cogeneration facility firing diesel fuel.

* Based on a 92 percent annual availability factor.

6.0 ADDITIONAL IMPACT ANALYSIS

6.1 IMPACTS UPON VEGETATION

The natural vegetation communities in the vicinity of the site are a mixture of grassy scrub and freshwater marshes and ponds. Some cultivated areas exist north of the site.

The response of plants to atmospheric pollutants is a function of the concentration during exposure, duration of each exposure, and the frequency of exposures. The usual pattern of pollutant exposure is that of a few episodes of relatively high concentrations for a short duration, interspersed with long periods of extremely low concentrations. Effects on most plants will be from the short-term higher doses (a dose is the product of the concentration of the pollutant and the duration of exposure).

The maximum predicted annual concentration of NO_2 due to all sources predicted in the vicinity of the P&W facility is 72 ug/m^3. Laboratory and field studies on NO_2 effects to vegetation indicate that lowest long-term NO_2 doses known to cause effects are above 200 ug/m^3 (MacClean, 1975).

The highest, second-highest total 3- and 24- hour, and highest annual average SO_2 concentrations due to all sources are predicted to be 359, 184, and 24.4 ug/m^3, respectively. These concentrations are predicted to occur within 1 km of the proposed unit. Concentrations will diminish appreciably with distance beyond the location of the maximum concentration.

Woltz and Howe (1981) investigated the effects of pollutants on some species of native vegetation in Florida. They showed that exposure to 1,300 ug/m^3 SO_2 for 8 hours caused no visible injury to bald cypress (Taxodium distichum), slash pine (Pinus elliottii), live oak (Quercus virginiana), or red mangrove (Rhizophora mangle).

The predicted maximum concentrations are below values shown to cause injury to native vegetation and below the threshold SO_2 doses known to adversely affect the growth of some common vegetables and grasses. These values are shown in Table 6-1. As a result, no adverse impacts to vegetation from NO_x and SO_2 are predicted due to the proposed unit.

6.2 IMPACTS UPON SOILS

Soils in the vicinity of the P&W site are generally classified as histosols. Histosols are organic in nature and have an extremely high buffering capacity. No effects to the soils of the area from NO_2 or SO_2 deposition are predicted.

Table 6-1. Lowest Doses of SO_2 Reported to Affect Growth of Some Grasses and Trees

Species	Lowest SO_2 Dose Known to Affect Species (ug/m^3)	Reference
Rye grass	367, for 131 days reduced growth	Ayazloo and Bell, 1981
Orchard grass	37 to 62, for 72 days reduced growth	Crittenden and Read, 1979
Ragweeds, legumes blackberry, southern pines, red and black oaks, white-ash, sumac	790-1570 for 3 hours	Jones et al., 1974
Trembling aspen; % foliar injury	920 for 3 hours	Karnosky, 1976
Native vegetation, potatoes, soybeans, forage grasses; foliar injury	520 to 1118 for 3 hours	McLauglin and Lee, 1974
Sensitive vegetation; showing foliar injury	680 for 4 hours and 470 for 8 hours	Dreisinger and McGovern, 1970
Cottonwood, green ash, sycamore-reduce height growth	650 for 8 hrs/day, 5 days/wk for 14 weeks	Jensen and Dochinger, 1979
Jackpine, altered physiology	470-520 for 24 hours	Malhotra and Kahn, 1978
Chinese elm, ginko, norway maple, pin oak; caused chlorosis	1310 for 24 hrs/day for 30 days	Temple, 1972
Sugar maple, black oak, white ash; reduced photosynthesis	1310 for 24 hrs/day for 1 week	Carbon, 1979

7.0 BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION

7.1 REQUIREMENTS AND APPLICABILITY

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission limiting standards be met and that BACT be applied to control emissions from the source [see 40 CFR 52.21 (1985) and Fla. Admin. Code, Section 17.2.500 (5)(b)-(c)]. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the source or modification exceeds the significant emission rate (see Table 4-1). Regulated pollutants are those subject to new source review under Rule 17-2.500(2)(f). For the proposed cogeneration facility, the following pollutants must undergo BACT review [as set forth in Rule 17-2.500(2)(f)]: PM, SO_2, NO_x, CO, and As. FDER has been delegated authority for PSD Review. VOC emissions must undergo nonattainment review.

BACT is defined in Rule 17-2.100(22) of the Fla. Admin. Code as "[an] emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which [FDER], 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 (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant." If the imposition of an emission standard is not feasible, a design, equipment, work practice, operational standard, or combination thereof may be prescribed instead to satisfy the requirement for the application of BACT.

In making a BACT determination, FDER must consider [Rule 17-2.630(a) of the Fla. Admin. Code] the following:

1. Any USEPA determination of BACT 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). The above references are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., and

may be inspected at FDER's Tallahassee office. In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed under 40 CFR Parts 60 or 61,

2. All scientific, engineering, and technical material and other information available to FDER,
3. The emission-limiting standards or BACT determinations of any other state, and
4. The social and economic impact of the application of such technology.

The requirements for BACT were promulgated within the framework of PSD in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increment, thereby enlarging the potential for future economic growth without significantly degrading air quality (USEPA, 1978; USEPA, 1980). Guidelines for the evaluation of BACT can be found in USEPA's Guidelines for the Evaluation of BACT (USEPA, 1978) and in the PSD Workshop Manual (USEPA, 1980). These guidelines were promulgated by USEPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to another. The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with NSPS for a source. An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than NSPS, is also required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems as well as the environmental benefits derived from these systems. A decision on BACT is based on sound judgment, balancing environmental benefits with energy, economic and other impacts (USEPA, 1978).

Table 7-1. Proposed BACT Emission Limitations (Per Engine)

Pollutant	Proposed BACT Emissions (lbs/hr) Primary Fuel (Dual Fuel)	Secondary Fuel (Diesel)
Particulate Matter	0.73	1.7
SO_2	0.9	17.7
NO_x	117	236
CO	40	5.8
As	1.4×10^{-5}	2.8×10^{-4}

These four emission control techniques, or combinations of these techniques, have been identified by USEPA as demonstrated NO_x emission reduction systems for stationary large-bore IC engines. In general, all four techniques are applied by engine operating adjustments.

Fuel injection retard is the most effective NO_x control technique for diesel engines, while air-to-fuel ratio change is the most effective NO_x control technique for gas engines. Both retard and air-to-fuel ratio changes are effective in reducing NO_x emissions from dual-fuel engines.

Other NO_x emission control techniques exist but are not considered feasible alternatives. Of these other techniques, catalytic reduction of NO_x emissions through the use of systems similar to automobile catalyst systems has been evaluated (USEPA, 1979). Most large stationary IC engines operate at air-to-fuel ratios that are typically much greater than stoichiometric, and consequently, the engine exhaust is characterized by high oxygen (O_2) concentrations. Existing automobile catalytic converters, however, operate near stoichiometric conditions (i.e., low exhaust O_2 concentrations). These automobile catalysts are not effective in reducing NO_x in the presence of high O_2 concentrations.

As a result, different catalyst systems would be needed to reduce NO_x emissions from large stationary IC engines. Although such catalyst systems are currently under development and have been demonstrated for one very narrow application (i.e., fuel-rich naturally aspirated gas engines), they have not been demonstrated for the broad range of IC engines manufactured. This is particularly true of turbocharged engines, fuel-lean gas engines, or diesel engines. For these types of engines, the reduction of NO_x by ammonia injection over a precious metal (e.g., platinum) catalyst may be feasible; however, the cost of such a system is high. Such systems may obtain an NO_x reduction of up to 90%. For an 8000 horsepower engine approximately 16 cubic feet of honeycomb catalyst (platinum based) would be required to ensure proper operation of the system. The cost of the catalyst was estimated at $22,000/cubic foot. The total capital cost for one 8000 hp engine would be about $362,000, or a major portion of the cost of the engine.

The amount of ammonia required for an ammonia/catalyst NO_x reduction system will depend on the NO_x emission rate (g/hp-hr). Based on uncontrolled NO_x emission rates of 9 to 22 g/hp-hr and the cost of $150/ton for the ammonia, the cost impact of injecting ammonia is approximately 5 to 15 percent of the total annual operating costs ($/hr-hr) for natural gas engines (USEPA, 1979). When this operating cost is combined with the capital cost of the catalytic system discussed above, the total cost increase is about 25%. Therefore, in continuous service applications, this system is expensive compared to control techniques, such as retard or air-to-fuel changes.

From an energy standpoint, consumption of ammonia can be expressed as a quantity of fuel since natural gas is generally used to produce ammonia. Assuming an uncontrolled NO_x emission rate of 20 g/hp-hr, the ammonia necessary for the catalytic reduction has the same effect on the supply of natural gas as a two percent increase in fuel consumption (USEPA, 1979). Also, additional fuel is required to operate the plant which produces the ammonia.

Catalytic reduction, therefore, is currently not a demonstrated NO_x emission control technique which could be used by all IC engines. Therefore, the proposed BACT emission limitations will be achieved through the application of one or more of the engine control techniques cited earlier.

The environmental impacts associated with NO_x emissions of the proposed facility, as discussed in Section 5.2, are within the AAQS. Also, the remoteness of the site indicates that impacts to populated areas will be insignificant.

7.3.2 Sulfur Dioxide

The proposed BACT control technique for sulfur dioxide is low sulfur fuel. For dual-fuel firing, SO_2 emissions will be less than 0.02 lb $SO_2/10^6$ Btu heat input; for diesel firing, the sulfur content in fuel will be limited to

0.3% which is equivalent to 0.32 lb $SO_2/10^6$ Btu. These proposed BACT emission limitations are substantially below the NSPS for industrial-commercial-institutional fossil fuel steam generators and electric utility steam generators firing either oil or solid fuel [see 40 CFR Subparts D, D(a) and D(b)].

The installation of SO_2 control equipment for IC engines has not been practiced. If applied to the secondary fuel (diesel) the estimated annual operating cost would exceed $1,490,000/year for 70% removal at an initial emission rate of 0.32 lb $SO_2/10^6$ Btu (adapted from KBN, 1986). The cost per ton of pollutant removal would be over $7,000/ton. Therefore, the optimum control is low sulfur fuel. The environmental impacts of the proposed facility associated with SO_2 emissions are substantially less than the PSD increments and AAQS (refer to Section 5.2).

7.3.3 Particulate Matter

The proposed BACT control technique for particulate matter (PM) is the application of good combustion techniques as adjusted for NO_x control (see 7.3.1). PM emissions for dual-fuel firing is equivalent to 0.013 lb/10^6 Btu, while for diesel firing it is equivalent to 0.03 lb/10^6. The latter emission rate is equivalent to the NSPS for electric utility steam generators (see 50 CFR Part Da). In addition, the PM impacts are less than the significant impact levels (see Section 5.2).

7.3.4 Carbon Monoxide (CO)

The proposed emission level BACT for carbon monoxide will be accomplished through application of good combustion techniques as adjusted for NO_x control (see 7.3.1). Environmental impacts of the proposed CO emission rates are substantially below AAQS (see Section 5.2).

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APPENDIX A

MAXIMUM POTENTIAL FUEL CONSUMPTION
SO_2 AND NO_2 EMISSIONS AT EXISTING PERMITTED PRATT & WHITNEY SOURCES

Table A-1. Maximum Potential Fuel Consumption, SO_2 and NO_2 Emissions at Existing Permitted Pratt & Whitney Sources

Source	Rating ($x10^6$ Btu/hr)	Maximum Potential Fuel Consumption: Fuel	Maximum Potential Fuel Consumption: Rate/hr (Natural gas-MMCF; All others-gph)	Annual Operating Factor (%)	NO_2 lb/hr	NO_2 TPY	SO_2 lb/hr	SO_2 TPY
Manufacturing Area								
1. BO-1-MBH (steam boiler)	54	Natural gas	0.052	50	7.28	15.9	0.031	0.068
		No. 6 Fuel oil*	360	50	-	-	-	-
2. BO-2-MBH (steam boiler)	54	Natural gas	0.052	50	7.28	15.9	0.031	0.068
		No. 6 Fuel oil*	360	50	-	-	-	-
3. BO-3-MDL	1	Natural gas	0.001	100	0.10	0.438	0.0006	0.0026
4. BO-4-SIK	2.93	Natural gas	0.003	100	0.30	1.31	0.0018	0.0079
5. FU-1-MHT (box furnace)	4.0	Natural gas	0.004	100	0.40	1.75	0.0024	0.011
6-8. FU-2-MHT, FU-3-MHT, FU-4-MHT (box furnaces)	18 (6.0 each)	Natural gas	0.018	100	1.80	7.88	0.011	0.047
9. FU-5-MFD (tilting furnace)	2.0	Natural gas	0.002	100	0.20	0.876	0.0012	0.0053
10. LI-1-MW (liquid incinerator)	2.8	Waste oil	25	100	1.05	4.60	7.5	32.9

Table A-1. Maximum Potential Fuel Consumption, SO_2 and NO_2 Emissions at Existing Permitted Pratt & Whitney Sources (Continued, Page 2 of 3)

Source	Rating ($x10^6$ Btu/hr)	Maximum Potential Fuel Consumption: Fuel	Rate/hr (Natural gas-MMCF; All others-gph)	Annual Operating Factor (%)	NO_2 lb/hr	NO_2 TPY	SO_2 lb/hr	SO_2 TPY
Testing Area								
11. ACHR-1-A1	264	Jet Fuel**	2016	100	135.1	591.6	126.6	554.5
		Natural gas	0.2563	100	141.0	617.4	0.154	0.674
12. ACHR-2-B2	264	Salvage fuel+	2016	100	135.1	591.6	379.8	1664.0
		Natural gas	0.2563	100	141.0	617.4	0.154	0.674
13. ACHR-3-C21	370	Jet Fuel	2960	100	198.3	868.7	185.9	814.2
		Natural gas	0.3592	100	197.6	865.5	0.215	0.942
14-17. BO-2-D, BO-3-D, BO-4-D, BO-5-D	8.0 (2.0 each)	No. 2 Fuel Oil++	60	100	1.2	5.3	12.8	56.0
		Natural gas	0.0078	100	0.78	3.4	0.0047	0.020
18. BO-10-TAB	1.3	No. 2 Fuel Oil++	10	100	0.20	0.88	2.13	9.33
		Natural gas	0.0013	100	0.13	0.57	0.0008	0.003
19. BO-11-TAB	1.0	No. 2 Fuel Oil	7.56	100	0.15	0.66	1.61	7.05
		Natural gas	0.0010	100	0.10	0.44	0.0006	0.003
20. BO-12-E	41.8	Jet Fuel++	336	100	6.72	29.4	71.6	313.6
		Natural gas	0.0406	100	5.68	24.9	0.024	0.11
21. BO-13-C	5.0	Natural gas	0.0049	100	0.485	2.12	0.0029	0.013
22. HR-1-A8	13.0	Jet Fuel++	100.8	100	2.02	8.83	21.5	94.2
		Natural gas	0.0126	100	1.77	7.74	0.0076	0.033
23. HR-17-DSEC2	15.0	Natural gas	0.0146	100	2.04	8.94	0.0087	0.038
24. HR-19-D7	0.5	Natural gas	0.0005	100	0.048	0.21	0.00029	0.0013

Table A-1. Maximum Potential Fuel Consumption, SO_2 and NO_2 Emissions at Existing Permitted Pratt & Whitney Sources (Continued, Page 3 of 3)

Source		Rating ($x10^6$ Btu/hr)	Maximum Potential Fuel Consumption		Annual Operating Factor (%)	NO_2		SO_2	
			Fuel	Rate/hr (Natural gas-MMCF; All others-gph)		lb/hr	TPY	lb/hr	TPY
25.	HR-20-D21	8.0	Natural gas	0.0078	100	0.777	3.40	0.0047	0.021
26.	HR-22-DSEC1	7.0	Natural gas	0.0068	100	0.680	3.0	0.0041	0.018
27.	HR-23-DSEC3	4.0	Natural gas	0.0039	100	0.388	1.70	0.0023	0.010
28.	HR-24-A	18.0	Natural gas	0.0175	100	2.45	10.7	0.010	0.044
29.	HR-25-A2	2.0	Natural gas	0.0019	100	0.194	0.85	0.0012	0.0053
30.	HR-26-DSEC4	3.8	Natural gas	0.0037	100	0.369	1.62	0.0022	0.0096

Note: MMCF = million cubic feet; gph = gallons per hour.

* Although this unit is capable of firing fuel oil, annual operating reports from 1982 through 1986 show that fuel oil has not been used. Therefore, emissions are based on firing natural gas only.

** Jet Fuel assumed to have sulfur content of 0.4% and be similar to residual oil.

\+ Salvage fuel assumed to have sulfur content of 1.2% and be similar to residual oil.

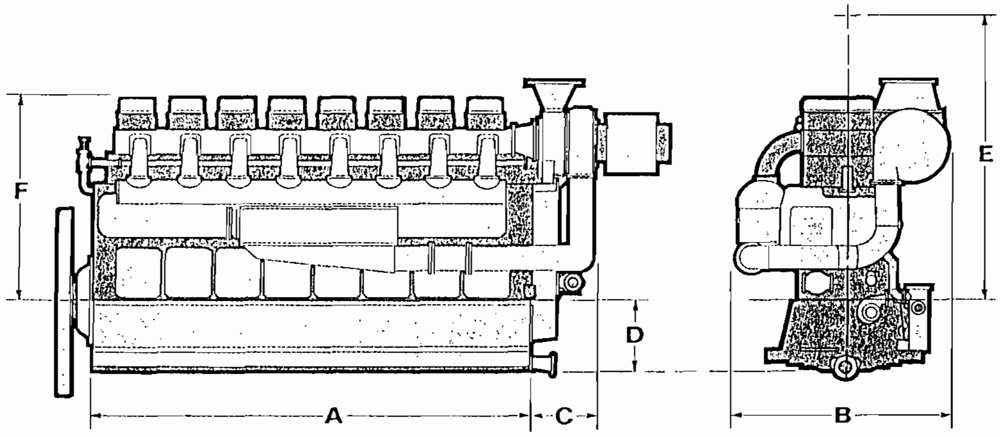
++ Jet fuel assumed to have sulfur content of 1.5% and be similar to distillate oil.

