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

March 21, 1989

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Robert R. Padron
Key West City Electric System
1006 James Street
Key West, Florida 33041

Dear Mr. Padron:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit for Key West City Electric System to construct two 10 MW diesel generators at the existing Stock Island Plant, in Monroe County, Florida.

Please submit any written comments 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/ks

Attachments

cc: D. Knowles
W. Aronson, EPA
C. Shaver, NPS
D. Swann, P.E./M. Henderson, R.W. Beck

INTENT PUBLISHED 3-29-89

Department of Environmental Regulation

Routing and Transmittal Slip

To: (Name, Office, Location)

1. Cleve Holladay
2. Air Resources Management
3. Bureau of Air Regulation
4. Tallahassee

Remarks:

RECEIVED

NOV 12 1993

Division of Air
Resources Management

From	Date
David Knowles South District	11/10/93
	Phone SC 748-6975

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permits by:

Key West City Electric System
1006 James Street
Key West, Florida 33041

DER File Nos. AC 44-152197
PSD-FL-135

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 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, Key West City Electric System applied on July 18, 1988 to the Department of Environmental Regulation for a permit to construct two 10 MW diesel generators at the Stock Island plant, near Key West, Monroe County, Florida.

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 is required for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days, in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department, at the address specified within seven days of publication. 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 permit with the attached conditions unless a 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. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. 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.

The Petition shall contain the following information;

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

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 position taken by it in this notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the applicant have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office in General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such

person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

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:

D. Knowles, SF District
W. Aronson, EPA
C. Shaver, NPS
D. Swann, P.E., RW Beck

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 3-21-89.

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.

Martha J. Wise 3-21-89
Clerk Date

State of Florida
Department of Environmental Regulation
Notice of Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Key West City Electric System, 1006 James Street, Key West, Florida, 33041, to construct two 10 MW diesel generators at the Stock Island plant in Monroe County, Florida. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

The project will involve the shut down of three 16.5 MW steam units located at the Key West Plant and the construction of two 10 MW diesel generators at the Stock Island plant.

A determination of Best Available Control Technology (BACT) was required. BACT review was conducted for nitrogen oxides, carbon monoxide, sulfur dioxide, particulates and volatile organic compounds. In determining the BACT, the Department has considered toxics and those air pollutants not regulated by the Clean Air Act. A discussion of how BACT was determined is included in the Department's preliminary determination.

The maximum degree of increment consumed is as follows:

Pollutant	Class I, % Consumed			Class II, % Consumed		
	3-hr	24-hr	Annual	3-hr	24-hr	Annual
SO_2	-	-	-	23	51	2
TSP	-	-	-	-	25	1
NO_2	-	-	2	-	-	22

The maximum combined pollutant concentrations from the two diesel engines and other sources in the area will be less than the National Ambient Air Quality Standards (NAAQS). The NAAQS are levels set by the EPA which identify the ambient concentration necessary to protect human health and welfare with an adequate margin of safety.

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. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. 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.

The Petition shall contain the following information;

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

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 position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

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:

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

Dept. of Environmental Regulation
South Florida District Office
2269 Bay Street
Ft. Myers, Florida 33901-2896

Dept. of Environmental Regulation
South Florida District Branch Office
11400 Overseas Hwy., Suites 219-224
Marathon, Florida 33050

Any person may send written comments or request a public hearing 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. Furthermore, a public hearing can be requested by any person. Such requests must be submitted within 30 days of this notice.

Technical Evaluation
and
Preliminary Determination

Utility Board of the City of Key West
Key West, Monroe County, Florida

Diesel Engine Generating Station

Permit Numbers:
AC 44-152197

PSD-FL-135

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

March 21, 1989

I. Application

A. Applicant

Key West City Electric System
1006 James Street
Key West, Florida 33041

B. Project and Location

The applicant proposes to add two 10 MW diesel generators to their existing Stock Island Plant, while simultaneously shutting down three existing 16.5 MW steam units at the Key West Plant. The project will result in emissions of nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter (PM), and volatile organic compounds (VOCs).

The UTM coordinates of this facility are Zone 17, 425 km East and 2716 km North.

C. Facility Category

The Key West diesel generator station is classified in accordance with the Standard Industrial Classification (SIC) Code as Group No. 49, Electric, Gas and Sanitary Services; Industry No. 4931, Electric Services. In accordance with the NEDs Source Classification Code (SCC) the source is classified as 2-01-001-01, Internal Combustion Engine, Electric Generation.

Key West's application was received on July 18, 1988, and was deemed complete on February 10, 1989.

II. Project Description

The two diesel generators proposed for the Stock Island plant will utilize No. 2 fuel oil and will generate 10 MW each. The facility currently has one 37 MW steam unit and three 2 MW diesel peaking units. This project also includes the shut down of three 16.5 MW steam units which are located at another facility, the Key West Plant. Two 500,000 gallon oil storage tanks will be installed. There is currently a 2,000,000 gallon No. 6 fuel oil storage tank and a 69 kv switchyard at the facility. To make room for the new units, a certain amount of demolition, pond cleaning, and utility rerouting will be necessary.

No add on air pollution control equipment has been proposed for the diesel engines.

This project will result in a significant increase in emissions of PM/PM_{10}, CO, NO_x, SO_2, and VOCs. PM_{10} represents particulates 10 microns or less.

III. Rule Applicability

The proposed project will emit the pollutants PM/PM_{10}, CO, NO_x, SO_2, and VOCs and is subject to a preconstruction review in accordance with Chapters 17-2 and 17-4 of the Florida Administrative Code (F.A.C.) and Chapter 403 of the Florida Statutes.

The Stock Island facility is located in an area designated as attainment for all the criteria pollutants in accordance with F.A.C. Rule 17-2.420. The facility is within 100 km of a Class I area, the Everglades National Park, in accordance with F.A.C. Rule 17-2.440(1)(b).

The proposed project is subject to Prevention of Significant Deterioration (PSD) Review Requirements, since there will be a significant increase in the emissions of PM/PM_{10}, CO, NO_x, SO_2, and VOCs in accordance with F.A.C. Rule 17-2.500(2)(d)4.

The proposed project will be subject to a Best Available Control Technology (BACT) determination in accordance with F.A.C. Rule 17-2.630.

The proposed project is subject to compliance testing and reporting requirements in accordance with F.A.C. Rule 17-2.700. The compliance tests will be conducted using the following test methods in accordance with the 1987 version of 40 CFR 60 Appendix A:

a. EPA Method 5 for PM
b. EPA Method 9 for VE (visible emissions)
c. EPA Method 6/8 for SO_2, or oil analysis using ASTM D 2880-71
d. EPA Method 7 for NO_x
e. EPA Method 10 for CO
f. EPA Method 25 for VOCs
g. EPA Method 104 for Be, or EPA SW 846 Method 3040 and 7090/7091

IV. Source Impact Analysis

A. Emission Limitations

As addressed in the attached BACT analysis, the expected emissions from each engine is 19.7 lb/hr for PM/PM_{10}, 155 lb/hr for NOx, 50.4 lb/hr for SO_2, 51.7 lb/hr for CO, 25.8 lb/hr for VOC, and 0.00054 lb/hr for Be. The annual emission limits are obtained by multiplying hourly emissions by 1870 hours per year.

B. Air Quality Impact Analysis

The project proposed by the Utility Board of Key West (CES) to add two 10-MW diesel generators to the Stock Island plant with the concurrent retirement of three existing 16.5-MW steam units at the Key West plant located approximately 6.5 km west of the Stock

Island site has been reviewed. Although the proposed project should result in a net decrease in area emissions, the addition of the two 10-MW diesel generators to the Stock Island plant will result in a significant emissions increase locally in carbon monoxide (CO), oxides of nitrogen (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC), and total suspended particulate matter (TSP). An air quality analysis is required for the above pollutants. This analysis consists of:

- An analysis of existing air quality;
- A PSD increment analysis;
- A National and Florida Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, and visibility and growth-related air quality impact; and
- A "Good Engineering Practice" (GEP) stack height evaluation.

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

Based on these required analyses, the Department has reasonable assurance that the proposed project, as described in 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 analyses follows.

Modeling Methodology

The latest version of the EPA-approved Industrial Source Complex Short Term (ISCST) air quality model (UNAMAP 6, change 7) was used by the applicant to predict ambient ground-level concentrations of these pollutants. This model is appropriate for use in areas of flat or gently rolling terrain. The model incorporates elements for plume rise, transport by the mean wind, Gaussian dispersion, and pollutant removal mechanisms such as deposition. It also allows for the separation of sources, directional building wake downwash, and various other input and output features. Both screening and refined modeling were performed.

Five years of sequential hourly meteorological data were used to complete the modeling. Both the surface and the upper air data were National Weather Service (NWS) data collected in Miami during the period 1981-1985. For the short-term air quality impacts, the highest second-highest predicted concentrations were compared with appropriate ambient standards and PSD increments. For the annual averages, the highest predicted yearly averages were compared to the standards.

Table I
Source Parameters

Source	SO_2 Emission (lbs/hr)	Height (ft)	Stack Temp. (°F)	Velocity (ft/sec)	Diameter (ft)	UTM Coordinates (km E)	(km N)
New SI Diesels (1)	100	100	600	100	4	425.7	2716.6
will be shut down							
KW Steam #3	408 (2)	150	284	16	8	419.1	2716.6
KW Steam #4	350	150	252	15	8	419.1	2716.6
KW Steam #5	325	150	282	28	8	419.1	2716.6
KW Gas Turbine (1)	173	35	910	150	12	419.1	2716.6
SI Steam Unit	1195 (4)	104	369	147	5	425.7	2716.7

(1) Increment consuming source
(2) SO_2 at 2.75 lb/MMBtu, TSP at 0.1 lb/MMBtu, NOx at 0.7 lb/MMBtu
(3) SO_2 at 0.5 lb/MMBtu, TSP at 0.04 lb/MMBtu, NOx at 0.3 lb/MMBtu
(4) SO_2 at 2.75 lb/MMBtu, TSP at 0.1 lb/MMBtu, NOx at 0.7 lb/MMBtu

The stack and emission rate date used for all sources are summarized in Table I. Only SO_2 emissions were modeled; however, the impacts of other pollutants were determined, as required, by adjusting the SO_2 impacts by the ratio of the emissions of the other pollutants to the emissions of SO_2. Although the stack height of the two proposed 10-MW diesel generators is equal to the calculated good-engineering-practice (GEP) height, the nearby Stock Island steam unit has a stack less than the calculated GEP height. Thus, the directional building wake downwash was considered in the modeling to estimate the combined effects.

The applicant first determined the general area surrounding the facility where the highest predicted concentrations would be expected. The ISCST model was run using complete meteorology and a coarse receptor grid (with receptors spaced from 250 meters to 2000 meters) to determine annual-average impacts, and then, using selected meteorology with a refined (increments of 0.1 km) receptor grid, to determine short-term-worst-case impacts. Six discrete receptors (directions 10 to 60 degrees) were also placed in the Everglades National Park Class I area to quantify the impact there.

The maximum increases in ambient concentrations for both SO_2 and NO_x are above the significant impact levels defined in Section 17-2.100. Except for the gas turbine of the Key West plant, which is located approximately 6.5 km to the west of the proposed diesel generators, the locations of maximum impact under expected meteorological conditions for all six sources are in the range from 0.5 to 2.0 km from the Stock Island plant. Thus, compliance with AAQS was based on interaction between the diesel generators and the steam unit in the Stock Island plant. Compliance with PSD increments was, however, based on interaction between the diesel generators and the Key West sources.

Analysis of Existing Air Quality

Preconstruction ambient air quality monitoring may be 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. In some cases, less than one year of data, but not less than four months, may be accepted when Department 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 deminimus 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 facility for these pollutants subject to PSD review are given in Table II. None of the pollutants is predicted to increase in concentration by an amount greater than its defined de minimus level. Therefore, specific preconstruction monitoring is not required for any pollutant.