APPENDIX B

ENGINE MANUFACTURER INFORMATION

Transamerica Delaval

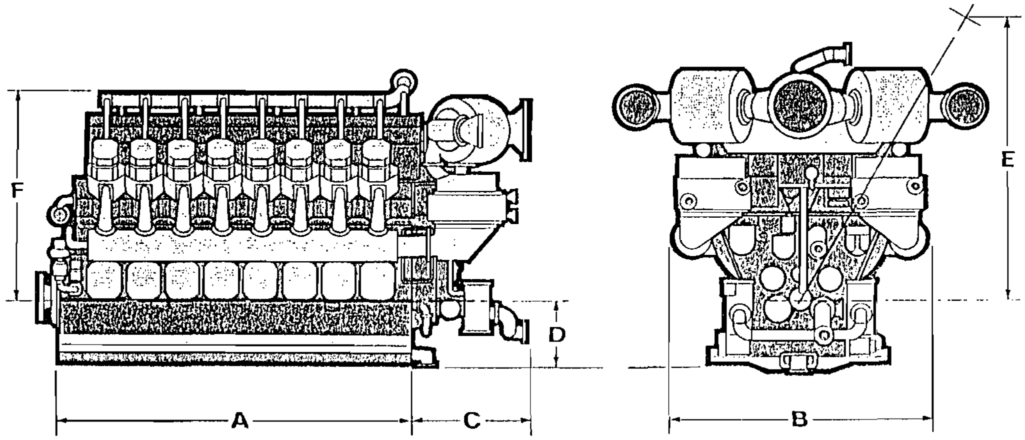
The Modern Technology of Diesel Engines



General Specifications	R-46	R-48
Rating, brake horsepower	4,063	5,416
Metric horsepower	4,120	5,492
KW at flywheel	3,031	4,040
RPM	450	450
Number of cylinders	6	8
Bore x stroke	17 x 21 in. 431.8 x 533.4 mm	17 x 21 in. 431.8 x 533.4 mm
Stroke/cycle	4	4
Total piston displacement	28,600 cu. in. 468.8 liters	38,133 cu. in. 625 liters
Number of main bearings	7	9

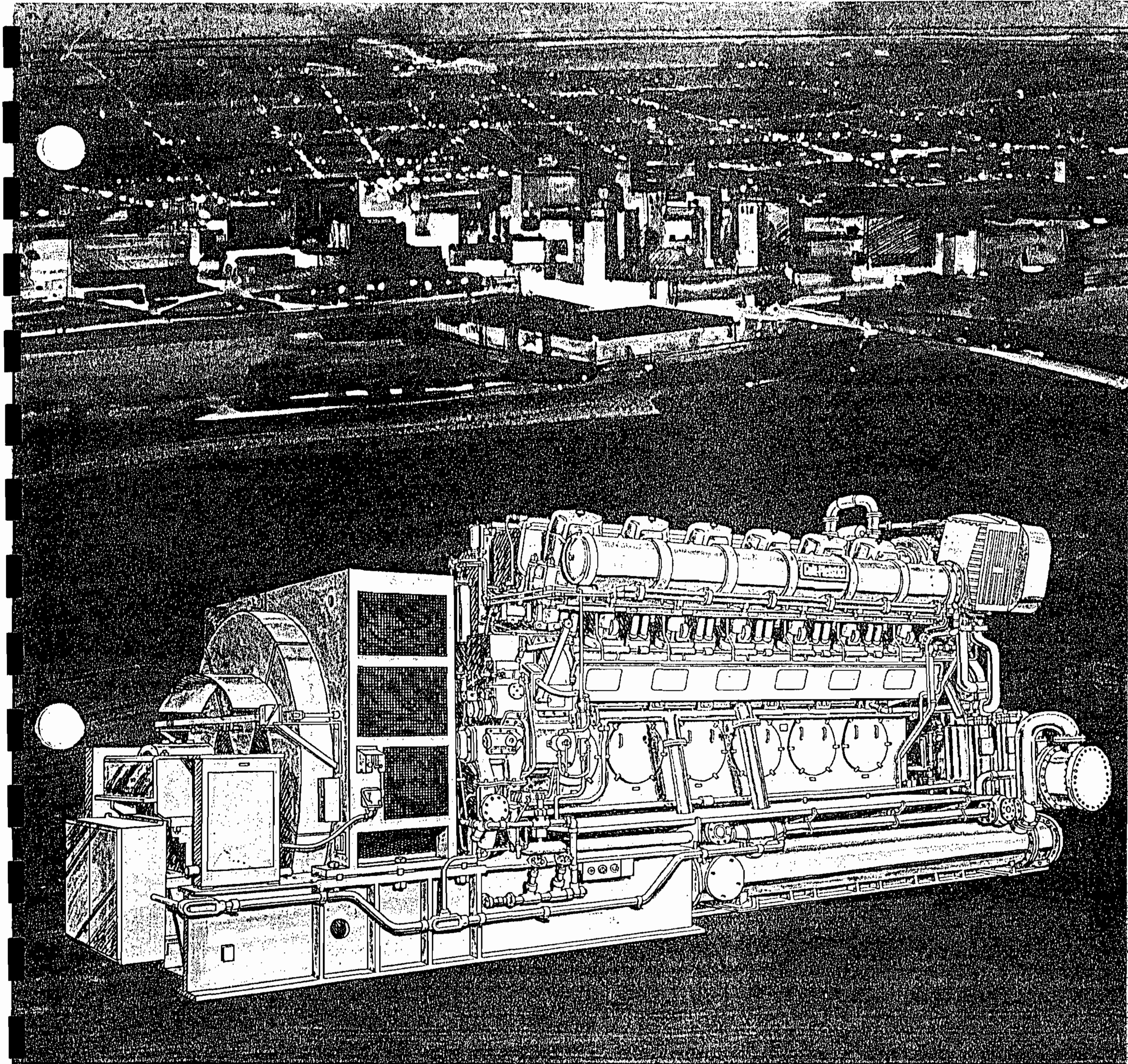
Dimensions and Weights		
A Base length	190 in. 4.83 m	214 in. 5.44 m
B Width less platforms*	103 in. 2.62 m	103 in. 2.62 m
C Lube oil fittings	33 in. .84 m	33 in. .84 m
D Depth below crankshaft C/L	32 in. .81 m	32 in. .81 m
E Height to pull piston and rod above crankshaft C/L	148 in. 3.76 m	148 in. 3.76 m
F Height above crankshaft C/L*	99 in. 2.51 m	99 in. 2.51 m
Approx. weight, engine and flywheel	95,000 lb. 43,090 kg.	125,000 lb. 56,700 kg.

*Widths, heights and overall lengths vary according to turbo used, and air branch and stack adapter desired.



RV-12-4	RV-16-4	RV-20-4
8.125	10.833	13.540
8.240	10.985	13.730
6.061	8.081	10.101
450	450	450
12	16	20
17 x 21 in. 431.8 x 533.4 mm	17 x 21 in. 431.8 x 533.4 mm	17 x 21 in. 431.8 x 533.4 mm
4	4	4
57.200 cu. in. 937.5 liters	76.266 cu. in. 1.250 liters	95.333 cu. in. 1.563 liters
7	9	11

169 in. 4.29 m	217 in. 5.51 m	265 in. 6.73 m
133 in. 3.38 m	133 in. 3.38 m	133 in. 3.38 m
41 in. 1.04 m	41 in. 1.04 m	41 in. 1.04 m
40 in. 1.02 m	40 in. 1.02 m	40 in. 1.02 m
159 in. 4.04 m	159 in. 4.04 m	159 in. 4.04 m
116 in. 2.95 m	116 in. 2.95 m	116 in. 2.95 m
190.000 lb. 86.182 kg.	225.000 lb. 102.060 kg.	288.000 lb 128.369 kg.



Colt Industries

Fairbanks Morse
Engine Division

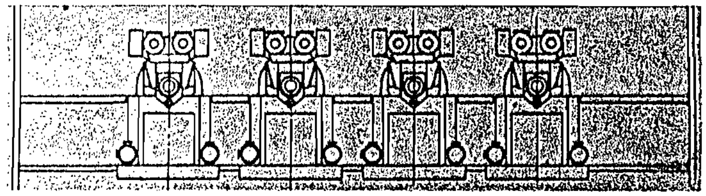
Colt-Pielstick PC-2 Series Diesels for Power Generation

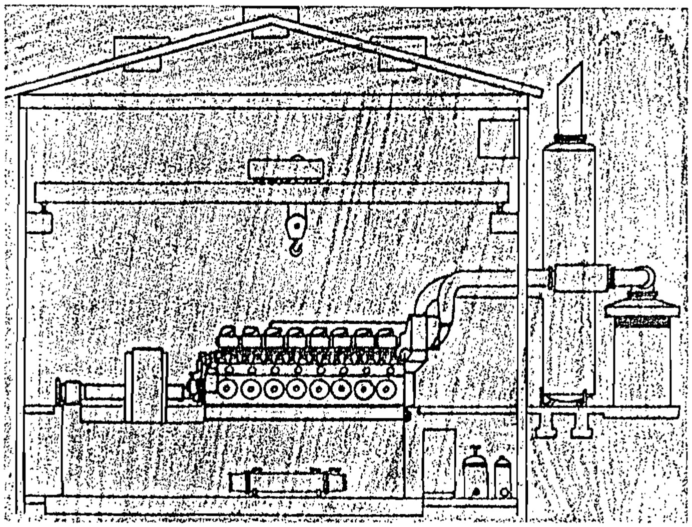
Medium speed
High horsepower
Proven compact design

Colt-Pielstick PC-2 Series diesel engine generating sets are ideally suited for a Power Module concept—engine-generator unit plus packaged auxiliaries. Power requirements can be satisfied by using a suitable number of power modules. Modules can be furnished completely tested and ready for operation for either new plants or as an addition to an existing plant. Associated switchgear and plant support systems can be furnished by Fairbanks Morse Engine Division.

Free standing cubicle type control panels can be furnished including all necessary instrumentation, alarm and protection systems, and start/stop pushbuttons for the engine and the Power Module auxiliaries. Engine auxiliaries for the Module may be prepackaged on a skid. Prefabricated piping for connections to the engine and a lube oil sump tank may be furnished. Plant support systems provide each Module with fuel oil, lube oil, cooling water and starting air.

Colt-Pielstick PC-2 Series power generation units are ideally suited for installation in low-cost prefabricated steel buildings with a minimum of installation expense.





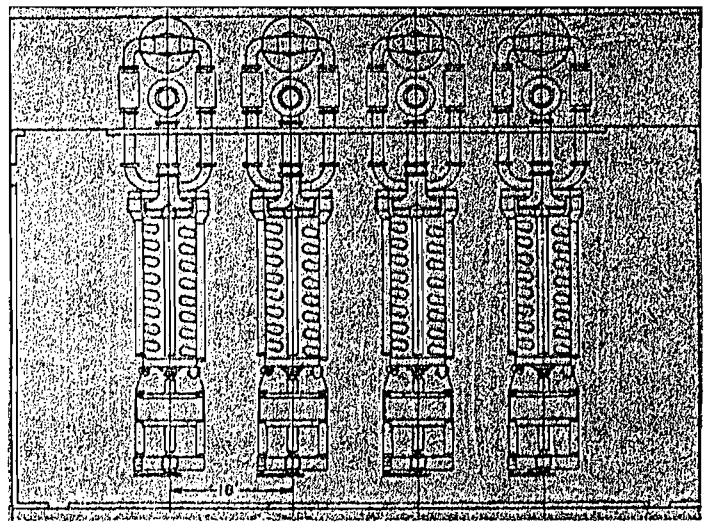
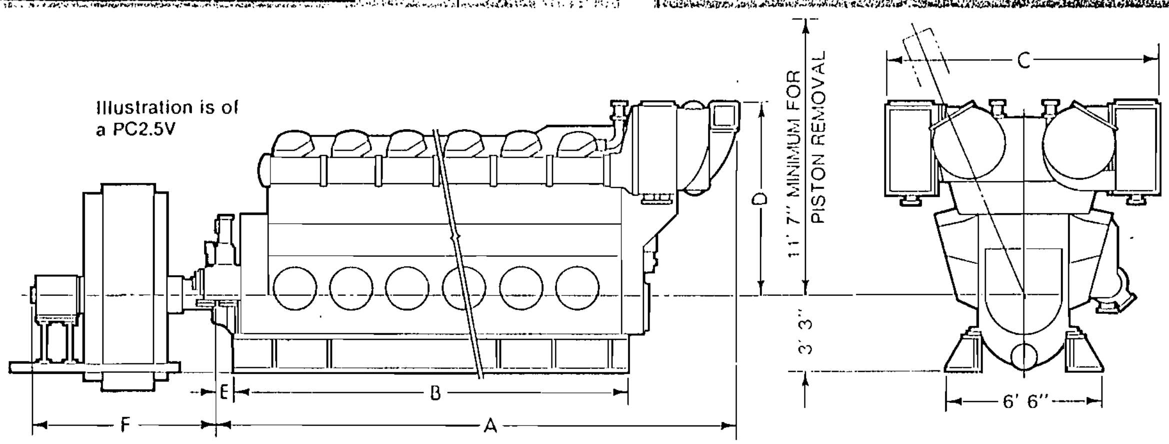
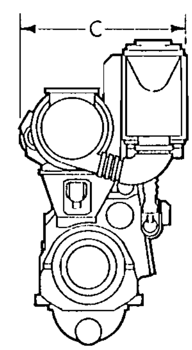


Illustration is of a PC2.5V





End view illustration of a PC2.6 in-line engine.

Cyl.	RPM	KW—Diesel PC2 thru. 2.6	KW—Dual Fuel PC2.3 Only	A	B	C	D	E	F	*Approx. Wt. Lbs.
6L	514	3182	Inline engine avail. in PC2.6 only	24'0"	16'7"	6'11"	9'7"	18"	6'6"	76,450
7L	514	3712		26'5"	19'1"	6'11"	9'7"	18"	7'0"	87,175
8L	514	4243		28'10"	21'5"	6'11"	9'7"	18"	8'7"	97,900
9L	514	4773		32'6"	23'10"	7'10"	10'6"	18"	10'0"	108,680
12V	514	4598/6364	4598	23'1"	16'11"	11'0"	8'5"	18"	8'7"	145,200
14V	514	5364/7425	5364	25'6"	19'4"	11'0"	8'5"	18"	10'0"	166,540
16V	514	6130/8486	6130	27'11"	21'9"	11'0"	9'9"	18"	10'10"	182,600
18V	514	6896/9546	6896	32'3"	24'2"	12'2"	9'8"	18"	10'10"	198,000

*Dry weights for PC2.6 engines without base rails and engine mounted pumps.

L = in-line type engine
V = V type engines

Ratings per cylinder BHP
535 (PC2.3) — 650 (PC2.5) — 737 (PC2.6)
Bore .... 15.74 in. (400mm)
Stroke .... 18.11 in. (460mm)
Piston displacement (per cylinder) .... 3,528.3 cu. in.
Cycle .... 4 Stroke

Drawings and dimensions are for illustration only. For illustrations obtain certified prints. Ratings subject to factory approved application.

HAWKER SIDDELEY
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MIRRLEES BLACKSTONE (STAMFORD) LIMITED STAMFORD, LINCOLNSHIRE, ENGLAND.
Telephone: 0780 4641 Telex: 32234.

INDUSTRIAL & MARINE DIESEL ENGINES FROM 134kw (180bhp) to 8700kw (11680bhp)

Mirrlees Blackstone (Stockport) Limited manufacture the Mirrlees K Major range and the MB275 range, both of which are available as inline and vee form units.

The Stamford company manufacture the well known Blackstone E Type range of engines in inline and twin bank form and the MB190 range which is produced in inline and vee configuration. Mirrlees Blackstone (Stamford) Limited also market the P type range of single cylinder horizontal engines which provide a simple, reliable power source in the lower output range.

The complete Mirrlees Blackstone range covers power outputs from 10 - 31½ bhp and from 180 to 11680 bhp. The products of both companies are marketed through a joint sales force based at Stockport with the exception of the P Type which is marketed by the Stamford factory direct.

There is a large measure of consultation and co-operation between the two companies particularly on basic engine design philosophy and on research and development work.

MIRRLEES BLACKSTONE (STOCKPORT) LIMITED

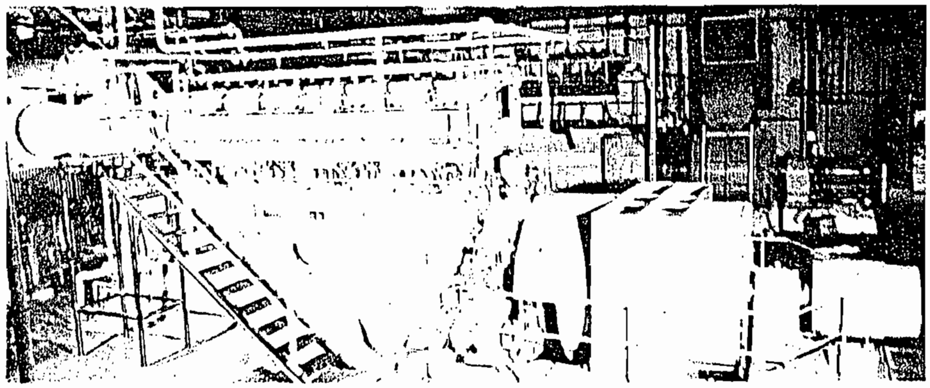
K+KV Major Industrial Engines

K and KV Major engines are of the four-stroke, medium speed, direct injection type and are specifically designed to run on residual fuels. "In line" engines are of 3 to 9 cylinders, whilst the Vee engines are 12 to 16 cylinders. All have a stroke of 18" (457 mm). All K Major engines are turbocharged and intercooled.

For excellence of design and performance the K Major range of engines was chosen for the British Council of Industrial Design Awards 1969 - the first internal combustion engine to receive this honour. The K Major has cylinder casings, main column and bedplate of cast iron construction. The two piece piston has an oil cooled alloy steel crown carrying compression rings. Automotive type connecting rods facilitate removal through the cylinder. Exhaust valves are caged with water cooled seats and guides. Valve rotators and flow lubrication is provided for the valve spindles. K Major type engines are available for dual fuel operation.

K Major Mk3

The K Major Mk3 engine is essentially a prudent, logical extension of the well established current K Major design based upon a vast amount of field experience and a continuing research and development programme. Increased power outputs up to 545 kW (730 bhp) per cylinder have been achieved by increasing the cylinder bore from 381mm to 400mm.



This 600 rev/min K8 Major generating set was installed at the Mount Newman mine site by Hawker Siddeley Engineering Pty Ltd. Melbourne, Australia. The set was commissioned within three months from receipt of order.

K + KV MAJOR RATINGS AT 17.2 bar (250lbs/in²) NOMINAL BMEP

ENGINE TYPE	500 RPM (50HZ)			514 RPM (60HZ)			600 RPM (50/60HZ)		
	BRAKE POWER		ALTERNATOR	BRAKE POWER		ALTERNATOR	BRAKE POWER		ALTERNATOR
	KW	BHP	KW	KW	BHP	KW	KW	BHP	KW
K3	1119	1500	1062	1150	1542	1091	1342	1800	1280
K5	1864	2500	1790	1916	2270	1616			
K6	2237	3000	2145	2300	3084	2205	2685	3600	2574
K7	2610	3500	2510	2683	3598	2580			
K8	2983	4000	2870	3066	4112	2950	3579	4800	3440
K9	3356	4500	3200	3450	4626	3276	4027	5400	3840
KV12	4474	6000	4320	4600	6168	4440	5369	7200	5185
KV14	5220	7000	5050	5366	7196	5191			
KV16	5966	8000	5760	6133	8224	5921	7159	9600	6910

K + KV MAJOR RATINGS AT 18.9 bar (275lbs/in²) NOMINAL BMEP

ENGINE TYPE	500 RPM (50HZ)			514 RPM (60HZ)			600 RPM (50/60HZ)		
	BRAKE POWER		ALTERNATOR	BRAKE POWER		ALTERNATOR	BRAKE POWER		ALTERNATOR
	KW	BHP	KW	KW	BHP	KW	KW	BHP	KW
K3	1230	1650	1168	1264	1695	1200	1476	1980	1408
K5	2051	2750	1969	2107	2825	1778			
K6	2461	3300	2360	2528	3390	2425	2953	3960	2831
K7	2871	3850	2761	2949	3955	2838			
K8	3281	4400	3157	3371	4520	3245	3937	5280	3784
K9	3691	4950	3520	3792	5085	3604	4429	5940	4224
KV12	4922	6600	4752	5056	6780	4884	5906	7920	5704
KV14	5742	7700	5555	5898	7910	5710			
KV16	6562	8800	6336	6741	9040	6513	7875	10560	7601

DUEL FUEL ENGINES:—
KP + KVP MAJOR (INDUSTRIAL) RATINGS AT 12.4 bar (180lbs/in²) NOMINAL BMEP

		ENGINE	BRAKE POWER		ALTERNATOR	RPM
TYPE	No. of Cyls.	TYPE	K.W.	B.H.P.	K.W.	
KP Major	3	KP3	969	1300	921	600
	5	KP5	1384	1856	1315	514
	6	KP6	1939	2600	1842	600
	7	KP7	1939	2599	1842	514
	8	KP8	2584	3465	2332	600
	9	KP9	2908	3900	2763	600
KVP Major	12	KVP12	3878	5200	3684	600
	14	KVP14	3876	5198	3682	514
	16	KVP16	5168	6930	4910	600

K MAJOR Mk3 POWER OUTPUTS AT 18.9 bar (275lbs/in²) NOMINAL BMEP

ENGINE TYPE	500 RPM (50 Hz)			600RPM (50 Hz - 60 Hz)		
	BRAKE POWER		ALTERNATOR	BRAKE POWER		ALTERNATOR
	kW	BHP	kW	kW	BHP	kW
K6	2721	3648	2585	3267	4380	3104
K8	3629	4864	3448	4357	5840	4139
K9	4082	5472	3878	4901	6570	4656
KV12	5443	7296	5171	6535	8760	6208

HAWKER SIDDELEY
MIRRLEES BLACKSTONE DIESELS

MIRRLEES BLACKSTONE (STOCKPORT) LIMITED

K + KV Major Marine Engines

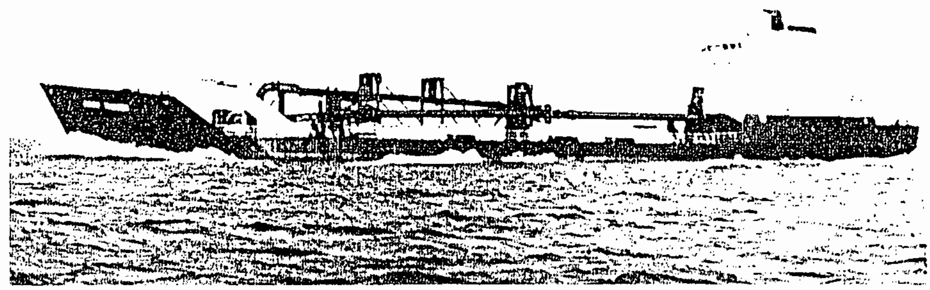
K and KV Major marine engines provide high specific output at relatively low mechanical and thermal loading. They conform to B.S.I. specifications and meet the requirements of all the Classification Societies. These engines are the marine versions of the stationary engines described earlier, but the range is confined to the engines detailed below.

The following table gives the continuous unrestricted service ratings for propulsion or auxiliary duties with sea water up to 86°F(30°C) and ambient air temperature up to 113°F(45°C).

K + KV MAJOR (MARINE) RATINGS AT 19.1 bar (275lbs/in²) NOMINAL BMEP

ENGINE TYPE	KW	BHP	MAX R.P.M.
K6	2953	3960	600
K7	3014	4051	525
K8	3937	5280	600
KV12	5906	7920	600
KV14	6029	8085	525
KV16	7875	10560	600

The above ratings apply when operating on light or heavy fuels with viscosities up to 3500 secs.



The modern suction dredger "Arco Thames" is powered by a 3400 bhp K6 Major engine driving C.P. Propeller. A 1600 kW alternator is driven from the free end at the constant engine speed of 600 rev./min. The vessel is also equipped with two 250 kW E type auxiliary sets, one of which is arranged for auto start.

Engines can be supplied as reversing or non-reversing units in single or multi-engined installations and they are also suitable for diesel electric propulsion or auxiliary applications. K and KV Major marine engines are particularly suitable for semi or fully automated engine rooms and full power can be taken from both ends of the engine making it an ideal choice for propulsion installations where power is required to drive auxiliary machinery such as pumps or generators. Pumps for lubrication and cooling systems can be engine or motor driven and the design provides ready accessibility for routine inspection and maintenance.

THE MB275 RANGE of Industrial & Marine Engines

The Mirrlees Blackstone MB275 diesel engine has been designed as a high reliability, low initial cost engine capable of heavy duty operation with long periods between maintenance. Design considerations have aimed for ease of accessibility and rigidity of components together with compatible stress levels. High cylinder pressures ensure an efficient thermo-dynamic cycle with attendant low fuel consumption. Special attention has been given to the burning of heavy fuels and recommendations will be made and performance confirmed upon receipt of site conditions and fuel analysis.

Modern techniques have been used in design and production to produce an engine which maintains acceptable operating limits in concert with high specific outputs and to this end the tensioning of all stressed nuts and bolts is effected by hydraulic jacks. 6 and 8 cylinder engines are built in-line with 12 and 16 cylinder engines of Vee form construction, a 45° Vee angle being chosen to reduce overall engine width and ensure torsional stability.

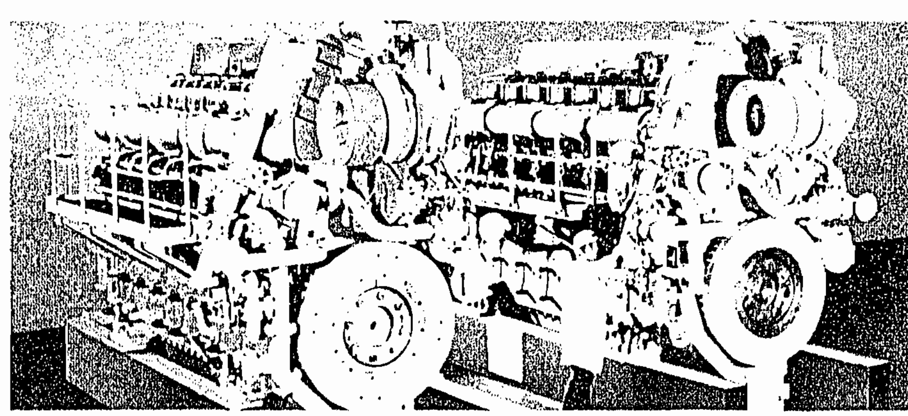
The crankshaft has large overlap of pins and journals permitting narrow crank webs so that the cylinder centre distance on the engine is controlled by only the cylinder head dimensions.

All normal auxiliary equipment is engine driven and is grouped with the inter-coolers at the flywheel end of the engine to give a compact arrangement. Attention has been given to limiting noise levels by the use of high density materials. The enclosure of the exhaust system is designed to limit the heat dissipated to the engine room atmosphere.

The requirements of the United Kingdom Department of Trade and Industry and the various classification societies have been met. Fire risks have been reduced in accordance with the Safety of Life at Sea requirements by the elimination of non-ferrous containment for oil and fuel.

This engine benefits from the Company's total experience of oil engine manufacture but more specifically on that gained with the successful Blackstone E Type and Mirrlees K and KV Major engines over the past 25 years.

The MB275 is ideally suited to marine propulsion in single or multi units, electric power generation for base load or emergency standby duties, or for driving auxiliaries such as pumps and compressors.



Twin eight-cylinder MB275 Marine engines ready for dispatch.

MB 275 ENGINE RATINGS AT 19.1 bar (275lbs/in²) NOMINAL BMEP

ENGINE TYPE	750 RPM (50 HZ)				900 RPM (60 HZ)				1000 RPM (50 HZ)			
	BRAKE POWER		ALTERNATOR		BRAKE POWER		ALTERNATOR		BRAKE POWER		ALTERNATOR	
	KW	BHP	KW	KVA	KW	BHP	KW	KVA	KW	BHP	KW	KVA
6MB275	1315	1760	1250	1562	1575	2112	1500	1875	1750	2346	1650	2062
8MB275	1725	2312	1650	2062	2010	2775	2000	2500	2300	3083	2200	2750
12MB275	2625	3519	2500	3125	3150	4222	3000	3750	3500	4692	3300	4125
16MB275	3450	4627	3300	4125	4140	5550	4000	5000	4600	6166	4400	5500

For industrial duties the ratings are applicable to continuous operation at 1000 rpm under conditions as defined in ISO 3046/1. A one hour overload rating 10% in excess of the listed powers is permissible.
For Propulsion and Marine Auxiliary duties, the listed outputs are for unrestricted service up to and including temperature limits defined by International Classification Societies rules, i.e. 32°C sea water temperature and 45°C ambient air temperature. For Propulsion duties no overload is permitted in service. For auxiliary duties 10% overload is permitted in service in line with requirements of Classification Society rules.
In all cases of electric output, an alternator efficiency of approximatley 95% has been assumed.
The ratings listed above are when using fuel oils Class A1 and A2 of BS 2869 : 1970.

HAWKER SIDDELEY

MIRRLEES BLACKSTONE DIESELS

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MIRRLEES BLACKSTONE (STAMFORD) LIMITED STAMFORD, LINCOLNSHIRE, ENGLAND
Telephone: 0780 4641 Telex: 32234

MIRRLEES BLACKSTONE (STAMFORD) LIMITED

E Type Industrial Engines

A wide range of E type engines are available with a common stroke of 11½" (292.1 mm). "In line" engines are of 4, 6 and 8 cylinders whilst the 12 and 16 cylinder units are in twin bank form. Both the "in line" and "twin bank" engines are designed to operate at speeds up to 1,000 rpm. The twin bank design incorporates an integral geared output shaft enabling alternative speeds to be selected for the driven machinery. The use of patented nodal dampers protects the gearing and ensures a smooth drive over the entire speed range. The engines are of cast iron construction. Pistons are of aluminium alloy with fully floating piston pins. Automotive type connecting rods are fitted with steel backed precision type bearings.

Starting is normally facilitated by compressed air but, as an alternative, the "in line" engines can be provided with electric starting facilities. Manual or automatic control can be provided for both air and electric start systems.

E RANGE ENGINE OUTPUTS AT 50HZ

ENGINE	No OF	RPM	BRAKE POWER		ALTERNATOR OUTPUT		B.M.E.P.	
TYPE	CYLS		KW	BHP	KW	KVA	lbs/in²	bar
E	4	1000	201	270	184	230	77	5.3
E	6	1000	302	405	278	348	77	5.3
E	8	1000	403	540	375	469	77	5.3
ES	4	1000	298	400	272	340	115	7.9
ES	6	1000	448	600	412	515	114	7.9
ES	8	1000	597	800	558	698	115	7.9
ESL	6	1000	699	937	658	823	179	12.3
ESL	8	1000	933	1250	880	1100	179	12.3
ESL	12	975	1361	1825	1292	1615	179	12.3
ESL	16	975	1820	2440	1750	2188	179	12.3

E RANGE ENGINE OUTPUTS AT 60HZ

ENGINE	No OF	RPM	BRAKE POWER		ALTERNATOR OUTPUT		B.M.E.P.	
TYPE	CYLS		KW	BHP	KW	KVA	lbs/in²	bar
E	4	900	201	270	186	232	86	5.9
E	6	900	302	405	281	351	86	5.9
E	8	900	403	540	377	472	86	5.9
ES	4	900	298	400	278	347	127	8.8
ES	6	900	448	600	419	524	127	8.8
ES	8	900	597	800	562	702	127	8.8
ESL	6	900	643	862	600	750	183	1.26
ESL	8	900	858	1150	800	1000	183	12.6
ESL	12	1000	1395	1870	1320	1650	179	12.3
ESL	16	1000	1865	2500	1765	2206	179	12.3

E = Naturally Aspirated, ES = Turbocharged, ESL = Turbocharged + Intercooled. The 12 and 16 Cylinder Twin Bank Engines show crank-shaft speeds, output speed being 1000 or 1200 rpm for 50HZ AND 60HZ respectively
Notes: The engines are available for lower synchronous speeds. Outputs for dual fuel operation will be supplied upon request.

The ESL Mk 2 Range

The ESL Mk 2 diesel engine is a logical development of the Blackstone E Type engines described above which have sold more than 8000 units for both industrial and marine duties in all parts of the world.

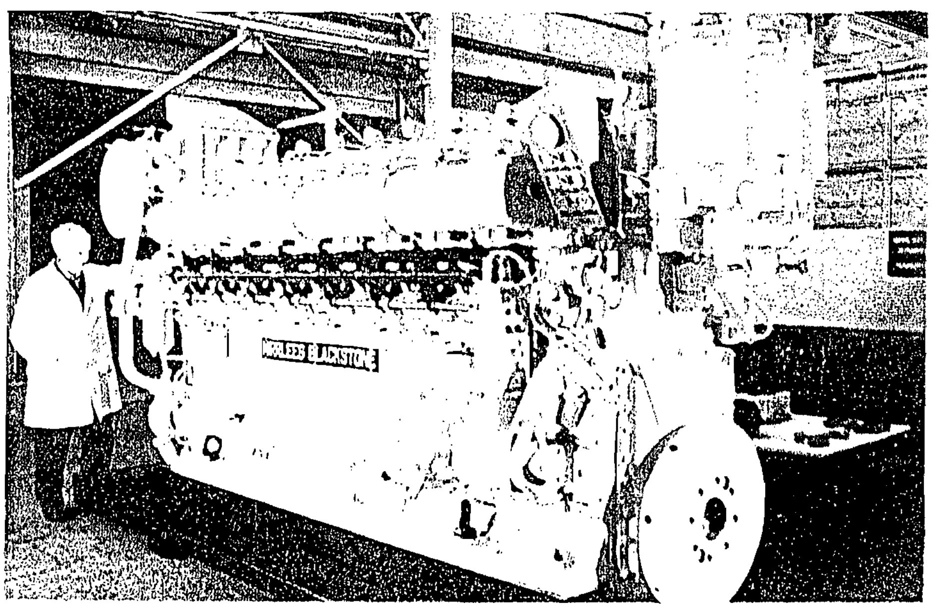
The experience gained with these engines has been used, together with modern manufacturing techniques and the latest diesel engine technology, to produce a medium speed engine of robust construction carefully designed for long and arduous service conditions in any industrial or marine application.

ESL Mk 2 engines have a bore of 222 mm (8·75 in.) and a stroke of 292 mm (11·5 in.) They are manufactured in 6 and 8 cylinder units in a vertical 'in line' configuration with a range of synchronous crankshaft speeds from 720 to 1000 rev/min. All engines in the range are turbocharged and intercooled as standard with optional positioning of these units at either end of the engine.

Many of the components are completely interchangeable with E Type Mk 1 engines which will enable operators of both types of engine to maintain a minimum of essential spares.