PSD Increment Analysis

The PSD increments are the amounts that new sources may increase the ambient ground-level concentrations of SO_2, NO_x, and particulate matter. The purpose of these increment limitations is to prevent less polluted areas from being degraded all the way to the level of the ambient air quality standards. Three types of areas are distinguished according to the amount of additional air pollution that is to be allowed. Class I areas allow the least amount of degradation, Class II a moderate amount, and Class III allows the greatest amount of air degradation, although in no case can increased emissions cause or contribute to an exceedance of an air quality standard. Four Class I areas have been designated in the state: Everglades National Park, Chassahowitzka National Wildlife Refuge, St. Marks National Wilderness Area, and Bradwell Bay National Wilderness Area. All other parts of the state are designated as Class II areas; there are no Class III areas.

The proposed CES facility is located in a Class II area and must meet the increments defined for this class. The facility is also approximately 92 kilometers from the Everglades National Park Class I area and must meet the more restrictive increments in that area.

In general, all SO_2 emission increases occurring after the baseline date (December 27, 1977) will consume PSD increment. In addition, all SO_2 emission increases associated with construction or modification at major facilities which occurred after January 6, 1975, will also consume increment.

Atmospheric dispersion modeling, as previously described, was performed to quantify the amount of PSD increment consumed. The results are summarized in Table III. The results indicate that the concentration increases are well below the allowable limits. Based on this analysis the Department has reasonable assurance that no exceedance of a PSD increment will occur as a result of the increased emissions by the CES facility.

Ambient Air Quality Standards (AAQS) Analysis

Of the pollutants subject to review, only the criteria pollutants have AAQS which are not to be exceeded. In general, the total ambient air quality impacts are determined by adding the predicted modeled concentrations to an estimated background

concentration for each pollutant. In the calculation of the CES facility's total impact on ambient air quality, 1986 monitoring data from the closest county were used to estimate the background levels. Since the highest concentrations of the monitoring data were used, the background concentrations are expected to be very conservative estimations. The results (Table IV) indicate that all pollutants are expected to be in compliance with AAQS.

Additional Analyses on Soils and Vegetation

The total ground-level concentrations of the criteria pollutants are predicted to be well 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.

Impact on Visibility in the Class I Area

A level-1 visibility screening analysis was performed by the applicant for impact on the Everglades National Park. The results indicate that no impact on visibility is expected in this area as a result of the increased emissions at the CES facility.

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.

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 is well below the GEP limit of 65 meters.

Although the proposed stack height of the CES facility is equal to the calculated GEP height, considering the building dimensions, the stack height of the nearby steam unit is less than the calculated GEP height. Therefore, the potential for building wake downwash was included in the modeling for source interactions.

V. Conclusion

Based on the information provided by the applicant, the Department has reasonable assurance that the two 10 MW diesel generator project as described in this evaluation and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.

D.G. Thomas
03/21/89

Table II

Modeling Results and De Minimus Impacts

Modeling Results at 100 lbs/hr

Averaging Time (hr)	Impact (ug/m^3)
1	34
3	27
24	9.5
8,760	1.2

	De Minimus		Actual	
Pollutant	Impact (ug/m^3)	Avg. Time (hr)	Emission (lb/hr)	Impact (ug/m^3)
NOx	14	8,760	9	5.6
CO	575	8	479	32 (3)
SO_2	13	24	118.7	9.5
TSP	10	24	100.5	2
			20.5	

(3) Conservative value actually for 3-hour impact.

Table III
Compliance with PSD Increments

Pollutant	Averaging Time (hr)	Class II Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	512	117 (2)	0	0	117
	24	91	46 (2)	0	0	46
	8,760	20	1.2	0	0.8	0.4
TSP	24	37		0	0	9.2
	8,760	19		0	0	0.2
NO_2	8,760	25		0	0.2	5.6

Pollutant	Averaging Time (hr)	Class I Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	25	2.0	0.9	10.8	0
	24	5	0.3	0.3	2.4	0
	8,760	2	0.010	0.008	0.092	0
TSP	24	10	0.04	0.02	0.09	0
	8,760	5	0.002	0.001	0.003	0
NO_2	8,760	2.5	0.05	0.005	0.02	0.04

(1) Value equal to diesel impact + gas turbine impact - steam impact and negative numbers set equal to zero.

(2) Includes downwash impact due to Stock Island steam building.

Table IV
Compliance With AAQS

Pollutant	Averaging Time (hr)	Standard (ug/m^3)	Background (ug/m^3) (1)	Two 10-MW Diesel Impact (ug/m^3)	Total (ug/m^3)
CO	8	10,000	5,500	31 (4)	5,531
	1	40,000	11,000	39	11,039
Pb	2,190	1.5	0.15	0.0001 (5)	0.15
NO_2	8,760	100	35	5.8	43.8
O_3	1	250	210 (2)	20 (6)	230
SO_2	8,760	60	15	1.2	25 (7)
	24	260	65	146 (9)	211
	3	1,300	325	458 (9)	783
TSP (8)	8,760	50	41 (3)	0.2	41.2
	24	150	99 (3)	1.9	100.9

(1) Values for state-wide background level from:

State of Florida Department of Environmental Regulation
Bureau of Air Quality Management, November 1987, "Ambient Air Quality in Florida 1986."

(2) Value from Lee County.

(3) Value from Monore County.

(4) Conservative value actually for 3-hour impact.

(5) Value actually for annual-average impact.

(6) Conservative value actually for VOC, O_3 indeterminate.

(7) Includes interaction with Stock Island steam unit.

(8) Standard revised July 1, 1987, to consider only particles less than or equal to 10 um size.

(9) Includes combined downwash impacts from Stock Island steam unit.

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:
Key West City Electric System
1006 James Street
Key West, Florida 33041

Permit Number: AC 44-152197
Expiration Date: September 1,1990
County: Monroe
Latitude/Longitude: 24°33'49"N
81°44'03"W
Project: Two Diesel Generators

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 drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the construction of two Fairbanks Morse diesel generators, each combusting about 700 gals/hr No. 2 fuel oil, 100 MMBtu/hr heat input, generating almost 10-MW of electricity. The project will be located at the existing Stock Island plant in Monroe County, Florida. This project is also PSD-FL-135.

The UTM coordinates of the facility are Zone 17, 425 km East and 2716 km North. The Source Classification Code for the diesel generators is 2-01-001-02.

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

Attachments:

1. Key West's (KW) application received July 15, 1988.
2. DER's letter of incompleteness dated August 11, 1988.
3. RWB's letter received August 24, 1988.
4. RWB's letter received September 20, 1988.
5. DER's letter dated September 21, 1988.
6. RWB's letter received September 23, 1988.
7. EPA's letter dated September 29, 1988.
8. NPS's letter dated October 11, 1988.
9. KW's letter received November 22, 1988.
10. KW's letter received December 15, 1988.
11. RWB's letter received January 18, 1989.
12. RWB's letter received February 10, 1989.
13. RWB's letter received March 2, 1989.
14. RWB's letter received March 6, 1989.
15. DER's Preliminary Determination dated March 21, 1989.

PERMITTEE:
Key West City Electric System

Permit Number: AC 44-152197
Expiration Date: 9/1/90

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 non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

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. Each diesel engine may operate up to 1870 full load equivalent hours per year. Selective catalytic reduction (SCR) technology shall be used for NOx control should the permittee choose to operate beyond permitted hours of operation.

2. Only No. 2 fuel oil with a maximum of 0.5% sulfur content shall be fired in the engines.

3. The maximum heat input to each engine shall not exceed 100 MMBtu/hr (approx. 700 gals/hr). The derated electrical output (with timing retardation) is expected to be about 8.8 MW for each unit.

SPECIFIC CONDITIONS:

4. The maximum allowable emissions from the project, in accordance with the attached BACT determination, shall not exceed:

Pollutant	Basis	Maximum Allowable Emissions Per Unit lb/hr	TPY	2 Units TPY
PM/PM_{10} *	0.10 lb/MMBtu	19.7	18.7	37.4
NOx	6 g/hp-hr	155	145	290
SO2	0.5% S oil	50.4	48	96
CO *	2 g/hp-hr	51.7	49	98
VOC *	1 g/hp-hr	25.8	25	50
Be	-	0.00054	0.0005	0.001

* PM_{10}, CO, and VOC emission limitations are maximum allowables and are subject to change based on stack testing results.

Each engine may fire up to 1.3 million gallons per year of diesel oil, or operate up to 1870 full load equivalent hours annually, as long as the NOx emissions do not exceed 145 TPY based on a 12 month rolling average.

Visible emissions (VE) shall not exceed 20% opacity (mfrs. guarantee). This limit is subject to change after testing.

5. Initial (I) and annual (A) compliance tests shall be performed using EPA Methods in accordance with 40 CFR 60 Appendix A, 1987 version:

a. EPA Method 5 for PM (I,A)
b. EPA Method 6 for SO_2, or ASTM D 2880-71 for sulfur in oil (I,A)
c. EPA Method 9 for VE (I,A)
d. EPA Method 10 for CO (I)
e. EPA Method 20 for NOx (I,A)
f. EPA Method 25 for VOC (I)
g. EPA Method 104 for Be, or EPA SW846 Method 3040, 7090/7091 (I)

Other DER approved test methods may be used only after Departmental approval.

Continuous emission monitors shall be installed, calibrated, maintained and operated for opacity and NOx.

6. The project shall comply with all the applicable requirements of Chapters 17-2 and 17-4 of the Florida Administrative Code (F.A.C.).

7. DER's South Florida District office shall be notified in writing a minimum of 15 days prior to source testing. Written reports of the test results shall be submitted to the district office within 45 days of test completion.

PERMITTEE:
Key West City Electric System

Permit Number: AC 44-152197
Expiration Date: 9/1/90

SPECIFIC CONDITIONS:

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

9. An application for an operation permit must be submitted to the South Florida District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever occurs first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. 17-4.220).

10. Any change in the method of operation, fuels, equipment or operating hours shall be submitted for approval to the South Florida District office.

11. The three existing 16.5 MW steam units at the Key West Plant shall be shut down and operation permits shall be surrendered for cancellation when operation permits are issued for the two new engines authorized by this permit.

Issued this _____ day
of _____, 1989

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

_____
Dale Twachtmann, Secretary

Best Available Control Technology (BACT) Determination
Key West City Electric System
Monroe County

The applicant proposes to install two diesel generators at their Stock Island Plant at Key West, Monroe County, Florida. The generation facility will consist of two diesel engines with an electric generation capability of 9,605 kw each. The total heat input per engine is 100 MMBtu/hr.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the two engines based on 8,760 hours per year operation to be as follows:

Pollutant	Max. Potential Emissions (tons/yr)	PSD Significant Emission Rate tons/yr
NO_x	2,100	40
SO_2	440	40
PM_{10}	90	15
CO	520	100
VOC	260	40
Pb	0.05	0.6
Hg	0.01	0.1
Be	0.0005	0.0004

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.

BACT Determination Requested by the Applicant

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

Pollutant	Determination
NO_x	8.0 g/hp-hr
SO_2	Low sulfur fuel (sulfur content of diesel will be limited to 0.5%)
PM_{10}	0.1 lb/MMBtu
CO	2.0 g/hp-hr
VOC	1.0 g/hp-hr
Be	0.0005 tons per year

Date of Receipt of a BACT Application

September 23, 1988

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.