A fine example of British engineering at its best the Mk2 is a completely metricated design with an improved power/weight ratio and most economical fuel consumption.

Important refinements include 4-valve cylinder heads, oil cooled pistons, externally mounted fuel pumps, separation of lubricant and fuel oil, higher strength gears and choice of wet or dry sump. The ESL Mk 2 has been designed with



ESL8 Mk2 engine

ESL MK 2 ENGINE RATINGS — 60HZ AT 14.5 bar (210lbs/in²) NOMINAL BMEP

ENGINE	SPEED	BRAKE POWER		ALTERNATOR OUTPUT	
TYPE	RPM	KW	BHP	KW	KVA
ESL6 MK2	720	590	790	548	685
ESL6 MK2	900	730	980	683	854
ESL8 MK2	720	783	1050	738	923
ESL8 MK2	900	977	1310	917	1147

ESL MK 2 ENGINE RATINGS — 50HZ

ENGINE	SPEED	BRAKE POWER		ALTERNATOR OUTPUT	
TYPE	RPM	KW	BHP	KW	KVA
ESL6 MK2	750	612	820	570	712
ESL6 MK2	1000	813	1090	766	957
ESL8 MK2	750	813	1090	761	952

HAWKER SIDDELEY
MIRRLEES BLACKSTONE DIESELS

MIRRLEES BLACKSTONE (STAMFORD) LIMITED

E type Marine Engines

These are the marine versions of the E series previously described and are built in units with 4 to 16 cylinders giving powers of from 180 to 2,500 bhp, the maximum crankshaft speed being 1,000 rpm. The ratings are generally in accordance with the table shown on the previous page with minor amendments for marine operating conditions.

"In-line" construction is used for units with 4, 6 and 8 cylinders and the "twin bank" arrangement for units with 12 and 16 cylinders. Power from each twin bank crankshaft is transmitted through an integral twin input/single output gearbox which permits a wide range of output shaft speeds.

Basic construction is similar to that given on the previous page with the addition of the features necessary for propulsion or auxiliary services. Engines are uni-directional but direction of rotation is optional. A complementary range of vertical, offset, reverse/reduction gears capable of transmitting up to 11,900 lbs.-ft. input torques are available.

For installations with controllable pitch propellers, twin input/single output, plain reduction gearboxes can be supplied with overall reduction ratios of 3:1, 4:1, 5:1 or 6:1, these being suitable for transmitting torques up to 6,750 lbs.-ft. each input.

The Blackstone patented and world renowned Nodal Damper Coupling is fitted between the engine and the gearbox. A hydraulic damper is fitted to the "free" end of the crankshaft in engines with six or eight cylinders and to all twin bank engines, dissipating all undesirable torsional vibrations giving smooth operation over the full speed range.

Large crankcase doors provide complete accessibility to facilitate maintenance. Connecting rods and pistons can be withdrawn through the side via the crankcase doors and individual cylinder heads can be removed without disturbing the manifolds. The camshaft can also be removed sideways through the side doors without major dismantling.

The MB190 Range

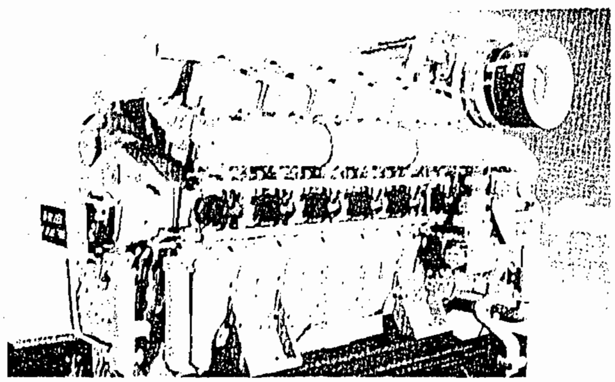
The Mirrlees Blackstone MB190 diesel engine has been designed as a high reliability, low initial cost engine capable of heavy duty operation with long periods between maintenance, coupled with a high standard of component accessibility. Design considerations have aimed for rigidity of components as well as compatible stress levels, permitting high cylinder pressures to ensure an efficient thermodynamic cycle with attendant low fuel consumption.

Modern techniques, including three-dimensional photo-elasticity and finite element analysis have been used in the design process and care has been taken to ensure, despite the high specific output, that oil film thickness in bearings and component working temperatures are within existing operating experience.

The MB190 is built in 6, 8, 12 and 16 cylinder units. An in-line form is used for 6 and 8 cylinder engines and a vee-form for 12 and 16 cylinder engines, a 45° vee angle being chosen to reduce the overall engine width and ensure overall torsional stability.

The crankshaft has large overlap of pins and journals permitting narrow crank webs such that the cylinder centre distance on the engine is controlled by only the cylinder head dimensions.

Special attention has been paid to achieving a high air flow through the engine and large valves (4 per cylinder) with unobstructed porting arrangements having been used. This, combined with a bore stroke ratio of 1:1.1 gives a good compromise between valve throat velocity and combustion chamber configuration. All normal auxiliary equipment is engine driven and is



A twelve cylinder MB190 engine

grouped with the intercoolers at the flywheel end of the engine to give a compact arrangement.

Attention has been given to limiting noise levels by the use of high density materials. The enclosure of the exhaust system being designed to limit the heat dissipated to the engine room atmosphere.

The requirements of the United Kingdom Department of Trade and Industry and the various classification societies have been met. Fire risks have been reduced in accordance with the Safety of Life at Sea requirements by the elimination of non-ferrous containment for oil and fuel.

This engine benefits from the Company's total experience of oil engine manufacture but more specifically on that gained with the successful E and K type engines over the past 25 years.

The MB190 engine is ideal for electric power generation and other industrial duties such as pump and compressor drives and is a true 'base load' type of engine of strong, rigid construction and should not be confused with automotive type engines.

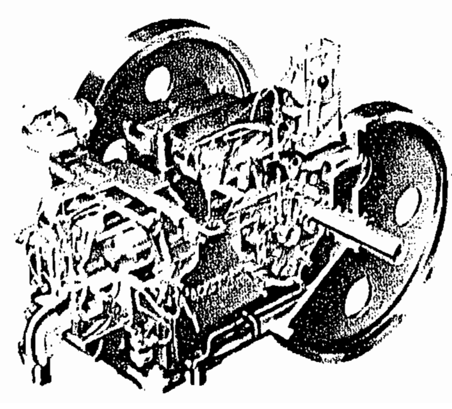
MB 190 ENGINE RATINGS AT 17.9 bar (260lbs/in²) NOMINAL BMEP

ENGINE	1200 RPM (60HZ)				1500 RPM (50HZ)			
TYPE	BRAKE POWER		ALTERNATOR		BRAKE POWER		ALTERNATOR	
	KW	BHP	KW	KVA	KW	BHP	KW	KVA
6MB 190	641	859	600	750	801	1074	750	938
8MB 190	854	1146	800	1000	1068	1432	1000	1250
12MB 190	1282	1718	1200	1500	1602	2148	1500	1875

Horizontal Engines

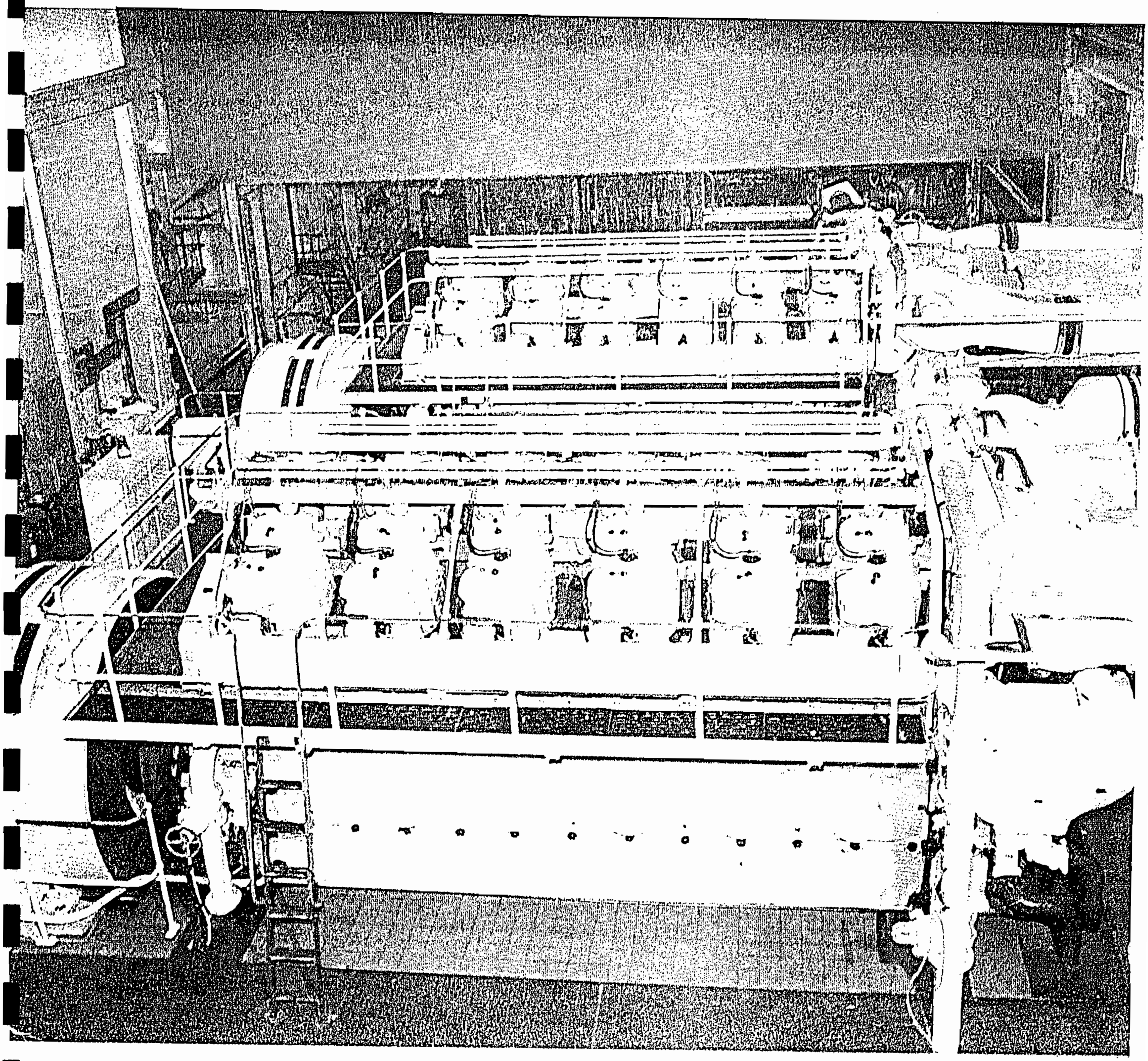
The Blackstone horizontal engine is a robust, simple-to-operate, single cylinder power unit that has been in proven service for many years on duties in all parts of the world. Drives direct or through pulleys with the following outputs:

	JP	OP	MP
H.P./R.P.M.	16/800	26/700	31½/850
	14/700	24/650	25½/800
	12/600	22/600	27½/750
	10/500	18/500	
Bore x stroke			
in	5 x7½	7¼x9½	7¼x9½
mm.	149x191	184x241	184x241

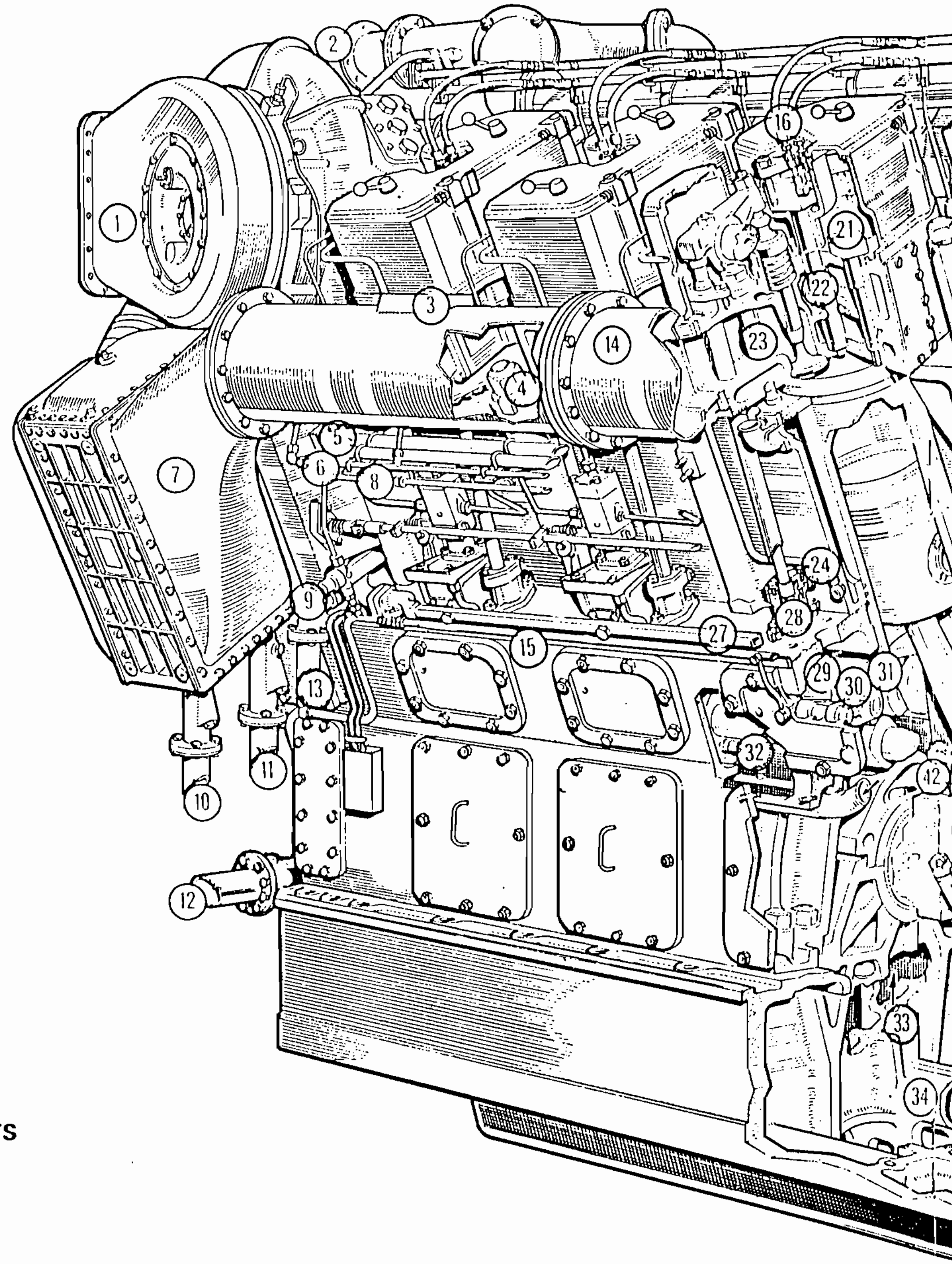


CoID design award 1969

industrial diesels

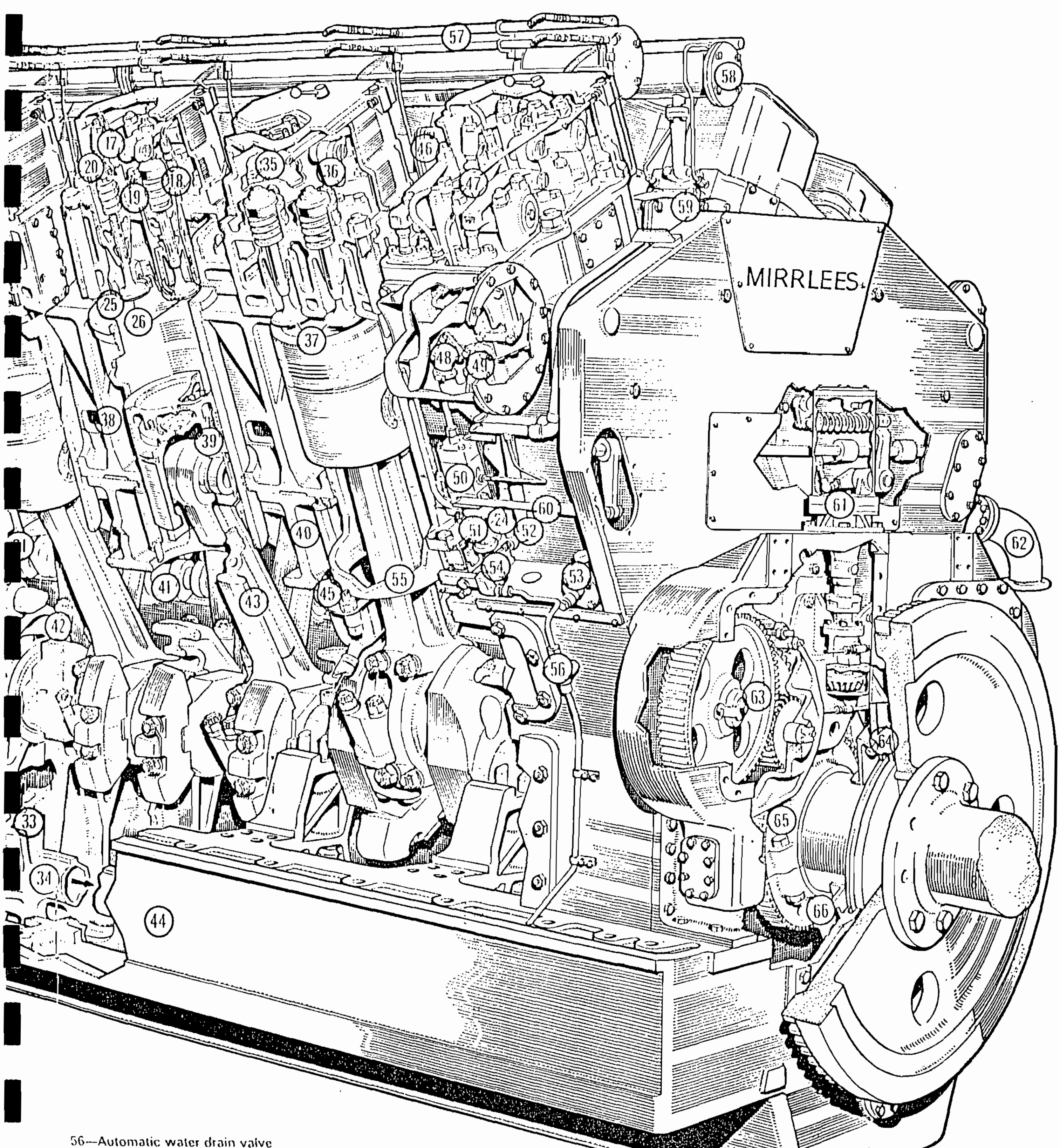


HAWKER SIDDELEY



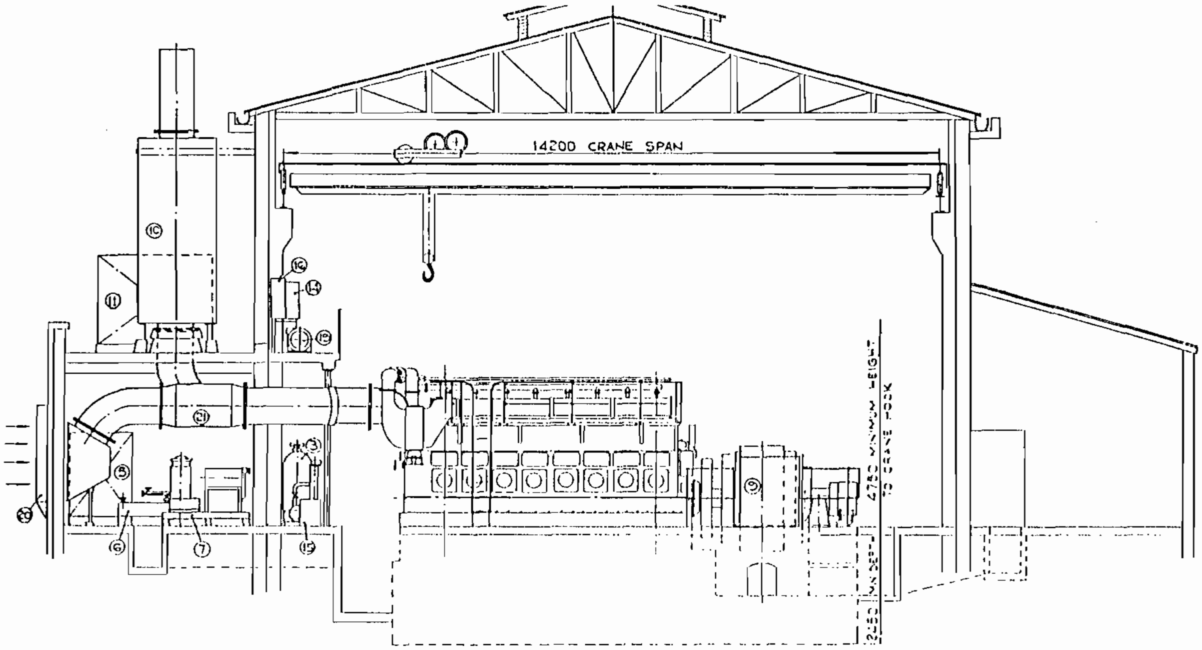
KEY TO MAIN COMPONENTS

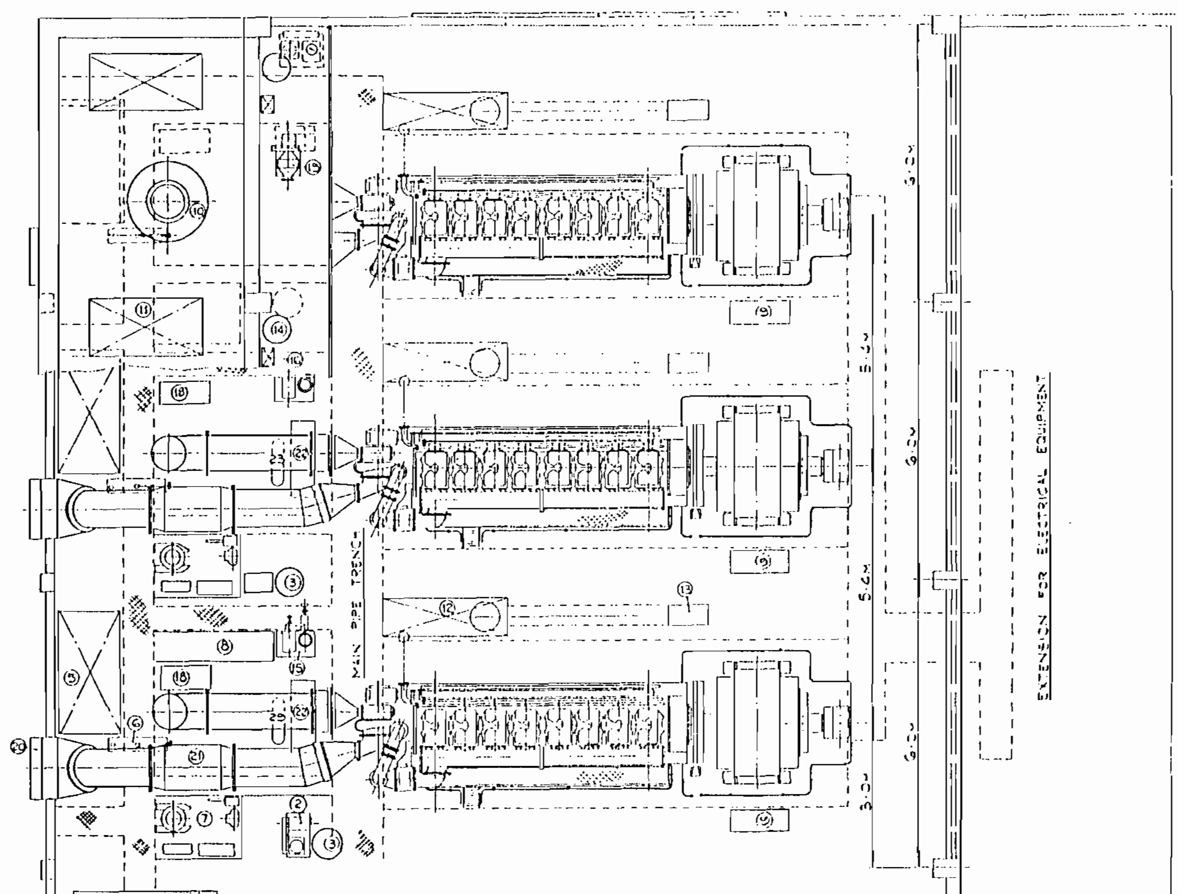
1—Air inlet to turbocharger
2—Circulating water outlet
3—Tool tray
4—Stud-cylinder casing to column
5—Fuel manifold
6—Valve gear lubricating oil manifold
7—Charge air cooler
8—Valve cage lubricating oil manifold
9—Lubricating oil flow regulator
10—Raw water outlet
11—Raw water inlet
12—Lubricating oil outlet
13—Starting air inlet
14—Air inlet manifold
15—Cam follower gear lubricating oil manifold
16—Injector nozzle cooling pipes
17—Exhaust valve stem lubricating oil inlet
18—Exhaust valve seat cooling inlet
19—Exhaust valve seat cooling outlet
20—Valve rotator
21—Relief valve
22—Fuel injectors
23—Cylinder head stud and tube
24—Starting air pipe
25—Water cooled exhaust valve seat
26—Exhaust valves
27—Starting air manifold
28—Push rod tappet and guide
29—Air cam follower
30—Fuel cam follower
31—Exhaust cam follower
32—Oil to camshaft bearings
33—Oil to main bearings and pistons
34—Main oil gallery
35—Starting air valve
36—Link for exhaust valve levers
37—Air valve
38—Cylinder casing
39—Piston crown cooling oilway
40—Column
41—Camshaft(s)
42—Main bearing cap
43—Connecting rod
44—Bedplate
45—Piston oil catcher tray
46—Upper exhaust pipes
47—Rocker lubricating oil pipe
48—Water inlet to head
49—Pressure indicator cock
50—Fuel injector pump
51—Fuel pump tappet
52—Exhaust valve push rod
53—Water drain valve
54—Starting air controller
55—Cylinder liner



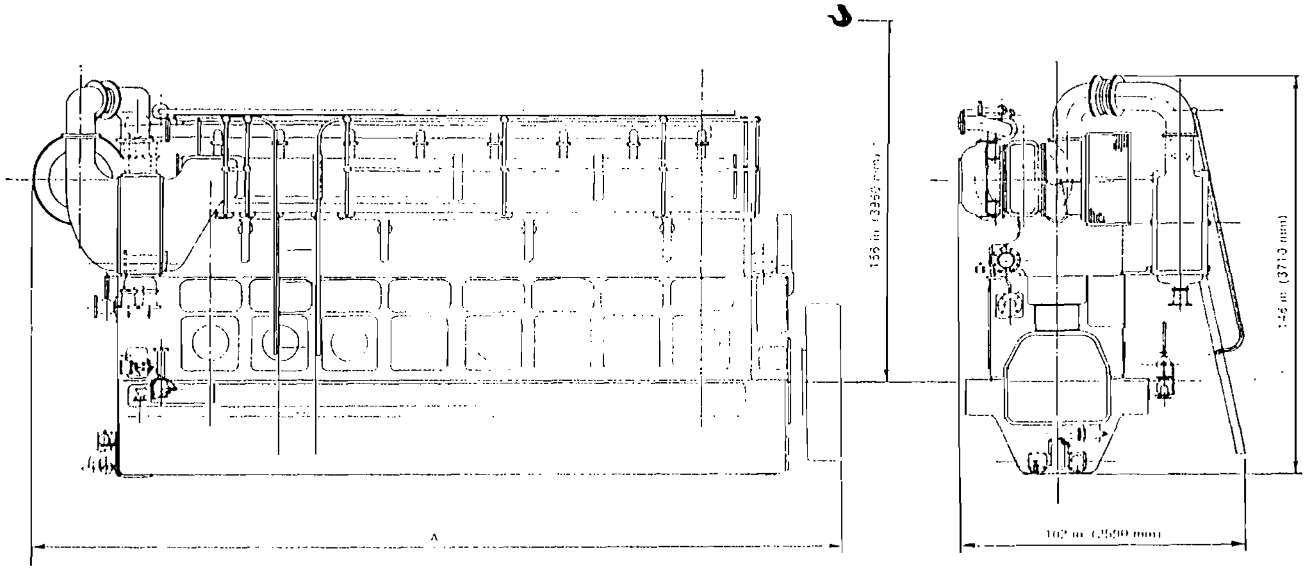
56—Automatic water drain valve
57—Valve cage and nozzle cooling pipes
58—Water outlet manifold
59—Lower exhaust pipes
60—Fuel pump control shaft
61—Woodward governor and linkages
62—Circulating water inlet
63—Camshaft drive gear
64—Oil catcher
65—Crankshaft gearwheel
66—Oil thrower

Sectional Elevation of a typical KV Major engine.





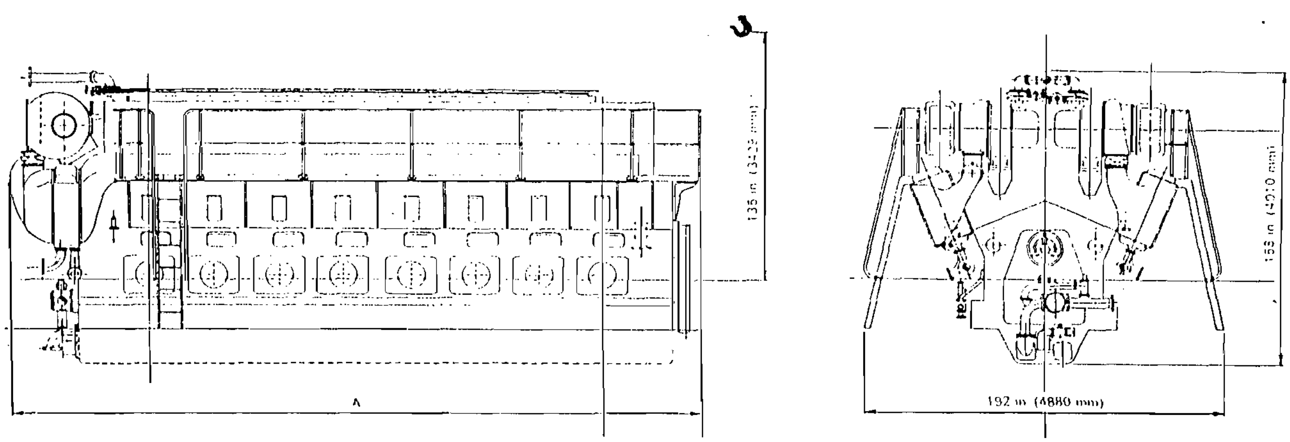
ITEM No	DESCRIPTION
1	DIESEL DRIVEN AIR COMPRESSOR
2	MOTOR DRIVEN AIR COMPRESSOR
3	STARTING AIR RECEIVERS
4	HEAVY FUEL TREATMENT UNIT & BALANCE TANK
5	HEAVY FUEL SERVICE TANKS
6	HEAVY FUEL LINE HEATERS
7	HEAVY FUEL BUS RAIL UNITS
8	MOTOR CONTROL BOARD
9	CONTROL / ALARM / INSTRUMENT PANEL
10	EXHAUST SILENCERS
11	LIGHT FUEL OIL SERVICE TANKS
12	LUB OIL PRIMING / COOLER / FILTER & JACKET WATER HEAT EXCH^{R} UNITS
13	MOTOR DRIVEN JACKET WATER PUMPS
14	JACKET WATER MAKE-UP TANKS
15	INJECTOR / EXHAUST VALVE COOLING UNITS
16	INJECTOR / EXHAUST VALVE COOLING UNITS MAKE UP TANKS
17	SECONDARY WATER COOLERS SEE SITE PLAN.
18	SECONDARY WATER PUMPS
19	CRANKCASE FUME EXTRACTOR FANS
20	AIR INLET FILTERS
21	AIR INLET NOISE ATTENUATORS
22	OVERSPEED FUEL DUMP TANK
23	AIR RECEIVER FOR OVERSPEED FUEL DUMP TANK



K MAJOR	A in.	A mm.
3 CYL.	161·5	4100
5 CYL.	210·5	5350
6 CYL.	236·5	6010
7 CYL.	263·5	6690
8 CYL.	285·5	7250
9 CYL.	312·5	7940

KV MAJOR	A in.	A mm.
12 CYL.	297	7550
14 CYL.	333	8460
16 CYL.	364	9250
18 CYL.	400	10160

* Allows 22 in. (560 mm.) for Crane Slings



'IN LINE' ENGINES

			Total	Bedplate	Crankshaft	Column	Cylinder Casing	Other parts packed in 15/20 Cases
K3 MAJOR	Net Weight	tons	28.9	5.5	2.5	4.3	3.7	12.9
	Nett Weight	kilos	29470	5600	2550	4400	3770	13150
	Gross Weight	tons	32.4	6.05	2.75	5.1	4.3	14.2
	Gross Weight	kilos	33000	6160	2800	5200	4380	14460
	Case Size	inches	—	135 x 72 x 64	125 x 43 x 48	102 x 62 x 66	86 x 50 x 66	Various
	Case Size	mm.	—	3175 x 1830 x 1620	3175 x 1100 x 1230	2590 x 1570 x 1680	2180 x 1270 x 1680	Various
	Volume	cu.ft.	1430	334	150	238	154	544
	Volume	cu.m.	40,49	9,45	4,24	6,75	4,65	15,4
K5 MAJOR	Nett Weight	tons	37	7.6	4.0	7.2	5.5	12.7
	Nett Weight	kilos	37610	7750	4050	7300	5600	12910
	Gross Weight	tons	41	8.22	4.28	8.1	6.2	14.2
	Gross Weight	kilos	41755	8370	4360	8250	6315	14460
	Case Size	inches	—	175 x 72 x 64	175 x 43 x 48	173 x 62 x 66	141 x 50 x 66	Various
	Case Size	mm.	—	4440 x 1830 x 1620	4440 x 1100 x 1230	4390 x 1570 x 1680	3580 x 1270 x 1680	Various
	Volume	cu.ft.	1939	466	210	410	264	589
	Volume	cu.m.	54,92	13,2	5,94	11,6	7,48	16,7
K6 MAJOR	Nett Weight	tons	40.2	9.0	4.4	8.5	6.6	11.7
	Nett Weight	kilos	40920	9150	4500	8650	6700	11920
	Gross Weight	tons	44.2	9.67	4.73	9.45	7.4	12.95
	Gross Weight	kilos	45010	9850	4820	9630	7540	13170
	Case Size	inches	—	207 x 72 x 64	207 x 43 x 48	202 x 62 x 66	171 x 50 x 66	Various
	Case Size	mm.	—	5260 x 1830 x 1620	5260 x 1100 x 1230	5130 x 1570 x 1680	4340 x 1270 x 1680	Various
	Volume	cu.ft.	2197	550	249	478	327	593
	Volume	cu.m.	62,13	15,56	7,02	13,5	9,25	16,8
K7 MAJOR	Nett Weight	tons	45.4	10.3	5.0	9.0	7.6	13.5
	Nett Weight	kilos	46230	10500	5100	9150	7750	13730
	Gross Weight	tons	49.9	11.04	5.36	10.0	8.5	15
	Gross Weight	kilos	50780	11250	5460	10160	8650	15260
	Case Size	inches	—	227 x 72 x 64	227 x 43 x 48	228 x 62 x 66	198 x 50 x 66	Various
	Case Size	mm.	—	5765 x 1830 x 1620	5735 x 1100 x 1230	5790 x 1570 x 1680	5030 x 1270 x 1680	Various
	Volume	cu.ft.	2479	607	271	536	380	685
	Volume	cu.m.	70,12	17,15	7,67	15,15	10,75	19,4
K8 MAJOR	Nett Weight	tons	50.95	11.6	5.5	10.1	8.6	15.15
	Nett Weight	kilos	51880	11800	5600	10300	8750	15430
	Gross Weight	tons	55.95	12.4	5.9	11.15	9.6	16.9
	Gross Weight	kilos	57030	12620	6010	11360	9780	17260
	Case Size	inches	—	248 x 72 x 64	248 x 43 x 48	249 x 62 x 66	220 x 50 x 36	Various
	Case Size	mm.	—	6300 x 1830 x 1630	6300 x 1100 x 1230	6320 x 1570 x 1680	5580 x 1270 x 1680	Various
	Volume	cu.ft.	2667	660	296	590	420	701
	Volume	cu.m	75,54	18,67	8,37	16,7	11,9	19,9

APPROXIMATE SHIPPING SPECIFICATION FOR ENGINES INCLUDING HEAVIEST LIFTS

These Shipping Specifications are given for guidance purposes only and may vary on different Contracts as a result of Special Requirements, Non-standard Equipment, Destination, and Ship and Port Handling Facilities.