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

BACT Analysis

A review of previous BACT determinations and control measures utilized for stationary large bore diesel engines indicates that

in general the emission rates proposed by the applicant do not represent BACT. The rationale for establishing BACT at a lower than proposed level for the applicable pollutants is presented as follows:

Nitrogen Oxides

The emission of nitrogen oxides from stationary large bore diesel engines has in recent years become a concern in the BACT decision making process. A review of the various technologies used to generate electricity indicates that large bore diesel engines are by far the greatest emitter of nitrogen oxides on a heat input basis. This is illustrated by comparing the proposed emission limit for the diesel engines to New Source Performance Standards or typical BACT determinations for the other common electrical power generating technologies as follows:

Source	NO_x Emission Level (lb/MMBtu)
Key West Diesels (Proposed BACT)	2.35
Steam Generating Units (Industrial-Commercial-Institutional)	0.20
Resource Recovery (uncontrolled)	0.5 - 0.65
Oil Fired Turbines	0.40
Electric Utility Steam Generating Units	0.30

Based on the comparison shown above, the BACT determination will concentrate on the economics and pragmatics of using the following four alternate power production/control strategies.

1) Oil Fired Turbines
2) Combined Cycle
3) Timing Retardation
4) Selective Catalytic Reduction

Turbines, like internal combustion engines, are capable of firing both gaseous and liquid fuels. This ability to fire liquid fuels is an important consideration since natural gas is not available on Key West. From an environmental standpoint the use of turbines is advantageous because the NO_x emissions can be controlled to levels much less than the proposed 8.0 g/hp-hr through the use of inexpensive control techniques such as steam injection.

Similar to the turbine is the combined cycle. A combined cycle configuration typically utilizes a gas turbine as the first means of producing electrical energy, then uses the heat energy of the turbines exhaust to produce steam which is then 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.

With regard to the use of turbines and combined cycle configurations, the applicant has stated several disadvantages when compared to the proposed diesel engines.

Turbines and combined cycle configurations are typically sized larger than the largest stationary diesel engines and would require that only one unit (rather than two diesel units) be installed to supply the needed 20MW of generation requirement, thereby resulting in a lower reliability. Another disadvantage associated with the combined cycle is the steam cycle which requires more operating personnel to operate the equipment when compared to diesels which operate in an unattended mode. In addition, both the turbine and combined cycle operate at a higher heating rate to produce an equivalent amount of power as the diesel, thereby requiring more fuel on a per kilowatt basis. This increase in cost will be further evaluated in the economic section of this determination.

The emission of nitrogen oxides from stationary large bore diesel engines are minimized by the use of selective catalytic reduction (SCR). Until recently, SCR has not been judged to be a reasonable control technology for diesel engines due to problems encountered with catalyst poisoning. Although catalyst systems are currently under development and have been demonstrated for some applications (i.e, fuel-rich naturally aspirated gas engines, and gas turbines), there have not been any known demonstrations of their effectiveness as a control measure for the broad range of full-scale internal combustion engines manufactured. This has been particularly true of turbocharged engines, fuel-lean gas engines, and diesel engines.

A recent survey of permitting activities, however, indicates that SCR is now being used on stationary large bore diesel engines. This SCR installation (the first in the United States on a diesel engine) is currently operating on a 4.8 megawatt co-generation facility at a chemical plant in Adams, Massachusetts. This co-generation facility is scheduled to operate on a year round basis with dual fuel being used for 8 months per year and diesel for the remaining 4 months. Additional research indicates that although this SCR system is

being used for the first time in the United States, it has been used extensively in Europe. Background information indicates that this system has been used successfully since 1982, serving over 50 engines and gas turbines, operating on gas, dual fuel, diesel and heavy oil with up to 3.5% sulfur content.

Because the use of SCR has such a limited use at this time (especially in the United States) as a control technology for large stationary diesel engines, the Department has contacted the companies using SCR to obtain their impressions. In the case of the Massachusetts facility, the personnel responsible for operating the cogeneration equipment were very pleased with the SCR system, which has been operating for more than 1,500 hours on diesel fuel. These feelings were also expressed by a company in Germany which has recently submitted another order for a diesel engine with the same SCR technology. Based on these conversations, the Department believes that the SCR technology can be considered to proven on diesel applications.

The final alternative to be considered is the use of the additional timing retardation on the diesel engines. Timing retardation has been used extensively as the primary means of reducing NO_x emissions from diesel fueled engines. This reduction is achieved by essentially lowering the peak combustion temperatures, thereby limiting thermal NO_x formation. Depending on the amount of timing retard used, NO_x reductions can range up to 45 percent. Timing retardation does however result in the derating of the diesel, thereby increasing the cost to generate a given amount of power.

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 NO_x emissions EPA has determined that a cost of up to $1,000 per ton of emissions controlled ($0.50/lb) is reasonable for NSPS. In accordance with these guidelines and the control alternatives discussed the cost/benefits are illustrated in Table 1. A review of Table 1 indicates that when operating continuously, the use of SCR is by far the most economical means of control on a cost per ton basis. This cost of $370.00 per ton is well within EPA's guidelines for NSPS purposes and is hence judged to be economically feasible as BACT for the Key West Facility.

With regard to SO_2 emissions the Department does not believe that the applicants proposal to limit diesel sulfur content to 0.5% is representative of BACT. A review of the latest (July 1988) BACT/LAER Clearinghouse indicates that BACT for SO_2

TABLE 1

Comparison of Alternates for NO_x Control

NO_x Cases	Diesel	Gas Turbine	Diesel with Add. Timing Retardation	Combined Cycle	Diesel with SCR
Capital Cost ($/KW)	1250	675	1360	900	1400
Heat Rate (Btu/kWh)	8500	13,600	9500	10,800	8500
Part Load Heat Rate	base	higher	base	higher	base
Amount of Derating (MW)	none	none	1.6	none	none
Reliability	base	lower	base	lower	unknown
Response Time (minute)	10	20	10	90	10
Emission (gm/hp-hr)	8	1.3	6	1.0	0.8
Emission (T/yr)(2)	2100	340	1580	260	210
Increased Cost ($/yr)(1)	base	2,540,000	820,000	980,000	700,000
Cost of Emission Reduction ($/T)	base	1400	1560	530	370

(1) Capital cost amortized at nine percent annual rate; fuel cost of $4/mm Btu, 100% capacity factor, SCR cost includes ammonia and maintenance.
(2) Based on 20 MW output.

emissions from diesel engines has previously been set at limiting sulfur content to 0.2%. This level appears to be the maximum control established and hence is evaluated using the "top down" BACT approach as follows:

Discussions with the applicant's fuel supplier indicate that the additional cost of reducing fuel sulfur content from the proposed level of 0.5% to 0.2% would be approximately 3 cents per gallon. At the maximum firing rate, the additional hourly cost of using the 0.2% sulfur content diesel instead of the proposed 0.5% sulfur content diesel would be $42.00. The sulfur dioxide reductions from switching to the 0.2% sulfur content diesel are estimated to be 60 pounds per hour. Based on this reduction, the hourly cost per pound of sulfur dioxide removal is 70 cents which is less than the EPA NSPS guideline of up to $1.00 per pound ($2,000 per ton) for sulfur dioxide removal. As this is the case, BACT is judged to be represented by limiting the diesel's sulfur content to 0.20%.

With regard to PM_{10} emissions, the Department does not agree with the applicant that the proposed emission level of 0.1 lb/MMBtu is representative of BACT. A recently permitted diesel generating facility proposed a PM_{10} emissions level of 0.03 lb/MMBtu. This emission level (0.03 lb/MMBtu) is consistent with what most large stationary diesel engine manufacturers are guaranteeing for recent permit applications and is representative of NSPS for other types of similar sized fuel burning equipment, thereby being judged to be reasonable as BACT for this facility.

For internal combustion engines there exists a trade-off between the emissions of NOx and the products of incomplete combustion (carbon monoxide (CO) and volatile organic compounds (VOCs)). Generally speaking, attempts to decrease the emissions of NO_x by means other than add-on controls (i.e., ignition timing retardation, air-to-fuel ratio changes, etc.) are accompanied by increases in CO and VOCs. Considering the timing retardation applied, the applicant's guaranteed emission levels of 2.0 and 1.0 grams per horsepower hour, respectively, may be representative of BACT.

Environmental Impact Analyses

A review of the ambient impacts associated with the diesel installation at the Key West Facility indicates that only the pollutants NO_x and SO_2 will contribute significantly when compared to the present background concentrations. Based on the applicant's proposal for BACT, the impacts associated with NO_x and SO_2 are estimated to be 5.8 (annual average) and 146 ug/m, (24 hour average) respectively.

For NO_x the impact is estimated to increase the total ambient concentration by approximately 25 percent resulting in a concentration which is 43.8% of the standard. For SO_2 the impact is estimated to increase the total ambient concentration by more than three times resulting in a concentration which is 81.2% of the standard.

Based on this impact review, the Department has determined that the Key West Facility has the potential to contribute moderately to the NO_x concentration and substantially to the SO_2 concentration in that area. As this is the case, the Department believes that its BACT determination which would reduce the proposed NO_x and SO_2 impacts by 85 and 60 percent, respectively is further justified.

In addition to the criteria pollutants, the impacts of toxic pollutants associated with the combustion of diesel have been evaluated. Three of the toxic pollutants (mercury, beryllium, and lead) have PSD significant levels with only beryllium being in exceedance. The other toxics (polyorganic matter, nickel, chromium, and arsenic) are expected to be emitted in minimal amounts, with the total emissions of all seven toxics combined to be less than one ton per year.

Although the emissions of the toxic pollutants could be controlled by particulate control devices such as a baghouse or scrubber, the amount of emission reductions would not warrant the added expense. As this is the case, the Department does not believe that the BACT determination would be effected by the emissions of the toxic pollutants associated with the firing of diesel.

Potentially Sensitive Concerns

With respect to the Key West Facility there are several sensitive concerns. Although the cost of using SCR was shown to be the most attractive on a cost per ton basis and well within the NSPS guidelines, the applicant is concerned that a requirement to use SCR will result in serious financial burdens.

Due to the large capital cost of the SCR system (approximately $2.3 million) the applicant is concerned that additional bonding coverage would be needed which would require that electrical rates be increased. This would be burdensome to the people in the Key West area where electricity rates are currently among the highest in the State of Florida and have recently had a significant increase to finance the diesel project.

In addition to the cost considerations, the applicant has expressed concern that the experience with the SCR system

TABLE 2

Economic Analysis of SCR for NO_x

Capital Costs					
Direct Costs for SCR	$2,300,000				
Financing Costs	625,000				
Total	$2,925,000				
Annual Operating Costs for SCR ($/yr)					
Equivalent Full Load Hrs. of Operation (hrs/yr)	8,760	5,000	2,500	1,500	1,000
Net Generation (MWH(1)	168,192	96,000	48,000	28,000	19,200
Net Debt Service ($)(2)	252,000	252,000	252,000	252,000	252,000
Maintenance ($)(3)	215,000	215,000	215,000	215,000	215,000
NH3 Cost ($)(4)	230,000	131,000	65,000	39,000	26,000
Total Cost	697,000	598,000	532,000	506,000	493,000
(cents/kWh)	.41	.62	1.11	1.76	2.57
NO_x Removal					
Tons/Year (5)	1,814	1,036	518	311	207
$/Ton	384	577	1,027	1,627	2,382

1) Based upon a combined net output for the diesel generators of 19.200 kw.

2) Based on assumed interest rate of 8.25% for municipal tax exempt debt and 25 year amortization period.

3) Average assumed cost for 10-year period based upon letter from SCR equipment supplier.

4) Based upon 90% NH3 removal, and usage of 220 lbs/hr at full load and cost of $0.12/lb.

5) Based upon an uncontrolled emission of 8 gm/hp-hr.

relative to diesel fueled generation is very limited and should only be considered in the demonstration category relative to technical risk, not having been proven commercially. The applicant also states that the addition of the SCR system will, in effect, void the Utility Board's existing performance guarantees and warranty on the diesel engine generator set, since the diesel manufacturer will not take any responsibility for the impact of the SCR equipment on the plant operation, performance, and reliability.

With regard to the low sulfur content requirement, the applicant has indicated that due to the size of the diesel facility, it is not likely that diesel fuel with a guaranteed sulfur content not to exceed 0.20% can be obtained. This is based on conversations with fuel suppliers which have indicated that the expected diesel usage is to large to be accomodated by the small shipments of low sulfur content diesel that are shipped in to fuel suppliers, but to small to receive a direct shipment on an ocean going barge.

Finally, the applicant is concerned that the Department's recommended BACT for PM_{10} emissions may be difficult to achieve. Each of these concerns is largely based on the diesel units projected operating schedule which is not likely to exceed more than 2500-3000 hours per year each except in emergency cases.

BACT Determination by DER:

Discussion

Based on the information presented by the applicant, the Department believes that the costs associated with using SCR should be evaluated for various operating schedules. These costs are shown in Table 2.

A review of Table 2 indicates that the cost per ton of NO_x controlled when using SCR is very dependent upon the hours of operation. This variability in cost is attributed to the fixed cost using SCR which is independent of hours of operation. From Table 2, the cost per ton of NO_x removal can be expressed by the following relationship.

$$\text{Cost of } NO_x \text{ Removal } (\$/\text{ton}) = \frac{460{,}000 + 25.64\,X}{.204\,X}$$

Where X = Number of hours operated

The cost analysis shown in Table 2 is useful in comparing other alternatives which can be employed to reduce NO_x emissions from large bore diesel engines.

At the maximum operation levels which are likely to occur as stated by the applicant (2,500 - 3,000 hours per year) the cost of using SCR is more comparable to using timing retardation on a cost per ton basis. The annual expense, however, of using timing retardation is much less than using SCR ($176,000 vs $532,000 at 2,500 hours of operation). This large difference in cost supports the applicant's concerns that SCR would be extremely costly for operating schedules which are much less than full time operation.

In accorance with this situation, it appears that a reasonable comparison would be to allow the applicant to use timing retardation providing the diesels would be operated at the level where the cost per ton of using either SCR or timing retardation are equivalent.

The cost of timing retardation at less than full time operation is only a function of additional fuel needed to produce an equivalent amount of power. For a given amount of power generated and the subsequent NO_x reductions acheived by timing retardation, the cost per ton of control is approximately $1,333. When this cost is substituted into the cost equation for SCR, the hours of operation which yield the same cost per ton for both SCR and timing retardation is approximately 1,870.

The Department's finding with regard to the availability of low sulfur content (0.20%) diesel support the applicant's claims. Although other large stationary engines/turbines with diesel firing capability have been recently limited to using diesel with a sulfur content in the 0.2-0.3% range, it appears that the expected diesel consumption by the Key West diesels will not allow such a requirement.

Conversations with the diesel suppliers for the previously permitted facilities with the low sulfur content requirement have indicated that these facilities are only able to get this quality of fuel, which is not readily available, due to the relatively small needs for diesel in general. Each of these facilities is expected to use diesel only during periods of natural gas curtailment. As this is the case, the need for diesel is limited and the low sulfur content batches can be obtained.

With regard to Key West, natural gas is unavailable. This results in a need for diesel engines which are too large to be supplied by these low sulfur content shipments obtained by local suppliers, but to small to be serviced by a direct shipment via an ocean going barge which carry at least four times the amount of fuel that can be stored in the Key West facility's tanks.

Conclusion

In view of the sensitive concerns that have been identified by the applicant concerning this facility, the Department has concluded that at this time, BACT for nitrogen oxides is represented by using timing retardation and limiting the hours of operation. It should be noted that at levels of operation which are greater than the specified 1,870 hours, the use of SCR becomes less costly than timing retardation and should be considered BACT for the facility.

With regard to the extent to which SCR has been demonstrated to be a proven technology on diesel applications, the Department feels that there has been sufficient operating experience to indicate that SCR is in fact a viable technology for diesel applications. It should be noted that the hours of diesel operation for the existing SCR systems addressed in this determination have been restricted in fact by the price of fuel. Discussions with large stationary internal combustion engine operators both in the United States and Europe have indicated that the preference to operate on natural gas is based on its cheaper cost per a given amount of heating value. The only time diesel is used is during periods of natural gas curtailment which has resulted in not having comparable amounts of operating experience for both diesel and natural gas.

With regard to limiting diesel sulfur content to levels which are less than requested by the applicant, the Department has determined that such a restriction is not warranted in view of the situation. Although modeling indicated that the sulfur dioxide concentrations would increase by more than three times using the 0.5% diesel for full time operation, the hours of operation restriction imposed to limit NO_x emissions will lower these projections substantially.

With regard to PM_{10} emissions, the Department has determined that the emissions of PM_{10} as well as CO and VOC's can likely be influenced by the measures taken to reduce NO_x emissions. As this is the case, BACT for each of these pollutants will be established at the applicants guaranteed levels, but will be subject to being adjusted to a lower level based on the stack testing results.

In accordance with this determination, the emission limits on a pollutant by pollutant basis are set as follows:

Pollutant	Emission Limit
NO_x *	6.0 g/hp-hr
SO_2	Diesel sulfur content limited to 0.50%
PM_{10}**	0.10 lb/MMBtu
CO**	2.0 g/hp-hr
VOC**	1.0 g/hp-hr
Be	0.0005 tons per year

*Nitrogen oxides emission limitation is based on limiting hours of operation to 1,870 full load equivalent hours for the facility (total of 3,740 full load equivalent engine hours). For operating schedules which are in excess of 1,870 full load equivalent hours the use of SCR has been justified as representing BACT for the facility.

**PM_{10}, CO, and VOC emission limitations are maximum allowables and are subject to change based on stack testing results. The emission level of these pollutants is sensitive to the level of NO_x control and should be established in accordance with actual test results.

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

_____1989
Date

Approved by:

_____
Dale Twachtmann, Secretary

_____1989
Date

R. W. BECK AND ASSOCIATES
ENGINEERS AND CONSULTANTS

PLANNING
DESIGN
RATES
ENVIRONMENTAL
ECONOMICS
MANAGEMENT

DENVER NATIONAL BANK BUILDING
SUITE 1900
1125 SEVENTEENTH STREET
DENVER, COLORADO 80202
TEL: 303-295-6900

GENERAL OFFICE
SEATTLE, WASHINGTON
Telephone: 206-441-7500
Telex: 4990402 BECKSEA
Denver, CO Telecopier
303-297-2811

TELECOPY MESSAGE

TO: Barry Andrews

PHONE NUMBER: (904) 488-6579

FROM: Mike Henderson

DATE: 3/6/89

TIME: 2:30

WORK ORDER NUMBER: FC-J8201-CA1-CA

NUMBER OF PAGES (Including This Cover Page): 2

OPERATOR:

R. W. BECK AND ASSOCIATES TELECOPY NUMBER: (303) 297-2811

MESSAGE: Here is information discussed on Friday. Engine capacity was approximately 6300 KW in referenced proposal

PLEASE CALL OPERATOR AT (303) 295-6900 IF YOU HAVE ANY PROBLEM RECEIVING THIS TRANSMISSION OR YOU DID NOT RECEIVE THE NUMBER OF PAGES LISTED ABOVE.

Colt Industries

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

March 6, 1989

R.W. Beck and Associates
Denver National Bank Building
Suite 1900
1125 Seventeenth Street
Denver, CO. 80202

Attention: Mr. Mike Henderson

Subject: Colt Proposal HK7-02-SS
Dual Fuel Generator Sets
Combustion Engineering
ITB 3971-110-01 Pratt-Whitney Project

Dear Mike:

Our proposal for the subject project which was submitted on Purchaser's Proposal data sheets did not contain exhaust emission data for particulate matter since it was not requested.

We were subsequently provided a copy of the environmental permit issued by the State of Florida for our review and confirmation that our bid met all permit requirements.

In regard to the Particulate, PM, we indicated we could meet the stated requirement for the proposed PC2.3 dual fuel engine operating in the dual fuel mode. Specifically we stated "Assuming that the values for particulates, PM, should be 4.03 and 8.06 Tons per year in the dual fuel and diesel modes respectively (1 #/HR x 8060 HR/2000 = 4.03 Tons). The engines proposed by Colt will meet the Tons/Year limitations listed in the dual fuel mode. PM values for Colt engines are calculated based on correlation between smoke meter measurements and soot weight rather than collected and measured." This was on a per engine basis.

This dual fuel information is not applicable to the Key West 18 Cylinder PC2.6 diesel engine.

Very truly yours,

J.M. Moriarty
Manager, Marketing

JMM/jl
cc: J. Clark
P. Danyluk
G. Kasel
T. Reder
M. Weiss

cc: R. Rand

In effort to preserve these documents I wrote over the original fax ~~copy~~ sheets which had faded. It is my desire to preserve the information not the typing. No copies were made at the time the fax was rec'd.

Kanani

AC 44-152197
AC 44-152198
PSDFC-135

R. W. BECK AND ASSOCIATES

R. W. Beck and Associates
Denver Office
Telecopy Message

Page 1 of 4
Date 2/28/89
Time 8:30

TO Barry Andrews
FAX Tele No. (904) 488-6579
PSA # FC-5801-DA3 AB
Project Key West Diesels
from Mike Henderson

(303) 297-2811 Denver Office Telecopier

Message: Attached is information we discussed Please call when you have reviewed

R.W. BECK AND ASSOCIATES

Denver National Bank Building Suite 1900 ■ 1125 Seventeenth Street ■ Denver Colorado 80202-2615
Telephone (303) 295-6900 ■ Fax (303) 297-3811

PC-5801-DA3-AB MEMORANDUM February 28, 1989

TO: Files

FROM: BECKY PATTINSON

SUBJECT: No. 2 Diesel Fuel Availability

I have contacted the following suppliers of No. 2 dieser fuel. I requested they supply written confirmation of the availability and cost of No. 2 fuel with a sulfur content not to exceed 0.2%. The letters I received are attached to this memo. A summary of the responses is listed below.

1. Belcher Oil Company
Port Everglades, FL
D. W. Carlton
(800) 327-3495

Belcher Oil cannot supply 0.2% sulfur content No. 2 diesel fuel Letter is attached.

2. Dion Oil Company
Key West, Fl
Larry Dion
(305) 296-2000

Dion Oil cannot supply 0.2% sulfur content No. 2 diesel fuel.

3. Chevron USA
Atlanta, GA
Hal Goodwin
(404) 984-3029

Chevron cannot supply 0.2% sulfur content No. 2 diesel fuel. Their guarantee minimum is 0.5%. They are unable to deliver by barge to Key West.

4. Blayloc Oil Company
Homestead, FL
R. D. Jackson
(305) 247-7249

Blayloc will only guarantee 0.5% sulfur content No. 2 diesel fuel. They are a distributor for Texaco and do not produce their own fuels.

Memorandum to:
Files

February 28, 1989

5. Amoco Oil Company
Atlanta, GA
Ken Jahde
(404) 634-8072

Amoco does not currently supply 0.2% sulfur content No. 2 diesel fuel to Florida. It is available from Texas City, Texas in ocean going barge quantities (100,000 bbls). Amoco does not currently have the ability to deliver in small barge quantities.

6. Apex Oil Company
Richmond Heights, MO
Mark Turner
(314) 889-9600

Apex cannot supply fuel in Florida

Ranco Oil Company
Miami, FL
Rex Benson
(305) 836-0152

Ranco Oil buys their fuel from Chevron Oil Company. The average sulfur content for No. 2 diesel fuel ranges from 0.5% sulfur. They cannot supply 0.2% sulfur content fuel and cannot guarantee sulfur content below 0.5%.