K9 MAJOR

		Total	Bedplate	Crankshaft	Column	Cylinder Casing	Other parts packed in 15/20 Cases
Nett Weight	tons	55.9	12.5	6.0	11.0	9.7	16.7
Nett Weight	kilos	56900	12700	6100	11200	9850	17050
Gross Weight	tons	61.4	13.36	6.44	12.1	10.8	18.7
Gross Weight	kilos	62520	13600	6550	12310	11000	19060
Case Size	inches	—	275 x 72 x 64	275 x 43 x 48	274 x 62 x 66	245 x 50 x 66	Various
Case Size	mm.	—	6980 x 1830 x 1620	6980 x 1100 x 1230	6960 x 1570 x 1680	6220 x 1270 x 1680	Various
Volume	cu ft.	2902	732	328	649	468	725
Volume	cu.m.	81,50	20,07	9,28	18,38	13,27	20,5

'VEE' TYPE ENGINES

KV12 MAJOR

Nett Weight	tons	76.8	16.2	5.6	16.0	8.0 each	23
Nett Weight	kilos	78100	16500	5700	16300	8150	23300
Gross Weight	tons	85.8	17.05	5.85	18.3	9.7	25.2
Gross Weight	kilos	87350	17380	5960	18650	9880	25600
Case Size	inches	—	265 x 84 x 69	265 x 43 x 48	247 x 87 x 89	228 x 45 x 69	Various
Case Size	mm.	—	6730 x 2140 x 1750	6730 x 1100 x 1230	6300 x 2220 x 2260	5820 x 1145 x 1750	Various
Volume	cu.ft.	4320	890	316	1120	409	1176
Volume	cu.m.	122,24	25,2	8,94	31,7	11,6	33,2

KV14 MAJOR

Nett Weight	tons	90.6	19.5	6.8	19.5	9.0 each	26.8
Nett Weight	kilos	92130	19800	6900	19800	9160	27260
Gross Weight	tons	100.6	20.5	7.4	22.1	10.8	29
Gross Weight	kilos	102430	20900	7540	22500	11000	29490
Case Size	inches	—	303 x 84 x 69	303 x 43 x 48	282 x 87 x 89	263 x 45 x 69	Various
Case Size	mm.	—	7700 x 2140 x 1750	7700 x 1100 x 1230	7160 x 2220 x 2260	6280 x 1145 x 1750	Various
Volume	cu.ft.	4943	1015	362	1280	474	1338
Volume	cu.m.	139,95	28,65	10,25	36,25	13,45	37,9

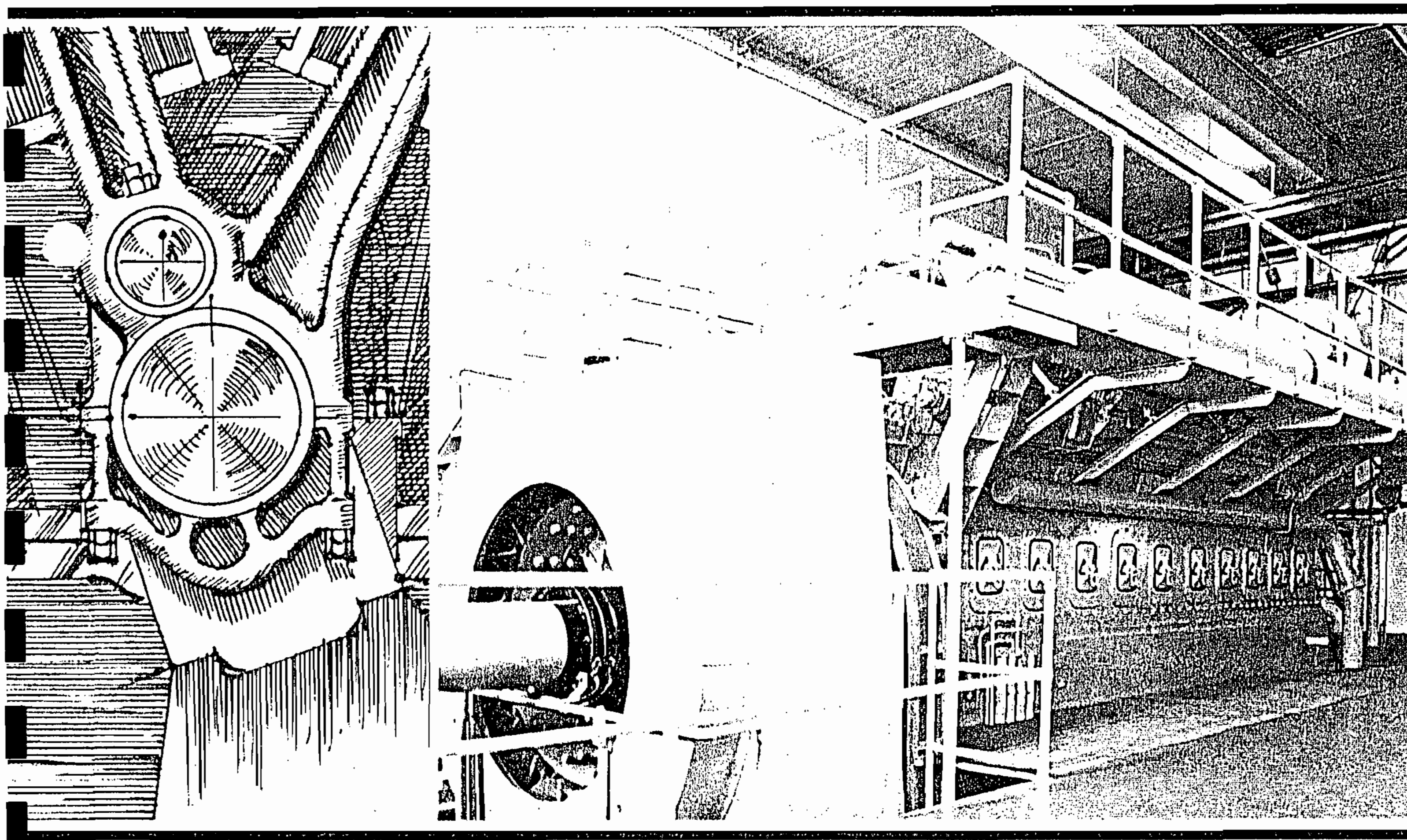
KV16 MAJOR

Nett Weight	tons	100.6	20.9	8.0	22.0	10.1 each	29.5
Nett Weight	kilos	102450	21300	8150	22400	10300	30000
Gross Weight	tons	111.6	22.0	8.7	24.8	12.1	31.9
Gross Weight	kilos	113650	22400	8860	25250	12320	32500
Case Size	inches	—	332 x 84 x 69	332 x 43 x 48	314 x 87 x 89	295 x 45 x 69	Various
Case Size	mm.	—	8430 x 2140 x 1750	8430 x 1100 x 1230	7980 x 2220 x 2260	7500 x 1145 x 1750	Various
Volume	cu.ft.	5543	1115	396	1430	532	1538
Volume	cu.m.	156,85	31,55	11,2	40,5	15,05	43,5

KV18 MAJOR

Nett Weight	tons	111.5	23.5	9.2	24.0	11.5 each	31.8
Nett Weight	kilos	113440	23900	9350	24400	11700	32390
Gross Weight	tons	124.5	25.7	10.0	27.0	13.7	34.4
Gross Weight	kilos	125760	25100	10160	27500	13950	35100
Case Size	inches	—	376 x 84 x 69	376 x 43 x 48	352 x 87 x 89	333 x 45 x 69	Various
Case Size	mm.	—	9550 x 2140 x 1750	9550 x 1100 x 1230	8940 x 2220 x 2260	8450 x 1145 x 1750	Various
Volume	cu.ft.	6189	1258	448	1600	600	1683
Volume	cu.m.	175,08	35,6	12,68	45.3	17	47,5

Cooper-Bessemer®
LSV/KSV Power Engines



COOPER INDUSTRIES

COOPER-BESSEMER RECIPROCATING

Cooper-Bessemer Turbocharged Power Engines.

High availability and fuel efficiency, low maintenance, high horsepower-to-space ratio and simplified installation are just a few of the benefits available from Cooper-Bessemer's LSV and KSV power engines. With a V-type, four-cycle design, these engines are engineered for high-horsepower, continuous-duty operation.

Since introducing its first V-engine in 1938, Cooper has produced nearly 6000 turbocharged power engines, totaling over 9 million horsepower. Applications include electric power generation for industry and utilities, pump and compressor drive, marine propulsion and standby power generation.

Both LSV and KSV models are available in 12-, 16- and 20-cylinder configurations. The heavier construction and slower speed (400 rpm) of the LSV engine is preferred for continuous-duty applications. The latest model, the LSVB, carries a nominal 200 psi (13.9 bars) BMEP rating.

The lighter weight KSV is ideal for standby duty, offshore and marine applications. It operates at 600 rpm and is rated for continuous duty up to 7160 hp (5180 kW) at 200 psi (13.9 bars) BMEP, though up to 250 psi (17.4 bars) BMEP ratings are available for standby duty.

High availability from a practical design

Rugged construction throughout LSV and KSV engines provides the necessary stamina for heavy-duty operation. All moving parts are enclosed and pressure lubricated. Careful attention to the design of pistons, cylinders, connecting rods, bearings, crankshafts and other components assures long life and low maintenance.

A high horsepower-to-space ratio is achieved by a V-angle design with articulated rods, permitting a low profile and short crankshaft. Also, auxiliary and driven equipment can be skid-mounted to further reduce plant size and simplify installation.

Large, quick-opening doors on each side of the engine provide access to the crankshaft and bearings for convenient maintenance. Camshafts and valve operating gear are outboard to permit easy service.

Efficiency on a variety of fuels

Constant-pressure turbocharging and advanced combustion air cooling, combined with automatic combustion controls, make the LSV and KSV two of the most efficient engines in their field with up to 41 percent thermal efficiency. Higher efficiencies are available with complete, custom-engineered cogeneration systems.

LSV and KSV engines operate well on many different fuels, including diesel oils, natural gas, landfill and sewage gas. Spark, diesel or dual-fuel (diesel-ignited) operation is available. Low NO_x Clean Burn engines are also available.

Complete systems

Cooper can supply a complete system, including prime mover, auxiliaries, cogeneration equipment, controls and the driven unit. This single-source responsibility can cover all planning, manufacturing, installation and service.

Cooper's En-Tronic® Controls can engineer a control system to meet your exact needs, including electric or electronic panels on site or at a remote office.

Aftermarket support

Cooper maintains service centers worldwide to support customer installations. Each has a supply of genuine OEM parts and staff of experienced engineers and mechanics. Also, each service center is linked by computer to Cooper's other centers with a combined multimillion-dollar parts inventory, so that any part not stocked locally can be found and shipped from another location.

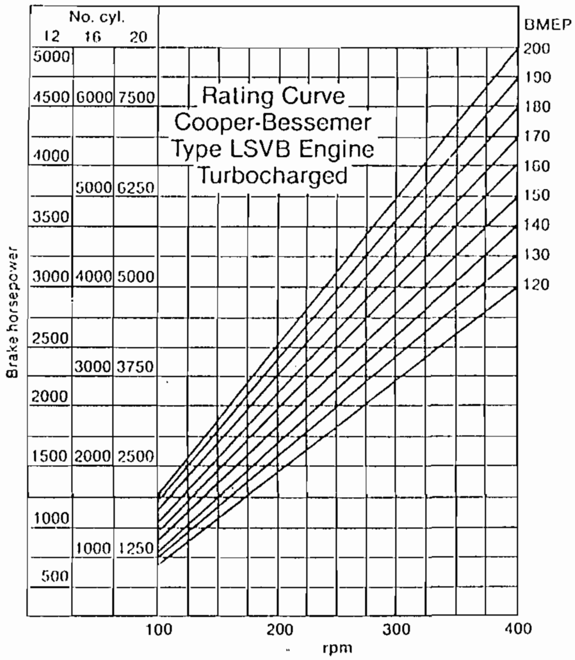
Cooper-Bessemer Power Engines

Model	Cylinders	Range[1] hp	(kW)[2]	Bore & Stroke in.	(mm)	rpm
LSVB-12	12	3510-5030	(2540-3640)	15.5 × 22	(394 × 559)	360-400
LSVB-16	16	4680-6710	(3385-4855)	15.5 × 22	(394 × 559)	360-400
LSVB-20	20	5850-8385	(4235-6070)	15.5 × 22	(394 × 559)	360-400
KSV-12	12	2945-4295	(2130-3110)	13.5 × 16.5	(343 × 419)	514-600
KSV-16	16	3925-5725	(2840-4145)	13.5 × 16.5	(343 × 419)	514-600
KSV-20	20	4900-7160	(3545-5180)	13.5 × 16.5	(343 × 419)	514-600

[1]Ratings per DEMA standards.
[2]Includes generator efficiency of 97%.
[3]Up to 125 percent of rating available for short-term peaking.

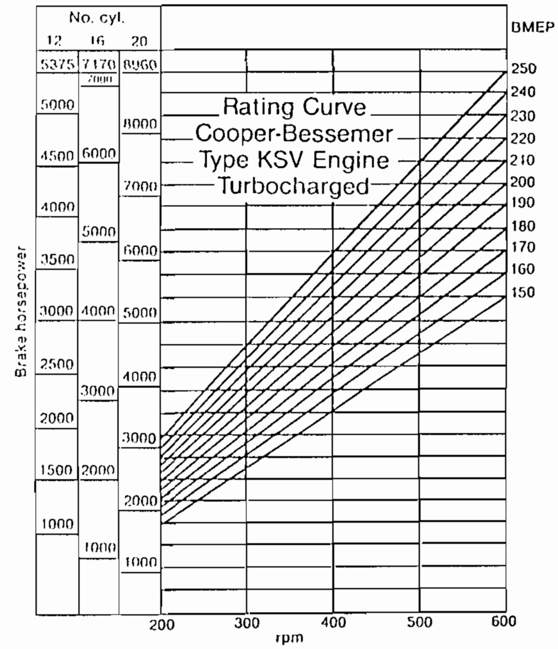
General Specifications

LSVB Engines



SPECIFICATIONS	
rpm	360-400
Continuous Rating @ 200 psi (13.9 bars) BMEP, bhp (kW)	3510-8385 (2540-6070)
Bore, in. (mm)	15.50 (394)
Stroke, in. (mm)	22 (559)

KSV Engines



SPECIFICATIONS	
rpm	514-600
Continuous Rating @ 200 psi (13.9 bars) BMEP, bhp (kW)	2945-7160 (2130-5180)
Rating for peaking @ 250 psi (17.4 bars) BMEP, 600 RPM, bhp (kW)	5370-8950 (3885-6475)
Bore, in. (mm)	13.50 (343)
Stroke, in. (mm)	16.50 (419)

LSVB Dimensions

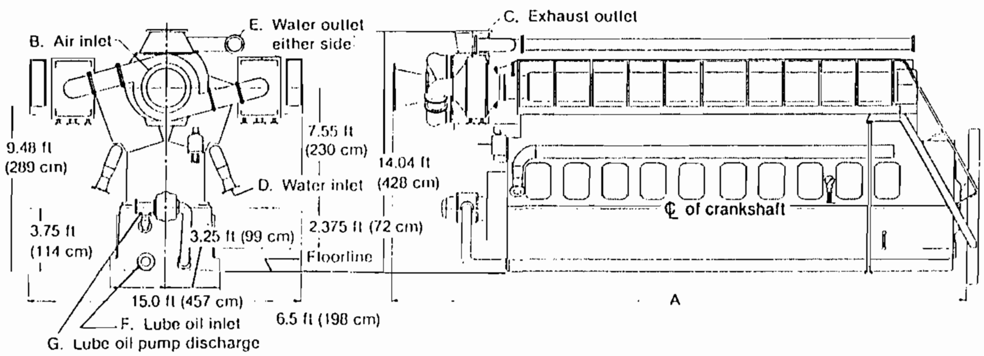
No. of cylinders

DIMENSIONS, ft (cm)

	12	16	20
A.	23.92 (729)	29.5 (899)	34.08 (1039)
B.	2.0 (61)	2.0 (61)	2.5 (76)
C.	2.0 (61)	2.17 (66)	2.5 (76)
D.	0.5 (15)	0.5 (15)	0.7 (20)
E.	0.7 (20)	0.7 (20)	0.8 (25)
F.	0.5 (15)	0.5 (15)	0.5 (15)
G.	0.5 (15)	0.5 (15)	0.5 (15)

Minimum height above centerline of crankshaft to inside of cranehook to remove:

1. Piston with articulated rod, ft (cm) 12.29 (375)
2. [illegible]
3. Cylinder liner, ft (cm) 12.0 (366)



KSV Dimensions

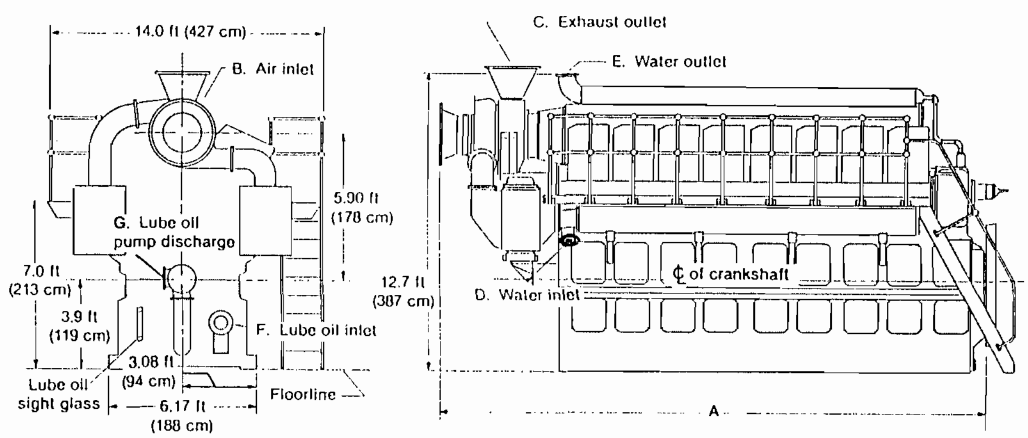
No. of cylinders

DIMENSIONS, ft (cm)

	12	16	20
A.	19.76 (602)	23.64 (720)	27.51 (839)
B.	2.0 (61)	2.0 (61)	2.5 (76)
C.	2.0 (61)	2.0 (61)	2.5 (76)
D.	0.5 (15)	0.5 (15)	0.5 (15)
E.	0.7 (20)	0.7 (20)	0.8 (25)
F.	0.5 (15)	0.5 (15)	0.5 (15)
G.	0.5 (15)	0.5 (15)	0.5 (15)

Minimum height above centerline of crankshaft to inside of cranehook to remove:

1. Piston with articulated rod, ft (cm) 8.8 (268)
2. Piston without rod, ft (cm) 7.0 (213)
3. Cylinder liner, ft (cm) 8.0 (244)



NOTE: Specifications given herein are subject to change without notice.