8. Sinclair Oil Company
Denver, CO

Sinclair does not distribute fuel in the Southeastern United States.

9 Western Fuels
Don Van Sickle
(813) 247-5063

Western Fuels has gone out of business and sold their terminal

10. Central Oil
Dale Robinson
(813) 248-2105

Central Oil cannot supply the Key West area

Becky Pattinson

BDH/BP:ehh/291
Attachment

cc: Nick Guarriello, Orlando
Keith Platte
Mike Henderson
Tom Donovan

CC P Raval
B Andrews
S.H. Chu
D Knowles, SF Dist
W.A Ronson, EPA
M. Flores, NPS

Belcher Oil Company
A SUBSIDIARY OF THE CONSOLIDATED CORPORATIONS

The Energy People

February 23, 1989

D. W. Carlton
SENIOR VICE PRESIDENT
MARKETING,

Ms. Becky Pattinson
Supervising Engineer
R. W. Beck & Associates
1125 17th Street
Suite 1900
Denver, CO 80202

Dear Ms. Pattinson:

Confirming our telephone conversation of this date. Belcher finds itself in the position of not being able to guarantee .2% or .3% maximum sulfur diesel fuel based on the low market requirements in the South Florida area for these low sulfur grades of diesel fuel and the estimated maximum consumption for the new units at the City of Key West.

Please let us know if there is any other information or assistance you require.

Sincerely,

BELCHER OIL COMPANY

D. W. Carlton
Senior Vice President
Marketing

DWC/mec

cc: R. R. Padron, Manager
City of Key West

P.O. BOX 025506
MIAMI, FLORIDA 33102-5506
305/591-5222

Cert. No. P 642 564 296
2-9-89

R.W. BECK
AND ASSOCIATES

Denver National Bank Building, Suite 1900 ■ 1125 Seventeenth Street ■ Denver, Colorado 80202-2615
Telephone (303) 295-6900 ■ Fax (303) 297-2811

FF-5801-CA1-AA

February 8, 1989

Mr. Barry Andrews, Central Air Permitting
Bureau of Air Quality
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RECEIVED
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DER - BAQM

Dear Barry:

This letter is to follow up on telephone conversations over the last week with Mr. Clair Fancy, Bill Thomas and yourself. Previously you proposed that a BACT determination could be recommended on the basis that equal costs per ton of NO_x removal would allow use of additional timing retardation (6 gm/hp-hr) and limited operation (less than 8760 equivalent full load hours per year for the two engines) rather than use of the Steuler SCR equipment on the exhaust. The reasoning as we understand from the conversation is that since the SCR system is technologically risky and would be difficult for CES to finance at this time, CES should be required to reduce emission by a combination of limited hours and timing retardation on its engines such that the cost per ton of NO_x removal would be similar to the cost with the SCR system. CES and its Consulting Engineer requested time to review this concept and the methodology upon which it was based and provide comments.

We believe the concerns raised in our December 14, 1988 and January 17, 1989 letters support the position that "on a case by case basis, taking into account energy, environmental and economic impacts, and other costs" the best available control technology for NO_x emissions is the proposed 8 gm/hp-hr as requested in our application. The only currently available method for CES to reduce emissions from the diesel engines and still receive performance guarantees from the diesel manufacturer would be additional timing retardation to 6 gm/hp-hr, although this method represents a substantial economic penalty to CES's customers. Based on the projected economics of these units, it is unlikely that each of these units would be operated more than 2500-3000 hours per year each except in emergency cases. In the interest of minimizing emissions, CES could agree with the general concept that the use of timing retardation on its engines at some agreed level of operation represents the best available control technology for NO_x removal for CES's diesel engines since (i) the SCR system is not a reasonable or technically demonstrated alternative, and (ii) the financing of the SCR system would be difficult for CES as explained later in this letter.

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2425646296

Date 2-9-89

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From (Your Name) Please Print
1 Mike Henderson

Your Phone Number (Very Important) (303) 295-6900

Company R. W. BECK & ASSOCIATES

Department/Floor No.

Street Address 1125 17TH ST STE 1900

City DENVER State CO ZIP Required 80202

To (Recipient's Name) Please Print
2 Mr. Barry Andrews, Central Bureau of Air Quality

Recipient's Phone Number (Very Important) (Air Permitting)

Company Florida Dept. of Environ. Regulations

Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. ZIP Codes.)
Twin Towers Office Building
2600 Blair Stone Road

City Tallahassee, State FL ZIP Required 32399-2400

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We believe that the restriction that you have calculated of 3,000 hrs per year for both units is a substantial restriction on the operation of these units and does not as was intended under your proposed methodology accurately represent the level of operation at which the cost of NO_X removal with timing retardation is equal to the cost of NO_X removal with the SCR. This level of operation should be approximately 4500 hours as our calculations that follow will indicate.

The cost estimates and other information presented in our letter dated January 17, 1989 were prepared on a preliminary basis to provide the information you requested in a timely manner. We have reviewed this data and believe that certain corrections should be made for purposes of determining the proposed level of operation for the diesel units. The cost of NO_X removal utilizing the SCR system and with additional timing retardation were based on diesel units of 10 MW size each. To simplify the comparison, the size of the units in each case was assumed to be the same. Based on the current guarantees, the size of the units should more precisely be 19.2 MW (2 x 9.6) without additional timing retardation, and 17.6 MW (2 x 8.8) with additional timing retardation. When these corrections are made the cost of NO_X removal with the Steuler system is represented by the following:

Cost of NO_X Removal ($/ton)

$$\frac{467{,}000 + 26.4\,X}{.204X}$$

Where: X = Number of hours

The cost of NO_X removal with additional timing retardation is represented by the following:

Total Annual Cost (Assuming 8760 hours) = $820{,}000 \times \frac{17.6}{20.0}$

= $722,000

Emission with base case timing retardation (tons/year) = $2100 \times \frac{19.2}{20}$

= 2016

Emission with additional timing retardation (tons/year) = $1580 \times \frac{17.6}{20}$

= 1390

Average Cost of NO_X removal ($/ton) = $\frac{\$722,000}{2016-1390}$

= $1,153

Allowable hours of operation:

Cost of NO_X removal (Steuler) = Cost of NO_X removal (Additional Timing Retardation)

$\frac{467,000 + 26.4\ X}{.204X} = 1,153$

X = 2,236 hours
Rounded - 2250 hours

Thus, the permit would restrict the use of the diesels to a total for both units of 4500 equivalent full load hours per year. We also request that DER allow for the upward adjustment in the allowable hours of operation should performance tests indicate that either the heat rate penalty associated with the additional timing retardation (guaranteed heat rate penalty differential of a 1000 Btu/kWh) or the actual emission (guaranteed to be 6 gm/hp-hr) is less than expected.

It is noted that the exhaust opacity is expected to exceed 20 percent with the additional timing retardation. As indicated in the original PSD application, section 17.2.610(2) allows such operation when operating practices to minimize opacity are being utilized.

With regard to CES's ability to finance additional capital expenditures, CES's current bond resolution requires that certain conditions be met prior to issuing additional parity debt. Among other conditions, CES must obtain a statement of an independent certified public accountant setting forth the amount of net revenues for a 12-month consecutive period within the last 18 months and stating that the net revenues for such preceding 12-month period, as adjusted for (i) changes made in rates or other changes prior to issuance of the additional parity obligation, and (ii) changes caused by new projects of the system having been placed into service and operation subsequent to the date of commencement of the 12-month period, will equal at least 120 percent of the maximum debt service requirements on (i) the bonds then outstanding, and (ii) the additional parity obligation with respect to which such statement is made.

Because of this additional bond coverage requirement, the financing of the capital expenditure for the Steuler SCR system would require an increase in rates to meet the historical coverage requirement on maximum debt service. As we have discussed previously, the Utility Board's rates are

currently among the highest in the State and its customers have just recently had a significant rate increase to finance the diesel project.

The size of the expenditure for the Steuler SCR system is estimated to be approximately $2,300,000. The financing costs for this level of expenditure as a percent of the amount financed is expected to be relatively large compared to larger financings because certain issuance expenses are not proportional to the size of the issue. There could also be an interest rate penalty associated with an issue of this small size.

We trust this information will assist you in completing the Preliminary Determination. If you have any further questions, please direct them to the author. CES appreciates your diligence in handling this permit application and anticipates your further best effort.

Sincerely,

R. W. BECK AND ASSOCIATES

Michael D. Henderson
Principal Engineer

MDH:(key64/1529T)

cc: Mr. Clair Fancy
Mr. Bill Thomas
Mr. Bobby Padron, General Manager
Mr. Nick Guarriello
Mr. Paul Arsuaga
Mr. Leo Carey, Asst. to the Manager
Mr. Ralph Garcia, Sr. Asst. to the Manager
Mr. Larry J. Thompson, Operations Manager
Mr. Paul Esquinaldo, Jr., Finance Manager
Mr. L. T. Curry, Jr., Production Manager
Ms. B. Pattinson
Mr. K. Platte
Mr. T. J. Reder

copied: Pradeep Raval
Shao-Hung Chu
Wayne Aronson, EPA
Chris Shaver, NPS
David Knowles, SFDER

R.W. BECK
AND ASSOCIATES

Denver National Bank Building, Suite 1900 ■ 1125 Seventeenth Street ■ Denver, Colorado 80202-2065
Telephone (303) 295-[illegible] ■ Fax (303) 297-2811

FC-5801-CA1-AB

January 17, 1989

RECEIVED
JAN 18 1989
DER - BAQM

Mr. Clair Fancy
Central Air Permitting
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: PSD Application for Two 10-MW Diesel Generators
at Key West, Florida
Permit Nos. AC44-152197, AC44-152198, and PSD-FL-135

Dear Mr. Fancy:

We write this letter to follow up a meeting held with your staff on January 11, 1989. At that time, several issues were discussed regarding use of an SCR system for NO_x control on the proposed diesel generators. In a letter dated December 14, 1988, City Electric System ("CES") provided information on Steuler experience and equipment costs, and Fairbanks-Morse' engine performance guarantees. The conclusions in that letter were stated as follows:

1) The Steuler SCR technology has not been commercially proven since there is little operating experience in the oil-only diesel engines. The technology should be considered in the development and demonstration category.

2) Fairbanks-Morse has stated that they will cancel their engine performance guarantees and warranty if installation of the SCR equipment changes the operating conditions of the engine.

3) The increased costs imposed on CES' customers is excessively burdensome since their electric costs are already high relative to other utilities' customers in the state. The environmental impact of the equipment will be minimal, even if the installation were successful, because of the low planned capacity factor for the generators.

Our recent meeting provided the opportunity to informally present the information in the December letter and to discuss other concerns with the staff. The staff has requested we provide additional information relative to alternates considered for NO_x and SO_2 control, and information regarding Key

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Date: 1/17/89

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Your Phone Number (Very Important): (303) 295-6900

Company: [illegible] & ASSOCIATES

Department/Floor No.:

Street Address: [illegible] 17TH ST STE 1900

City: DENVER State: CO ZIP Required: [illegible]

To (Recipient's Name) Please Print (2): Mr. Clair Fancy

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

Company: Florida Department of Environmental [illegible]
Bureau of Air Quality Management

Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): Twin Towers Office Building
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West's current rates and its customers' ability to pay as compared to customers of utilities in other areas in the state. The following paragraphs discuss the requested information relating to alternates of NO_x and SO_2 control and economic statistics for CES' customers. Tables 1 and 2 summarize data on the alternates for NO_x and SO_2 removal.

NO_x Control Alternates

The proposed diesels and four alternatives were considered relative to NO_x emissions. NSPS guidelines consider costs prohibitive for NO_x control when the next incremental reduction of emissions costs more than $1000/ton. CES believes that the proposed emission rate of 8 gm/hp-hr represents BACT "on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs." The base case and its alternates are discussed further here. Quantitative information for the five cases is given in Table 1. For each alternate in Table 1, the additional costs associated with incremental emission reduction is shown on an annual dollar basis and on a dollar per ton basis.

Alternate 1

The gas turbine alternate has lower estimated capital costs. Because of the higher heat rate at all loads, fuel costs are much higher and operating costs are increased. The reliability of the equipment is inherently lower as well because one unit (rather than two diesel units) would have been installed for the required generation capacity. As shown in Table 1, this alternate exceeds the NSPS guidelines.

Alternate 2

The second alternate, use of the diesels with additional timing retardation, results in NO_x emissions of 6 gm/hp-hr. Emissions of CO, HC, and opacity are increased in this case. Engine performance also changes; the heat rate increases and the gross output of the unit decreases. The result is higher capital and operating costs. This alternate also exceeds NSPS guidelines.

Alternate 3

The combined-cycle alternate is also lower in capital cost than the base case. Among other disadvantages, the heat rate of this type of unit is higher and its reliability is lower because it is a single unit. Since the unit uses a steam cycle, more operating personnel are required for the equipment when compared to the diesels which operate in an unattended mode. Because the smallest industrial generation equipment available for this option comes in increments of about 30 MW, the actual installation would be larger than Key West generation needs of 20 MW. The result is additional capital costs to the CES' customers.

Alternate 4

Because of limited operating history of SCR equipment on oil-only fired diesel engines, CES believes it is premature to take on the technical and financial risks related to adding SCR to their generating equipment. CES initial investigation is presented in their letter of December 14. This opinion is further supported by information recently received by Fairbanks-Morse following their inquiry of the German engine supplier (Blohm-Voss) responsible for the Piessenberg installation we visited in December. The Blohm-Voss letter is attached.

According to Blohm-Voss, the unit experienced reduced availability because the SCR catalysts fouled and the ammonia pumps have "been troublesome." Ammonia consumption is 50% greater than design. Blohm-Voss stated the fouling increases back-pressure on the engine, reducing engine performance. In an attempt to solve the existing problems, "there has been permanent attention of the Steuler guarantee engineer" during the one year of operation. Steuler has proposed to increase the catalyst volume 30% above original design and intends to change the ammonia pumps. It is apparent the Piessenberg unit is undergoing research and development to achieve its intended design parameters.

SO_2 Control

Table 2 provides additional information regarding the use of 0.3% sulfur fuel rather than 0.5%. The lower sulfur fuel is not currently available commercially in the Florida market and would require specifications be written to secure the lower sulfur fuel.

Economics

The increased costs for the alternates considered range from $200,000 to $2,500,000 per year or 1.2 to 14.6 mills/kWh for the diesel generation equipment. The economic impact of this increase is further emphasized when the relative rates of the Utility Board's customers and their ability to pay as approximated by per capita income is considered. Based on a report by the Florida Municipal Electric Association, the cost of power in May 1988 in Key West for a residential customer using 1,000 kWh per month was 85 mills/kWh, the seventh highest among the total 33 Florida municipal utilities and higher than costs to customers of all investor-owned utilities in the State. In March of 1987, prior to the interconnection of CES with other state utilities which allowed, among other things, the purchase of economy power, the Utility Board had the fourth highest rates in the State at 89 mills/kWh. With respect to personal income of its customers, the per capita income of residents of Monroe County is $11,300 as compared to an average of $12,733 for the State, based on the 1987 Florida Statistical Abstract. This statistic, which approximates personal income and ability to pay, indicates that, while the Utility Board's customers' rates are among the highest in the State, their ability to pay is below the average for the State.

TABLE 1

Comparison of Alternates for NO_x Control

NO_x Cases	Diesel	ALTERNATE 1 Gas Turbine	ALTERNATE 2 Diesel with Additional Timing Retardation	ALTERNATE 3 Combined Cycle	ALTERNATE 4 Diesel with Steuler SCR
Capital Cost ($/kW)	1250	675	1360	900	1400
Heat Rate (Btu/kWh)	8500	13,600	9500	10,800	8500 (2)
Part Load Heat Rate	base	higher	base	higher	base (2)
Amount of Derating (MW)	none	none	1.6	none	none
Reliability	base	lower	base	lower	unknown
Response Time (minute)	10	20	10	90	10
Emission (gm/hp-hr)	8	1.3	6	1.0	0.8
Emission (T/yr) (3)	2100	340	1580	260	210
Increased Cost ($/yr) (1)	base	2,540,000	820,000	980,000	700,000
Cost of Emission Reduction ($/T)	base	1440	1560	530	370

(1) Capital cost amortized at nine percent annual rate, fuel cost of $4/mm Btu, 100% capacity factor, Steuler SCR cost includes ammonia and maintenance.

(2) If Steuler SCR is installed and operating conditions change, engine performance guarantees will be void.

(3) Based on 20 MW output.

TABLE 2

Comparison of Alternates for SO_2 Control

Cases	0.5% S	0.3% S
Fuel Cost ($/mm Btu)	4.00	4.13
Emission (lb/mm Btu)	0.5	0.3
Emission (T/yr)	440	260
Increased Cost ($/yr)	base	200,000
Cost of Emission Reduction ($/T)	base	1110

We trust this information will assist your staff in completing the Preliminary Determination. If you have any further questions please direct them to the author. CES appreciates your diligence in handling this permit application and anticipates your further best efforts.

Sincerely,

R. W. BECK AND ASSOCIATES

Mike Henderson
Principal Engineer

RMP/MDH:kam (104)

cc: Robert Padron, City Electric Service
Ralph Garcia, City Electric Service
Robert Wallace, City Electric Service
Raymond Rodriguez, City Electric Service
Becky Pattinson, R. W. Beck and Associates
Nicholas Guarriello, R. W. Beck and Associates
Keith Platte, R. W. Beck and Associates
Tom Donovan, R. W. Beck and Associates

copied: Pradeep Raval, BAQM
Barry Andrews, BAQM
Shao-Hong Chu, BAQM
David Knowles, SF Dist.
Wayne Aronson, EPA
Miguel Flores, NPS
CHF/BT

Blohm+Voss

Blohm + Voss AG · Postfach 100720 · 2000 Hamburg 1

Mr. V. T. Stonehocker, PE
c/o COLT INDUSTRIES INC.
Fairbanks Morse Engine Division
701, Lawton Avenue,
Beloit, Wisconsin 53511-5492
U. S. A.

Hermann-Blohm-Straße 3
2000 Hamburg 11
Fernruf Hamburg (0 40) 31 19-0
Telegramm-Adresse
Blohmwerk Hamburg
Fernschreiben
2 11 047-0 bv d
2 11 047-30 bv d (Schiffsreparatur)
2 11 047-42 bv d (Maschinenbau)
2 11 047-60 bv d (Anlagenplanung)
Fernkopie (0 40) 3 19 37 37
Registergericht
Amtsgericht Hamburg
66 HR B 6121

Ihre Zeichen	Ihre Nachricht	Unsere Zeichen	Telefondurchwahl	Hamburg, den
	Nov. 15, 88	ME 56/Gbe/Ho	(0 40) 31 19- 519	December 15th, 1988

Subj.: SCR unit at Peißenberg
Ref. : Your letter dtd. Nov. 15th, 1988.

Dear Mr. Stonehocker,

Thank you for your letter, which, unfortunately, reached me with some delay since I was out.

Our experience with SCR, of course, is restricted to this one unit at Peißenberg fitted downstream of a 14 PC 2-5 V DF.C engine with 5980 kW alternator output. The engine has accumulated now 4500 hrs, thereof abt. 800 hrs on gasoil, the remainder in dual fuel mode.

I will try to answer your many questions as follows:

1) Does it do what was intended ?

Guaranteed emission after SCR is 500 mg/m^3 of NO_x (calculated as NO_2, related to dry exhaust gases with 5 % oxygen, as per stipulation of German law), which corresponds to

165 ppm in dual fuel mode
135 " " diesel "

(in your terms: abt. 0,95 g/HPhr).

The limit fixed by the authorities is well above, i.e. 1000 mg/m^3. The emission of the engine is

ard. 800 ppm in dual fuel mode
" 1400 " " diesel "

In dual fuel mode guaranteed and official limits are still reached, whereas in diesel mode only 230 ppm were reached now at increased NH_3 consumption and carryover.

2)

3 of 3

Blohm + Voss AG

Seite 2)

zum Schreiben vom Dec. 15th, 88

an Mr. V. T. Stonehocker, PE
c/o COLT INDUSTRIES INC.
Fairbanks Morse Engine Division
Beloit, Wisc.

Subj.: SCR unit at Peißenberg
Ref. : Your letter dtd. Nov. 15th, 1988.

2) Is it operating without fouling ?

This question cannot yet be answered. Steuler is claiming loss of efficiency due to layer of soot and is presently checking some ceramic moduls taken out recently.
We observed an increasing exhaust back pressure during the last two months, which could be caused by deposits.

3) Is it necessary to clean the unit ?

Neither necessity nor method or schedule are known yet. In general, maintenance and replacement costs of the SCR units are unknown yet. Our to-day's estimation is abt. 2 US-$/MWh.

4) Which control system for ammonia addition ?

Ammonia injection control is based on the downstream measurement of NO_x.

5) Performance of control system ?

There has been permanent attention of the Steuler guarantee engineer. Acc. to their explanations, the main problem was that the ammonia consumption at diesel mode was about 50 % higher than anticipated (due to higher emission of the engine, appr. 30 % more NO_x had to be taken out by the unit).

6) Who furnished the system ?

The system was completely furnished by Steuler.

To solve existing problems it is planned to fit an additional layer of ceramic moduls, thus increasing the active volume by abt. 30 %. Furthermore, new ammonia pumps will replace the existing, quite troublesome ones.

As a summary, in dual fuel mode the performance is quite stable, whereas th results in diesel mode leave some doubts concerning the suitability of the SCR system. However, we just received the order for a second engine at Peißenberg. Furthermore, a total energy plant with 2 x 12 PC2-5V DF.C is under construction at Gelsenkirchen, also to be fitted with Steuler units.

Hoping that the above information may be useful for you and wishing you full success for the anticipated orders,

Sincerely yours,
with Season greetings,
B L O H M + V O S S AG
Diesel Engine Plants
D. Grabbe

Remark:
All figures are given for full load.

UTILITY BOARD OF THE CITY OF KEY WEST

POST OFFICE DRAWER 6100
KEY WEST, FLORIDA 33041-6100

TELEPHONE: (305) 294-5272
TELECOPIER: (305) 294-3685

December 14, 1988

Mr. Clair Fancy, Central Air Permitting
Bureau of Air Quality
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Fl 32399-2400

SUBJECT: PSD Application for Two 10-MW Diesel Generators
at Key West, Florida
Permit Nos. AC44-152197, AC44-152198 and PSD-FL-135

Dear Mr. Fancy:

As indicated in our letter of November 21, 1988, we have investigated the potential use of the Steuler International Corporation ("Steuler") "CER-NOx" Selective Catalytic Reduction ("SCR") system to be installed on the diesel engine generating units proposed to be constructed by the Utility Board of the City of Key West, Florida (the "Utility Board"). The results of this investigation which are outlined below, indicate (i) that the experience with the Steuler SCR system relative to diesel fueled generation is very limited and this system should be considered in the demonstration category relative to technical risk, not having been proven commercially; (ii) the addition of the Steuler SCR system will, in effect, void the Utility Board's existing performance guarantees and warranty on the diesel engine generator set, since Fairbanks Morse will not take any responsibility for the impact of the SCR equipment on the plant operation, performance and reliability; and (iii) the additional cost of this SCR system is excessively burdensome on the Utility Board's customers, which already have high electric rates as compared to customers of other electric utilities in the State, since, even if successful, it would result in a minimal benefit to the environment, based on the expected usage of this equipment, at a very high cost to the community for such benefit.