AIRBORNE EXPRESS

RECEIVER'S COPY

202 (5/86)

ORIGIN PBI | AIRBILL NO 2[illegible]

FROM (COMPANY NAME)	TO (COMPANY NAME)
F P L ENERGY SYST	Department of Environmental Regulati
ADDRESS STE 304 100 AUSTRALIAN AVE	ADDRESS 2600 Blair Stone Road
CITY WEST PALM BEACH STATE FL ZIP CODE (REQUIRED) 33406	CITY Tallahassee, STATE FL ZIP CODE (REQUIRED) 32399-2400
SENT BY (NAME/DEPT.) Mr. Tom Reedy PHONE 305-683-6996	ATTN. (NAME/DEPT.) Mr. C.H. Fancy, P.E. Deputy Chief, Bureau of Air Qty. Mg PHONE
BILLING REFERENCE INFORMATION TO APPEAR ON INVOICE 4325	RECEIVER'S AIRBORNE EXPRESS ACCOUNT NO.

TYPE OF PACKAGING — DESCRIPTION OF CONTENTS — NO. OF PACKAGES — WEIGHT (LBS.) — SENDER'S C.O.D. $

- [ ] EXPRESS/AD PACK ENVELOPE
- [ ] LETTER EXPRESS (UP TO 8 OZ.)
- [ ] EXPRESS PACK BOX/TUBE
- [ ] MAG TAPE PACK

ROUTING

TLH 3-B

RENEIGH PBI

BILL CHARGES TO (ASSUMED SENDER UNLESS OTHERWISE SPECIFIED)

- [ ] SENDER
- [ ] RECEIVER
- [ ] 3RD PARTY ______ AIRBORNE EXPRESS ACCOUNT NO.
- [ ] PAID IN ADVANCE $ ______

CHECK NUMBER ______

TYPE OF SPECIAL SERVICE (EXTRA CHARGES MAY APPLY)

- [ ] SPECIAL PICKUP
- [ ] SATURDAY DELIVERY
- [ ] SPECIAL DELIVERY ______ TIME
- [ ] HOLD AT AIRBORNE FOR PICKUP (NO CHARGE)
- [ ]

33075113 AIRBORNE SIGNATURE | DATE RECEIVED

TO REMOVE COPY INSERT PENCIL

PS Form 3811, July 1983 447-845

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: Mr. Tom Reedy
Power Ventures
100 Australian Avenue
Suite 304
West Palm Beach, FL 33406

4. Type of Service:	Article Number
☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail	P 274 007 694

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature – Addressee
X Barbara Jones

6. Signature – Agent
X

7. Date of Delivery
9-17-87

8. Addressee's Address (ONLY if requested and fee paid)
100 Australian Ave #304
W.P.B FL. 33407

DOMESTIC RETURN RECEIPT

P 274 007 694

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

☆ U.S.G.P.O. 1985-480-794

Sent to Tom Reedy ~~Power Ventures~~	
Street and No. 100 Australian Ave., Suite 304	
P.O., State and ZIP Code West Palm Beach, FL 33406	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 09/15/87 Permits: AC 50-133747, 50-133748, 50, 133749 & 50-133750. PSD-FL-120	

PS Form 3800, June 1985

Power Ventures
Palm Beach County
AC 50-133747, -748, -749.
(750- W/D) PSD-FL-120

Date Complete: Jan. 21, 1988 } 58 days
TE/PD mailed: Mar. 18, 1988
P/N Rec'd BAQM: Apr. 5, 1988 } 14 day
Apr. 18, 1988 } req. P/N

April 19 → 30, 1988 = 12 days
May 1 → 20, 1988 = 20 days
90 days

May 20, 1988 = Day 90

Mr Wayne Ondler
F. P. L.
JEN / JB
P. O. Box 14000
Juno Beach
FL 33408.

POWER VENTURES

1. Package dated April 17, 1987
2. DER's letter dated, May 28 1987 original in file
3. P.V. Response dated, June 24, 1987
4. PV Add'l info dated July 1, 1987
~~5.~~
~~6.~~ PV Add'l info ~~Response~~ dated July 15, 1987

ORIG → Tom Reedy
CC → S. Brooks
W. Aronson
M. Flores
W. Ondler
K. Kosky
P. Raval
G. Sacco

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Power Ventures
100 Australian Avenue
West Palm Beach, Florida 33406

DER File Nos. AC 50-133747
50-133748
50-133749
50-133750

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue permits (copies attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Power Ventures applied on April 30, 1987, to the Department of Environmental Regulation for permits to construct a cogeneration facility consisting of four 6.3 MW internal combustion engines, located at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC).

The Department has permitting jurisdiction under Chapter 403, Florida Statutes and Florida Administrative Code Rules 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit was needed for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, FAC, you (the applicant) are required to publish at your own expense the enclosed Notice of Proposed Agency Action on permit application. The notice must be published one time only in a section of a major local newspaper of general circulation in the county in which the project is located and within thirty (30) days from receipt of is intent. Proof of publication must be provided to the Department within seven days of publication of the notice. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permits.

The Department will issue the permits with the attached conditions unless petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S. A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. Petitions must comply with the requirement of Florida Administrative Code Rules 17-103.155 and 28-5.201 (copies enclosed) and be filed with (received by) the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant must be filed within fourteen (14) days of receipt of this intent. Petitions filed by other persons must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of this intent, whichever first occurs. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes, concerning the subject permit application. Petitions which are not filed in accordance with the above provisions will be dismissed.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

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

Copies furnished to:

S. Brooks, SE Dist.
G. Sacco, Palm Beach County Health Dept.
W. Aronson, EPA
M. Flores, NPS
W. Ondler, FPL
K. Kosky, KBN Engineering

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on Sept. 15, 1987.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to §120.52(9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Judy Rogers
Clerk

9/15/87
Date

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 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 additional service(s) requested.
1. XXX Show to whom delivered, date, and addressee's address. ↑*(Extra charge)*↑
2. ☐ Restricted Delivery ↑*(Extra charge)*↑

3. Article Addressed to: Mr. Robert Fagan PW Ventures, Inc. 1000 Propsect Hill Road Windsor, CT 06095 TO	4. Article Number P 702 175 485
	Type of Service: ☐ Registered ☐ Insured XXX Certified ☐ COD ☐ Express Mail
	Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature — ~~Addressee~~ X W. Kennedy	8. Addressee's Address *(ONLY if requested and fee paid)*
6. Signature — Agent X	
7. Date of Delivery 5/19/88	

PS Form **3811**, Mar. 1987 ★ U.S.G.P.O. 1987-178-268 **DOMESTIC RETURN RECEIPT**

P 702 175 485

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. Robert Fagan ~~PW Ventures, Inc.~~	
Street and No. 1000 Prospect Hill Rd.	
P.O., State and ZIP Code Windsor, CT 06095	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 05/16/88 Permits: AC 50-133747,-748, -749	

PS Form 3800, June 1985

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 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 additional service(s) requested.

1. ☒ Show to whom delivered, date, and addressee's address. 2. ☐ Restricted Delivery.

3. Article Addressed to:	4. Article Number
Mr. Robert Fagan PW Ventures, Inc. 1000 Prospect Hill Road Windsor, CT 06095	P 274 010 438 Type of Service: ☐ Registered ☐ Insured XXX Certified ☐ COD ☐ Express Mail Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature — Addressee X	8. Addressee's Address (*ONLY if requested and fee paid*)
6. Signature — Agent X W. Kennedy	
7. Date of Delivery 3/22/88	

PS Form 3811, Feb. 1986 DOMESTIC RETURN RECEIPT

P 274 010 438

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to Mr. Robert Fagan PW Ventures, Inc.	
Street and No. 1000 Prospect Hill Road	
P.O., State and ZIP Code Windsor, CT 06095	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 03-18-88 Permits: AC 50-133747, -48, -49, Federal Permit:PSD-FL-120	

PS Form 3800, June 1985

☆ U.S.G.P.O. 1985-480-794

PM
4 April 1988
Gainesville, FL

File Copy

KBN

April 4, 1988
88001

RECEIVED
APR 5 1988
DER-BAQM

Mr. C.H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

Enclosed is the proof of publication of the notice of intent by the Florida Department of Environmental Regulation to issue a permit to construct a cogeneration project at the United Technology's (Pratt & Whitney) site in Palm Beach County, Florida.

If I can be of any additional assistance, please call me.

Sincerely,

Robert C. McCann Jr.
for
Kennard F. Kosky, P.E.
Principal Engineer

KFK/lgs

Enc.

cc: Thor Hibbler

Copied: Pradeep Raval
Max Linn
Isidore Goldman, SE Dist.
Gene Sacco
4.8.88 (initials)

Mr. C.H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Fla. 32399-2400

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604

THE PALM BEACH POST

Published Daily and Sunday
West Palm Beach, Palm Beach County, Florida

RECEIVED

APR 5 1988

DER - BAQM

PROOF OF PUBLICATION

STATE OF FLORIDA

COUNTY OF PALM BEACH

Before the undersigned authority personally appeared Barbara M. McCord who on oath says that she/he is Class. Adv. Mgr. of The Palm Beach Post, a daily and Sunday newspaper published at West Palm Beach in Palm Beach County, Florida; that the attached copy of advertising, being a Notice

in the matter of intent

in the --- Court, was published in said newspaper in the issues of March 31, 1988

Affiant further says that the said The Post is a newspaper published at West Palm Beach, in said Palm Beach County, Florida, and that the said newspaper has heretofore been continuously published in said Palm Beach County, Florida, daily and Sunday and has been entered as second class mail matter at the post office in West Palm Beach, in said Palm Beach County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she/he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Barbara M. McCord

Sworn to and subscribed before me this 1 day of April A.D. 19 88

NOTARY PUBLIC STATE OF FLORIDA
BONDED THRU GENERAL INS. UND.

NO. 819861
State of Florida
Department of
Environmental Regulation
Notice of Intent

The Department of Environmental Regulation hereby gives notice of its intent to issue permits to PW Ventures to construct a cogenerating facility consisting of three 6.3 MW internal combustion engines, at United Technology's (Pratt & Whitney) site in Palm Beach County, Florida. The engines will be fired by dual fuel, 95% (heat input) natural gas and 5% diesel fuel. The proposed project will emit the pollutants nitrogen oxides (NOx), sulfur dioxide (SO2), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC). The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

Persons whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative determination (hearing) in accordance with Section 120.57, Florida Statutes. The petition must conform to the requirements of Chapters 17-103 and 28-5, Florida Administrative Code, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Failure to file a petition within this time period constitutes a waiver of any right such person has to request an administrative determination (hesring) under Section 120.57, Florida Statutes.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the proposed agency action. Therefore, persons who may not wish to file a petition may wish to intervene in the proceeding. A petition for intervention must be filed pursuant to Rule 28-5.207, Florida Administrative Code, at least five (5) days before the final hearing and be filed with the hearing officer if one has been assigned at the Division of Administrative Hesrings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32301. If no hesring officer has been assigned, the petition is to be filed with the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahssee, Florida 32399-2400. Failure to petition to intorvene within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, Florida Statutes.

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

Dept. of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahaaaee, Florida 32399-2400

Dept. of Environmental Regulation
Southeast District
1900 S. Congress Avenue, Suite A
West Palm Beach, Florida 33406

Palm Beach County Health Department
Division of Environmental Science and Engineering
901 E. Evernia Street
West Palm Beach, Florida 33402

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

PUB: The Palm Beach Post
March 31, 1988

Mr. Dale H. Twachtmann
January 27, 1988
Page 3

Accordingly, I respectfully request that you formally extend the time for filing of a petition for administrative proceedings in regard to the Department's proposed agency action on air construction permits Nos. AC 50-133747, 50-133748, 50-133749, 50-133750 and PSD-FL-120 to and including February 26, 1988.

Sincerely,

Peter C. Cunningham
James S. Alves
Counsel for Power Ventures

/gb

cc: Barry Andrews, P.E.
Betsy Pittman, Esquire
Tom Reedy
Ken Kosky

Copied: Barry Andrews
Pradeep Raval
CHF/BT
1·28·88

HOPPING BOYD GREEN & SAMS
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314

Hand delivered @ 4:38 pm

DER
JAN 27
BAQM

Barry Andrews
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
2600 Blair Stone Road, Room 338
Tallahassee, Florida 32399-2400

Federal Express
Airbill No 5732165412
Mailed: 1/20/88

DER
JAN 21, 1988
BAQM

KBN

January 20, 1988

Mr. C.H. Fancy, P.E.
Deputy Chief, Bureau of Air Quality Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Application to Construct Cogeneration Project-
Four Diesel Engines

Permits No. AC 50-133747, -48, -49, -50 and
PSD-FL-120 (Pratt & Whitney Site)

Attention: Barry Andrews, BACT Coordinator

Dear Barry:

This correspondence is being submitted on behalf of the applicant, Power Ventures to confirm decisions regarding the number of diesel engines to be constructed and total volatile organic compound (VOC) emissions.

Based upon the electric load demands of the Pratt & Whitney facility only three diesel engines will be constructed. As a result, air construction permits will be required for only three engines. With three engines, the total emissions and impacts from the cogeneration plant will be three-fourths of that indicated in the PSD analysis.

The VOC emissions at three-fourths of the value listed in the PSD analysis would be 101.25 tons/year (refer to Table 2-2). Since a conservative 92% annual availability factor was used to calculate annual VOC emissions and additional information from engine manufacturers suggests that VOC emissions may be lower than indicated,

FEDERAL EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL NUMBER [redacted]2165[redacted]

350, 7265M

[redacted]2165[redacted]

CF

000

Date: 1-20-88

1 From (Your Name) Please Print: Kennard F. Kosky
Your Phone Number (Very Important): (904) 375-8000
Company: KBN ENG & APPLIED SCIENCES
Department/Floor No.:
Street Address: 5700 SW 34TH STREET STE 1262
City: GAINESVILLE State: FL
ZIP Required For Correct Invoicing: 32608

2 To (Recipient's Name) Please Print: Mr. C.H. Fancy, P.E.
Recipient's Phone Number (Very Important): 904 488-4805
Company: Dept. of Environmental Reg. (DER)
Department/Floor No.:
Exact Street Address (Use of P.O. Boxes or P.O. ® Zip Codes Will Delay Delivery And Result In Extra Charge.): Twin Towers Office Building
City: Tallahassee, State: FL
ZIP Street Address Zip Required: 32399-2400

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): 87003

PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

H HOLD FOR PICK-UP AT THIS FEDERAL EXPRESS LOCATION:
Street Address (See Service Guide or Call 800-238-5355)
City State
ZIP ® Zip Code of Street Address Required

4 SERVICES CHECK ONLY ONE BOX

1 ☐ PRIORITY 1 Overnight Delivery Using Your Packaging
6 ☐ OVERNIGHT LETTER* (Our Packaging 9½"x12½")
OVERNIGHT DELIVERY USING OUR PACKAGING
2 ☐ Courier-Pak Overnight Envelope* 12"x 15½"
3 ☐ Overnight Box 12¼"x 17½"x 3" A ☐
4 ☐ Overnight Tube 38"x 6"x 6"x 6" B ☐
*Declared Value Limit $100.
STANDARD AIR
5 ☐ Delivery not later than second business day

SERVICE COMMITMENT
PRIORITY 1 - Delivery is scheduled early next business morning in most locations. It may take two or more business days if the destination is outside our primary service areas.
STANDARD AIR - Delivery is generally next business day or not later than second business day. It may take three or more business days if the destination is outside our primary service areas.

DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED
1 ☐ HOLD FOR PICK-UP (Fill in Section H at right)
2 ☒ DELIVER WEEKDAY
3 ☐ DELIVER SATURDAY (Extra charge)
4 ☐ DANGEROUS GOODS (P-1 and Standard Air Packages only, Extra charge)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Do Not Complete Section 5)
6 ☐ DRY ICE _______ Lbs.
7 ☐ OTHER SPECIAL SERVICE _______
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐

PACKAGES	WEIGHT	YOUR DECLARED VALUE	OVER SIZE
	LBS		
	LBS		
	LBS		
	LBS		
Total	Total	Total	

Received At
1 ☐ Regular Stop 2 ☐ On-Call Stop
3 ☒ Drop Box 4 ☐ B.S.C. 5 ☐ Station
Federal Express Corp. Employee No.
Date/Time For Federal Express Use

Emp. No. Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold
Street Address
City State Zip
Received By:
X
Date/Time Received FedEx Employee Number

Federal Express Use
Base Charges
Declared Value Charge
Origin Agent Charge
Other
Total Charges

RECIPIENT'S COPY

PART #106001 REV. 5/87
PRINTED U.S.A. GBFE

007

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.
Release Signature:

1·21·88

~~CHF~~ } FYI
~~BT~~

action on air construction permits Nos. AC 50-133747, 50-133748, 50-133749, 50-133750 and PSD-FL-120 to and including January 28, 1988.

Sincerely,

James S. Alves

Peter C. Cunningham
James S. Alves
Counsel for Power Ventures

/gb

cc: Clair H. Fancy, P.E.
Betsy Pittman, Esquire
Tom Reedy
Ken Koskey

copied: Pradeep Raval
CHF/BT
Max Linn
Barry Andrews
12-29-87 mg

HOPPING BOYD GREEN & SAMS
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314

Hand delivered
@ 4:35pm

Clair H. Fancy
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
2600 Blair Stone Road, Room 338
Tallahassee, Florida 32399-2400

DER
DEC 28 1987
BAQM

Federal Express
Delivered - 12:14:87
Gainesville, FL

File Copy

KBN

December 14, 1987

Mr. C.H. Fancy, P.E.
Deputy Chief Bureau of Air Quality Management
Department of environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

DER
DEC 15 1987
BAQM

Subject: Application to Construct Cogeneration Project - Four Diesel Engines
Permits No. AC 50-133747, -48, -49, -50 and PSD-FL-120 (Pratt & Whitney Site)

Attention: Barry Andrews, BACT Coordinator

Dear Barry:

This correspondence is to clarify information submitted in the October 23, 1987 letter as you requested on December 9, 1987. Presented below are itemized responses to your information request.

1. The statement on page 3, 3rd complete paragraph, first sentence refers to steam electric cycles that would typically be installed for a cogeneration project. Presented in Table A is a comparison of the energy requirements of a dual fuel IC Engine and a standard steam cycle of the type that would be installed. Note that the energy usage for this option is greater than the no project alternative presented in Table 2 of the October 23, 1987 letter. The reason for this is the low steam requirements for the project. Table B presents the capital, operating and total annualized cost differentials for the steam cycle relative to the proposed dual fuel engines.

2. The need for backup fuel for the prime mover is a design requirement placed on the project by Pratt & Whitney. If spark ignited, IC Engines were used and Natural Gas were curtailed, there would be an additional cost of \$5,688/Day (79 x 10^6 BTU/HR x \$3/10^6 BTU x 24 hours) to assure thermal requirements. Electric power would be purchased from the local utility.

3. Tables A and B include the energy requirements and cost differentials respectively for a combined cycle facility (gas

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604 904/375-8000

FEDERAL EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL NUMBER [redacted]2166[redacted]

149 7265M [redacted]2166[redacted]

F

100

Date 12-14-87

1 From (Your Name) Please Print: Kennard F. Kosky

Your Phone Number (Very Important): 904 375-8000

Company: KBN ENG & APPLIED SCIENCES

Department/Floor No.

Street Address: 5700 SW 34TH STREET STE 1262

City: GAINESVILLE State: FL ZIP Required For Correct Invoicing: 32608

3VOL

2 To (Recipient's Name) Please Print: Mr. C.H. Fancy

Recipient's Phone Number (Very Important): 904) 488-4805

Company: Dept. Envir. Regulation (Twin Towers Off. Bldg)

Department/Floor No.

Exact Street Address (Use of P.O. Boxes or P.O. Zip Codes will Delay Delivery and Result in Extra Charges): 2600 Blair Stone Road

City: Tallahassee, Fla. 32399-2400 State ZIP Street Address Zip Required

3 YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.): 87003

DFK

PAYMENT ☒ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

H HOLD FOR PICK-UP AT THIS FEDERAL EXPRESS LOCATION: Street Address (See Service Guide or Call 800-238-5355)

City State

ZIP Zip Code of Street Address Required

4 SERVICES CHECK ONLY ONE BOX

1 ☐ PRIORITY 1 Overnight Delivery Using Your Packaging

6 ☒ OVERNIGHT LETTER (Our Packaging) 9½"x12½"

OVERNIGHT DELIVERY USING OUR PACKAGING

2 ☐ Courier-Pak Overnight Envelope 12"x 15½"

3 ☐ Overnight Box 12⅛"x 17½"x 3" A ☐

4 ☐ Overnight Tube 38"x 6"x 6"x 6" B ☐

*Declared Value Limit $100

STANDARD AIR

5 ☐ Delivery not later than second business day

SERVICE COMMITMENT

PRIORITY 1 - Delivery is scheduled early next business morning in most locations. It may take two or more business days if the destination is outside our primary service areas.

STANDARD AIR - Delivery is generally next business day or not later than second business day. It may take three or more business days if the destination is outside our primary service areas.

DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED

1 ☐ HOLD FOR PICK-UP (Fill in Section H at right)

2 ☒ DELIVER WEEKDAY

3 ☐ DELIVER SATURDAY (Extra charge)

4 ☐ DANGEROUS GOODS (P-1 and Standard Air Packages only. Extra charge)

5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Do Not Complete Section 5)

6 ☐ DRY ICE ____ Lbs.

7 ☐ OTHER SPECIAL SERVICE ____

8 ☐

9 ☐ SATURDAY PICK-UP (Extra charge)

10 ☐

PACKAGES	WEIGHT	YOUR DECLARED VALUE	OVER SIZE
	LBS		
	LBS		
	LBS		
	LBS		
Total	Total	Total	

Received At: 1 ☐ Regular Stop 2 ☐ On-Call Stop 3 ☐ Drop Box 4 ☐ B.S.C. 5 ☐ Station

Federal Express Corp. Employee No.

Date/Time For Federal Express Use: 1725

Emp. No. Date

☐ Cash Received

☐ Return Shipment

☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold

Street Address

City State Zip

Received By: X

Date/Time Received FedEx Employee Number

Federal Express Use

Base Charges

Declared Value Charge

Origin Agent Charge

Other

Total Charges

PART #106001 REV. 5/87 PRINTED U.S.A. GBFE

007

RECIPIENT'S COPY

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.

Release Signature:

12·16

CHF
~~BA~~ } FYI

i4

PM
30 Nov. 1987
Atlanta, GA

File Copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 27 1987

4APT/APB

Mr. C. H. Fancy, P. E., Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Power Ventures, PSD-FL-120

Dear Mr. Fancy:

This is to acknowledge receipt of your October 29, 1987, submittal of additional modeling information regarding the above referenced facility. We will retain this information for our files.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Copied: Pradeep Raval
Max Linn
CHF/BT
12/4/87

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

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1987

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P.B. METER
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Mr. C. H. Fancy, P.E., Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

DER

DEC 3 1987

BAQM

20

PM
→ 27 Oct. 1987
West Palm Beach, FL
Airborne Express
3996508711

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IMPELL POWER PROJECTS

FPL ENERGY SERVICES INC

POWER VENTURES

a Florida partnership

October 23, 1987

DER
OCT 28 1987
BAQM

Mr. C. H. Fancy, P.E.
Deputy Chief Bureau of Air Quality Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

SUBJECT: Application to Construct Four Diesel Engines, Permits No. 5. AC 50-133747,-48,-49,-50 and PSO-FL-120 (Pratt & Whitney Site)

Dear Mr. Fancy:

In our meeting of September 25, 1987 at your offices, one of the topics we discussed was the design basis used to select the prime movers for the Pratt & Whitney cogeneration project. A summary of this information is presented below. Also, additional information on the air quality impacts of the proposed facility is being presented.

PROJECT DESIGN REQUIREMENTS

The decision to use large bore dual fuel engines results from integrating Pratt & Whitney's site requirements with the available fuels and best suited prime mover technology. There are three basic design requirements for the Pratt & Whitney facility which must be satisfied by the cogeneration system. First, the cogeneration project must be a load following system, thereby satisfying 100% of Pratt & Whitney's electrical and thermal requirements. This is necessary since the Pratt & Whitney project is an internal cogeneration system, i.e., no power sales to the local utility. Many cogeneration projects have a firm sales contract with the local utility for the power produced. These systems (base load systems) are operated at full load at all times. In contrast, the Pratt & Whitney project must vary its electrical energy output to follow the host facility's electrical load. The selection of a prime mover for a load following system is significantly different than that for a base load system.

The second design requirement is that the ratio of electrical to thermal energy of the proposed cogeneration facility matches that required by the Pratt & Whitney site. A facility requiring a large amount of thermal energy

BEST AVAILABLE COPY

AIRBORNE EXPRESS

SHIPPING LABEL
22580751
202 (5-86)

ORIGIN PBI AIRBILL NO. 399650871

(COMPANY NAME) ENERGY SYST	TO (COMPANY NAME) Department of Environmental Regulation
ADDRESS 4 STRALIAN AVE	ADDRESS Twin Towers Office Building 2600 Blair Stone Road
CITY ALM BEACH STATE FL ZIP CODE (REQUIRED) 33406	CITY Tallahassee STATE FL ZIP CODE (REQUIRED) 32399-2400
SENT BY (NAME/DEPT.) B Reedy PHONE (305) 683-6996	ATTN. (NAME/DEPT.) Mr. C. H. Fancy Deputy Chief Bureau of Air Quality Management PHONE
BILLING REFERENCE INFORMATION TO APPEAR ON INVOICE 4325	RECEIVER'S AIRBORNE EXPRESS ACCOUNT NO. (904) 488-1344

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- CHECK NUMBER ____

TYPE OF SPECIAL SERVICE (EXTRA CHARGES MAY APPLY)
- [ ] SPECIAL PICKUP
- [ ] SATURDAY DELIVERY
- [ ] SPECIAL DELIVERY ____ TIME
- [ ] HOLD AT AIRBORNE FOR PICKUP (NO CHARGE)
- [ ]

PBI 399650871

399650871

PM
9/29/87
Tallahassee, Florida

File copy

HOPPING BOYD GREEN & SAMS

ATTORNEYS AND COUNSELORS

SUITE 420, FIRST FLORIDA BANK BUILDING
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314
(904) 222-7500

CARLOS ALVAREZ
BRIAN H. BIBEAU
ELIZABETH C. BOWMAN
WILLIAM L. BOYD, IV
RICHARD S. BRIGHTMAN
PETER C. CUNNINGHAM
WILLIAM H. GREEN
WADE L. HOPPING
FRANK E. MATTHEWS
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JAMES S. ALVES
KATHLEEN BLIZZARD
ANNE W. CLAUSSEN
C. TIMOTHY GRAY
ELEANOR M. HUNTER
DAVID L. POWELL
CHERYL G. STUART

OF COUNSEL
W. ROBERT FOKES

September 29, 1987

HAND DELIVERED THIS DATE

Mr. Dale H. Twachtmann, Secretary
c/o Office of General Counsel
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Power Ventures
Air Construction Permits
DER File Nos. AC 50-133747,
50-133748, 50-133749, 50-133750;
PSD-FL-120

Dear Secretary Twachtmann:

On or about September 16, 1987, applicant, Power Ventures, received the Department's "Notice of Intent to Issue" the referenced air permits authorizing construction of four disel engines, along with the accompanying "Technical Evaluation and Preliminary Determination" dated September 14, 1987. The intent to issue was signed by Clair H. Fancy, Deputy Clerk of the Bureau of Air Quality Management. Pursuant to the Notice and F.A.C. Rule 17-103.155, Power Ventures has until September 30, 1987 to file a petition for administrative proceedings regarding the Department's proposed agency action on these permits.

I am writing on behalf of Power Ventures to request an extension of thirty (30) days, to and including October 30, 1987, in which to file a petition for administrative proceedings regarding the Department's proposed action on the referenced permits. This request is made pursuant to F.A.C. Rule 17-103.070, which provides that a timely request for extension of time shall toll the running of the time period in which a petition must be filed. As good cause for granting this extension of time for filing, Power Ventures would show the following:

HOPPING BOYD GREEN & SAMS
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314

TALLAHASSEE FLA. SEP 29 '87
U S POSTAGE 0.22
PB METER 6009762

C. H. Fancy, Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental
Regulation
2600 Blair Stone Road, Room 306
Tallahassee, FL 32301

PM
30 Sept '87
Atlanta, GA

Full Copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DER

OCT 2 1987

BAQM

4APT/APB-am

SEP 30 1987

Mr. C. H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32339

Re: Power Ventures (PSD-Fl-120)

Dear Mr. Fancy:

This is to acknowledge receipt of your September 14, 1987, PSD preliminary determination for the above referenced cogeneration facility in West Palm Beach, Florida. We have determined that this source will not be reviewed under the Region IV Overview of State Programs policy.

Please submit copies of the final determination and permits when they are issued.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Copied: Pradeep Raval
Max Linn
CHF/BT
Gene Socco - PBC
I. Goldman
Betsy Pittman
10/5/87

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

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P.B. METER 6250488
U.S. POSTAGE
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Mr. Clair H. Fancy, P.E., Deputy Chief
Bureau of Air Quality Management
~~Twin Towers Office~~ Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

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PS Form 3811, July 1983 447-845

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

3. Article Addressed to:

Mr. Tom Reedy
100 Australian Avenue Suite 304
West Palm Beach, FL 33406

4. Type of Service:	Article Number
☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail	P 274 007 690

Always obtain signature of addressee or agent and **DATE DELIVERED.**

5. Signature – Addressee
X [signature]

6. Signature – Agent
X

7. Date of Delivery
9-21-87

8. Addressee's Address (ONLY if requested and fee paid)
100 Australian Ave #304
W.P.B. FL 33406

P 274 007 690

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☆ U.S.G.P.O. 1985-480-794

Sent to Power Ventures Mr. Tom Reedy	
Street and No. 100 Australian Avenue	
P.O., State and ZIP Code West Palm Beach, FL 33406	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date Mailed: 09118187 Permits: AC 50-133747, 748, 749 & 750 PSD-FL-120	

PS Form 3800, June 1985

PM
7-27-87
Atlanta, GA

AC 50-133747,
748,
749,
750

File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

JUL 27 1987

4APT/AB-aes

Mr. Clair Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Power Ventures (PSD FL-120)

Dear Mr. Fancy:

This is in reference to your submittals of June 16, 1987, July 15, 1987, and July 17, 1987. We have reviewed the contents of the company's responses to FDER and EPA comments on their application of April 17, 1987, and have no further questions or comments at this time. Please submit the preliminary determination and draft permits when they are issued.

Sincerely,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Copied: Pradeep Raval
Miguel Flores
Max Linn
CHF/BT
Isidore Goldman SE Dist.

7/31/87 mr

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

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PENALTY FOR PRIVATE USE, $300

Air - 4

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Engineer
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U.S. METER 6250488

Mr. Clair H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

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calculated from the length and width is 156 ft (not 138 ft as indicated in the report). To produce a W_a of 156 ft in the model calculations, a W_m of 138 ft was input to the model.

We apologize for any confusion this oversight may have caused. Please contact me if we can provide any further information.

Sincerely,

Tom Reedy

Tom Reedy
Vice President

TR/dh

cc: K. Kosky - KBN Engineering
W. Ondler - FPL

Copied: Pradeep Raval
Max Linn
Wayne Aronson / EPA
Miguel Flores / NPS
CHF / BT
07/06/87

618 - 304

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202 (5/86)

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ADDRESS: ... AUSTRALIAN AVE

CITY: ...ST PALM BEACH | STATE: FL | ZIP CODE (REQUIRED): 33406

SENT BY (NAME/DEPT.): Tom Reedy | PHONE:

BILLING REFERENCE INFORMATION TO APPEAR ON INVOICE: 4325

TO (COMPANY NAME): DEPARTMENT OF ENVIRONMENTAL REGU...

ADDRESS: 2600 Blair Stone Road

CITY: Tallahassee | STATE: FL | ZIP CODE (REQUIRED): 32399-2400

ATTN. (NAME/DEPT.): Mr. C. H. Fancy, P.E. Deputy Chief | PHONE:

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

3. Article Addressed to:
Tom Reedy
Power Ventures
100 Australian Avenue, Suite 304
West Palm Beach, Florida 33406

4. Type of Service:	Article Number
☐ Registered ☐ Insured ☒ Certified ☐ COD ☐ Express Mail	P 408 531 213

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature – Addressee
X

6. Signature – Agent
X

7. Date of Delivery
6-1-87

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

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P 408 531 213

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Sent to Tom Reedy	
Street and No. Power Ventures 100 Australian Ave., Suite 304	
P.O., State and ZIP Code West Palm Beach, FL 33406	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date 5/28/87 AC 50-133747, -48, -49, -50 PSD-FL-120	

PS Form 3800, Feb. 1982