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AIRBILL NUMBER 671774965 1

7380M 671774965 1

Date 12/14/88

1 From (Your Name) Please Print: Robert R. Padron, Manager

Your Phone Number (Very Important): ( )

Company: UTILITY BOARD OF KEY WEST

Department/Floor No.:

Street Address: 1001 JAMES STREET

City: KEY WEST State: FL ZIP Required For Correct Invoicing: 33040

2 To (Recipient's Name) Please Print: Mr. Clair Fancy, Central Air Permitting Bureau of Air Quality

Recipient's Phone Number (Very Important):

Company: Florida Department of Environmental Regulations

Department/Floor No.: Twin Towers Office Building

Exact Street Address (Use of P.O. Boxes or P.O. Zip Codes Will Delay Delivery And Result in Extra Charge.): 2600 Blair Stone Road

City: Tallahassee State: Florida ZIP Street Address Zip Required: 32399

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Steuler Experience

Although Steuler has installed the SCR system in various applications in several European countries for approximately five years, there are very few applications similar to the one proposed for Key West, that is, on a diesel engine which utilized only diesel fuel. There is only one installation in the United States on a diesel unit, located in Adams, Massachusetts, which could possibly be considered pertinent to the Key West installation. This unit is a dual-fueled unit which utilizes gas and oil and is presently still in the start-up phase. There is no operating data on the use of this SCR system on any diesel generating unit that would operate only on diesel fuel as the Key West units.

For purposes of reviewing the process, our consulting engineer visited an engine installation in Peisenburg, West Germany in the company of Steuler's process engineer. The diesel engine that was visited was a smaller engine (6 MW) and was utilized in a different application, being part of the district heating system, than the Key West application. The diesel engine had been in operation for less than one year and had only operated for approximately 500 hours on diesel oil, the fuel which is to be utilized exclusively on the Key West units. At the time of the visit the engine was down for turbocharger repairs, and had previously required repairs to the SCR ammonia pump. Based on a review of the operating records, it was reported that the SCR system had achieved a 90% removal of NOx emissions when operated on diesel oil, but because of the limited amount of data (500 hours), our consulting engineer was unable to judge the probability of the continued effective operation of the Steuler SCR system nor the potential impact of the Steuler SCR system on the generating equipment's performance and reliability.

From a physical standpoint, the Steuler SCR system consists primarily of the SCR compartment, aqueous NH3 tank, control cabinet, metering pumps and condenser. The SCR unit occupied approximately 50% of the floor space required for the entire diesel units. The SCR system requires the use of large amounts of ammonia (NH3), and for the

application in Key West would require approximately 220 lbs. per operating hour. The aqueous ammonia is mixed on site.

With the limited experience on the Steuler SCR system, the Utility Board believes it would be taking an unwarranted technical and financial risk in installing such a system on its diesel engines. The Utility Board cannot install unproven technology for use on its electric system. In the view of Fairbanks Morse, and our consulting engineer the operation of the Steuler SCR system on diesel oil-fueled, diesel generating units has not been adequately demonstrated. Without an adequate demonstration of successful commercial use for this technology, the Utility Board cannot risk utilizing this unproven technology on generating units which comprise approximately 25% of its generating resources. The diesel generating units were selected by the Utility Board, after screening approximately 12 potential options, because of their quick start capability, fuel efficiency over a wide range of outputs, proven dependability, and the unavailability of natural gas as a fuel option. Certain resources which were considered, such as conventional combustion turbines, have significantly lower fuel efficiency especially at less than full load, are less reliable, and require twice the response time. The more advanced "aircraft derivative" combustion turbines, although promising better performance than the conventional combustion turbines, are just becoming available for utility use and are not considered at this time as commercially proven technologies for the Utility Board's next increment of generation in 1990. In evaluating various power supply alternatives, the Utility Board has chosen not to select alternatives which represented technology in the demonstration stage, since with its relatively small size, the Utility Board has determined that it needed to install generating resources that were based on proven mature technologies which could be depended upon to operate reliably. The addition of the Steuler SCR system to the Utility Board's diesel generators would place these units in the same high technical risk category which the Utility Board has sought to avoid.

Fairbanks Morse Contract

We have requested that Fairbanks Morse, the selected diesel unit vendor respond with its opinion on the feasibility of installing the Steuler SCR System on its diesels, and inform us of the contractual terms under which it would maintain heat rate and output guarantees with the Steuler SCR system installed in its exhaust system. The response, which is attached , states that Fairbanks Morse is unable to take any responsibility for the impact, if any, on plant operation , performance and reliability of its equipment, including the heat rate and kilowatt output, that may result from the addition of the Steuler SCR system and therefore, would find it necessary to withdraw its existing guarantees and void its existing warranty on the equipment if the SCR system were installed. In making this decision, Fairbanks Morse states that the current experience on the Steuler SCR system is insufficient at this time to consider this system a full commercial proposition, citing the lack of experience relating to the use of the Steuler SCR system to reduce NOx emissions from engines burning diesel fuel. Fairbanks Morse further states that the inclusion of the Steuler SCR system will alter the building design and engine layout and that any additional costs of delays in the construction schedule would have to be borne by the City. Since it is very unlikely that Steuler will provide any warranties on the Fairbanks Morse equipment, the Utility Board would in effect be left without the existing warranty coverage and performance guarantees on its diesel engines.

Economic Impact

The additional costs to the Utility Board associated with the SCR system installation on the proposed diesel units are summarized on Table 1. As this table indicates, the initial cost for the Steuler SCR system is estimated to be approximately $2,925,000 including financing costs, which costs were not included in the bond issue for the diesel units. Such initial cost is excluding any additional costs due to changes in the building

design and engine layout or due to delays in the start-up of the diesels as a result of adding the SCR equipment. Assuming this investment is financed by the issuance of additional bonds, it is estimated that the Utility Board's annual debt service would increase by approximately $252,000. The other major operating costs would include additional annual maintenance costs estimated to be approximately $215,000 and the cost of ammonia which would vary according to the use of the generating facility and could be as high as $230,000 in the first full year of operation. As shown on Table 1, these additional costs are estimated to total approximately $697,000 in the first full year of operation assuming continuous full load operation, and are estimated to total approximately $532,000 assuming 2,500 hours of equivalent full load operation.

It is expected that, on the average, the diesel generating units would be operated approximately 2,500 hours per year of equivalent full load operation. Based on this level of operation, it is estimated that the Steuler SCR system, if operating successfully, would remove approximately 510 tons of NOx emissions per year, which would cost the Utility Board's customers over a $1,000 per ton. This additional SCR system cost also represents an increase of over one cent per kilowatt hour to the cost of electricity produced by the diesel generators. This increase in cost would require an immediate rate increase for the Utility board's customers that would be additionally burdensome to Utility Board's customer which have had the highest electric rates in the State in recent years and have just recently had a significant rate increase to finance the construction of the diesel generating units.

One of the principal reasons for installing these additional diesel generating units was to replace the older Key West steam units for various environmental reasons. With the installation of the Steuler SCR system, the Utility Board's customers are being penalized for taking actions which are aimed at improving the community's environment. Another factor which should be considered is the potential for a detrimental impact on the environment and on personnel safety resulting from handling the large quantities of ammonia associated with the operation of the Steuler SCR system which could offset the minimal benefits of the reduced NOx emission. Our

consulting engineer believes that when the Steuler SCR system is used for load following applications, emissions of NOx and ammonia will vary. When load is increased, NOx output is likely to exceed permitted levels. During the previously mentioned site visit, these excursions during start-up were reported in the operating records. During decreases of load, the Steuler SCR system will likely allow release of ammonia because of its inherently slow response time. No determinations have been made as to the regulatory and safety requirements associated with ammonia storage, handling, and stack emissions, but in the Key West environment and with the reduced solubility of ammonia at high ambient temperatures, these concerns are expected to be significant.

In summary, due to the technical risk the Steuler SCR system adds to the Utility Board's diesel generating units associated with potential impacts on performance and reliability, the detrimental effect on the Utility Board's existing performance guarantees and warranty with Fairbanks Morse for the diesel engine generators, the burdensome cost to the Utility Board's customers associated with the addition and operation of the Steuler SCR system, and the minimal benefit to the environment associated with such equipment, the Utility Board is of the opinion that the addition of the Steuler SCR system is not a reasonable nor technically feasible alternative. We believe these concerns support the position that "on a case-by-case basis, taking into account energy, environmental and economic impacts, and other costs", the best available control technology for NOx emissions is the proposed 8 gm/hp-hr as requested in our application.

Table 1

Economic Analysis of SCR for NOx

Capital Costs		
Direct Costs for SCR	$2,300,000	
Financing Costs	625,000	
Total	$2,925,000	
Annual Operating Costs for SCR ($/yr)		
Equivalent Full Load Hours of Operation (hrs/year)	8,760	2,500
Net Generation (MWH (1)	168,192	48,000
Net Debt Service ($) (2)	252,000	252,000
Maintenance ($) (3)	215,000	215,000
NH3 Cost ($) (4)	230,000	65,000
Total Cost	697,000	532,000
(cents/kWh)	.41	1.11
NOx Removal		
Tons/Year (5)	1,790	510
$/Ton	389	1,043

(1) Based upon a combined net output for the diesel generators of 19,200 kw.

(2) Based on assumed interest rate of 8.25% for municipal tax exempt debt and 25 year amortization period.

(3) Average assumed cost for 10-year period based upon letter from Steuler Industriewerke.

(4) Based upon 90% NH3 removal, and usage of 220 lbs/hr of full load and cost of $0.12/lb.

(5) Based upon an uncontrolled emission of 8 gm/hp-hr

We appreciate your consideration of this new information prior to making a preliminary determination on our application. We would also appreciate notification when this information has been determined to be complete based on your review. Thank you for placing the application on hold while we have developed this information.

Very truly yours,

UTILITY BOARD - CITY OF KEY WEST
"CITY ELECTRIC SYSTEM"

Robert R. Padron
General Manager

RRP/sh
cc:
Leo Carey, Ass't. to the Manager
Ralph Garcia, Sr., Ass't. to the Manager
Larry J. Thompson, Operations Manager
Paul Esquinaldo, Jr., Finance Manager
L. T. Curry, Jr., Production Manager
M. D. Henderson
B. Pattinson
K. Platte
N. Guarriello
T. J. Reder
copied: P. Raval
B. Andrews
S. W. Cline
D. Aronson, EPA
K. [illegible], SF Dist.
CHF/BT

Colt Industries

Fairbanks Morse
Engine Division
701 Lawton Avenue
Beloit, Wisconsin 53511

Thomas J. Reder
Vice President
Sales & Marketing
Phone: 608/364-8173
Fax: 608/364-0382
Telex: 260007 COLTFMOFF BELT

December 7, 1988

R. W. Beck & Associates
Denver National Bank Building
Suite 1900
1125 Seventeenth Street
Denver, CO 80202

Attention: Mr. Keith Platte

Subject: NOx Abatement System For Key West Project

Gentlemen:

As we indicated in our proposal back in June, exhaust gas post treatment via SCR catalyst technology did not have sufficient commercial experience for us to provide a commercial warranty acceptable to yourselves or the City of Key West.

We have reviewed the Steuler International Corporation proposal and would agree their molecular - sieve technology is promising and that the level of experience worldwide is growing, however, essentially all of their experience is overseas and on dual fuel engines. Gas turbines and engines firing on natural gas are easier applications in which to reduce emissions than are engines burning diesel fuel with higher sulfur content. We do not believe the experience in Europe is necessarily transferable across the border and therefore is insufficient at this time to consider SCR a fully commercial proposition. There are none of this type of SCR system currently operating in the U.S. on large bore diesel engines of which we are aware.

If it is decided that a Steuler system be utilized with our engines we would prefer the purchase, installation, warranty, etc. be handled by the City since we have no experience with this equipment on our engines we are unable to take responsibility for the impact, if any, on the plant operation, performance, or reliability of our equipment. Further, we cannot provide the KW output or heat rate guarantees listed in our proposal nor extend the warranty on our equipment as proposed.

It should be emphasized that the Steuler proposal is a budget proposal and represents equipment FOB Mertztown, PA. If Colt were to purchase this equipment, deliver it to the site, and install it in "available" space at the site, an estimated minimum price increase to the contract in the range of 2.3 million dollars would be necessary.

In addition to the above capital costs, if we understand Steuler's proposal, the operating costs for ammonia could be at least $60/engine/operating hour and replacement catalyst costs (after the initial cycle) $175,000 - $200,000/ year based on their guarantee period.

The inclusion of this equipment will alter the building design and engine layout, and thus, any additional cost or delays in the start up as a result of this expanded scope would be borne by the City.

Sincerely,

Thomas J. Reder
Vice President
Sales & Marketing

TJR/ems

UTILITY BOARD OF THE CITY OF KEY WEST

POST OFFICE DRAWER 6100
KEY WEST, FLORIDA 33041-6100

TELEPHONE: (305) 294-5272
TELECOPIER: (305) 294-3685

November 21, 1988

RECEIVED
NOV 23 1988
DER - BAQM

Mr. Clair Fancy, Central Air Permitting
Bureau of Air Quality
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJECT: PSD APPLICATION FOR TWO 10-MW DIESEL GENERATORS
AT KEY WEST, FLORIDA
Permit Nos. AC44-152197, AC44-152198 & PSD-FL-135

Dear Mr. Fancy:

It has recently come to our attention that German technology for Selective Catalytic Reduction ("SCR") of NOx emissions from small dual-fueled gas/oil-fired engines has been installed in the U.S. and will be tested in the near future. The applicability of this new SCR technology to the proposed Key West diesel units is contingent on resolving numerous questions that are specific to the Key West situation, such as its proven technical capabilities, its impact on unit performance and vendor guarantees, and its economic impact on the citizens of Key West. In order to develop information relative to the engineering and economic aspects of such equipment, which are pertinent to your BACT analysis for the proposed Key West diesels, we are planning to meet with the vendor and our selected contractor, Fairbanks Morse.

In recognition of your statutory requirement to make a determination within 90 days of receipt of a complete application (less 30 days for public comment on a preliminary determination) and your indicated intent to issue a preliminary determination by November 23, 1988, we hereby request that you place our application on hold at this time, pending our submission of further additional pertinent information. We are making

an expedited effort to gather information since we have our contractor on hold, and there is an indicated need to retire three existing steam units (for which the proposed diesels will provide replacement power) by February 1990.

Very truly yours,

UTILITY BOARD - CITY OF KEY WEST
"CITY ELECTRIC SYSTEM"

Robert R. Padron
General Manager

/sh
cc:
Leo Carey, Ass't. to the Manager
Ralph Garcia, Sr., Ass't. to the Manager
Larry J. Thompson, Operations Manager
Paul Esquinaldo, Jr., Finance Manager
L. T. Curry, Jr., Production Manager
Mike Henderson
Becky Pattinson
K. Platte
Nick Guarriello

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHEAST REGIONAL OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

RECEIVED
OCT 14 1988
DER-BAQM

IN REPLY REFER TO:
N16 (SER-CDN)

OCT 11 1988

Mr. Clair Fancy, Central Air Permitting
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

We appreciate the opportunity to review and comment on the Prevention of Significant Deterioration (PSD) permit application submitted by the Utility Board of the City of Key West, Florida, to add two 10-MW, Fairbanks Morse (model unspecified) diesel generators to their Stock Island plant. Concurrent with the startup of the two 10-MW diesel generators at the Stock Island site will be the retirement of three existing 16.5-MW steam units located approximately 6.5 km west of the Stock Island site at the Key West Plant. We understand that as a result of the retirement of these three steam units, the proposed project should result in a net decrease in area emissions.

The Stock Island site is located 1 mile east of the city of Key West and approximately 100 km southwest of Everglades National Park, a class I air quality area, and approximately 5 km south of Great White Heron National Wildlife Refuge, a class II air quality area. Under a cooperative agreement with the U.S. Fish and Wildlife Service, the National Park Service provides technical review of PSD permit applications that affect areas administered by the Fish and Wildlife Service.

Based on the National Park Service's review of the information provided, the distance of the facility from Everglades National Park, South Florida climatology, and the projected net decreases in area emissions, the proposed project should not adversely impact the air quality or air quality related values of Everglades National Park. However, based on the lack of ambient air quality monitoring and research data available we cannot determine whether or not emissions from the Key West City Electric System facility will impact the air quality related values (especially slash pine) of the Great White Heron National Wildlife Refuge. We do have several comments regarding (1) the best available technology analysis for sulfur dioxide and nitrogen oxides, (2) the air quality analysis, and (3) the air quality related values analysis (see enclosure).

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
SOUTHEAST REGION
75 SPRING STREET, S.W.
ATLANTA, GEORGIA 30303

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

RECEIVED
OCT 14 1988
DER-BAQM

Mr. Claire Fancy, Central Air Permitting
Bureau of Air Quality Management
Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

We appreciate your continued early notification of permitting activities that have the potential to impact the air quality or air quality related values of National Park Service and Fish and Wildlife Service lands in Florida. Please consider the enclosed information for your permit review for the Key West City Electric System project. If you have any questions regarding these comments, please contact Wayne King of our Air Quality Division (303) 969-2072.

Sincerely,

C. W. Clough

FOR Robert M. Baker
Regional Director
Southeast Region

Enclosure

copied: Pradeep Raval
Barry Andrews
Wayne King
Dave Knowles, SE Dist
CITE/BT

The following are comments furnished by the National Park Service regarding the Prevention of Significant Deterioration permit application submitted by the Utility Board of the City of Key West, Florida.

The emissions from the two 10-MW diesel engines are estimated as follows:

Pollutant	Emission rate (Tons/year)
Nitrogen oxides	2100
Carbon monoxide	520
Sulfur dioxide	440
Volatile Organic Compounds	260
Total suspended particulates	90

Based on our review of the information provided, we have several comments regarding (1) the best available control technology (BACT) analysis for sulfur dioxide (SO_2) and nitrogen oxides (NO_x), (2) the air quality analysis, and (3) the air quality related values analysis. The applicant, Key West City Electric System (CES), is proposing to fire No. 2 fuel oil (0.5% sulfur) in the two diesel engines as representative of BACT for controlling SO_2. A recent (August 5, 1988) PSD permit application submitted by CEC Energy Co., Inc. (CEC Energy) for the construction of a similar cogeneration facility for the Virgin Islands Water and Power Authority in St. Croix, U.S. Virgin Islands, was reviewed by National Park Service Air Quality Division personnel. CEC Energy is now proposing the firing of fuel oil with a 0.2% (rather than the 0.3% originally proposed) maximum sulfur content in three Stork-Werkspoon model 6 TM 620 diesel engines. Consistent with the Environmental Protection Agency's "top down" approach to BACT determinations, 0.2% (maximum 0.3%) sulfur content oil should be considered as BACT to minimize SO_2 emissions from the Fairbanks Morse diesel engines proposed by Key West CES, unless the applicant satisfactorily demonstrates that burning such fuel in the proposed engines is economically or technically infeasible.

Regarding NO_x controls, Key West CES has received information from potential vendors relative to NO_x reductions. The vendors evaluated the reductions achievable without additional equipment and with selective catalytic reduction. After reviewing the vendor information, Key West CES feels a NO_x limit of 8 gm/hp-hr (equivalent to approximately 4 degree timing retardation) represents BACT. Again referencing the CEC Energy PSD permit application, the diesel engine manufacturer, Stork-Werkspoon Diesel, underwent an extensive development and testing program to redesign the engine to use additional retard to decrease NO_x while at the same time maintain opacity at acceptable levels. This program included redesigning and testing the following:

- fuel cam profile
- fuel pump delivery valve
- fuel pump discharge valve
- fuel injector spray hole diameter
- fuel injector spray hole number

- fuel injector spray hole angle
- fuel injector position in the cylinder head
- fuel injection retard
- turbocharger turbine wheel flow area
- turbocharger turbine nozzle ring flow area
- turbocharger compressor wheel flow area
- turbocharger compressor wheel vane angle
- turbocharger compressor diffusor flow area
- turbocharger compressor diffusor vane angle

Based on the results of the engine testing and redesigning program, Stork-Werkspoon concluded that at full load, not only would it be possible to operate the CEC Energy engines at 8 degrees retard and obtain considerable reductions in NO_x (6 gm/hp-hr), but engine efficiency would be improved slightly from that previously obtained with 4 degrees retard.

Regarding the air quality and air quality related values analyses, Key West CES performed a level-1 visibility screening analysis for Everglades National Park. All three calculated parameters were well below the recommended Environmental Protection Agency's value of 0.10. Therefore, further analysis of potential visibility impacts to Everglades National Park is not necessary, and we would not expect emissions from the proposed engines to significantly impact visibility at the park.

In addition, the proposed project, in conjunction with the retirement of the three Key West steam units, should result in a net reduction in area emissions. Consequently, the net air quality impacts of the project should be minor.

To assist you in the review of future permit applications for projects proposed near Everglades National Park, we would like to take this opportunity to briefly describe some of the sensitive resources at the park and discuss the park's on-going research activities. There are numerous sensitive resources in Everglades National Park. Among these are: (1) slash pine, (2) lichens, (3) epiphytes (bromeliads and orchids), and (4) endangered and threatened species. The pine found in Everglades National Park and the Florida Keys is a variety of slash pine that is biologically distinct from the slash pine found in other parts of the southeastern United States. Originally extending throughout some 300,000 acres along a limestone ridge in southeast Florida, the species have been seriously cut back by urban development so that the only remaining population (approximately 20,000 acres) of this variety is in Everglades National Park. Smaller natural stands of slash pine are also known to occur as far south as Sugarloaf Key at Great White Heron National Wildlife Refuge. Currently there are four research projects on-going at Everglades National Park to determine the sensitivity of slash pine, bromeliads and lichens to ambient levels of O_3 and SO_2. It is too early to determine if existing O_3 and/or SO_2

concentrations are impacting these air quality related values of Everglades National Park; however, slash pine is known to be sensitive to $\emptyset_3$ levels as low as Ø.Ø5 ppm for 18 weeks of exposure. The highest monthly mean recorded thus far at Everglades National Park has been Ø.Ø38 ppm (April 1987) and the second highest has been Ø.Ø37 ppm (April 1988). If future research results show that O_3 and/or SO_2 injury is affecting susceptible floristic resources within Everglades National Park or Great White Heron National Wildlife Refuge further ozone precursor and SO_2 reductions may be necessary in order to protect these resources.

In conclusion, based on the most recent information available, firing of Ø.2% sulfur fuel oil in the Fairbanks Morse diesel engines represents BACT to minimize SO_2 emissions, and 8 degree timing retardation (a NO_x limit of 6 gm/hp-hr) represents BACT to minimize NO_x emissions from the proposed engines, unless it can be shown such measures are technically or economically infeasible. Also, based on the distance of the facility from Everglades National Park, South Florida climatology, and the projected net decrease in area emissions, the proposed project should not adversely impact the air quality or air quality related values of Everglades National Park. However, based on the lack of ambient air quality monitoring and research data available we can not determine whether or not emissions from the Key West CES facility will impact the air quality related values (especially slash pine) of Great White Heron National Wildlife Refuge.

We ask that you consider the above information in conducting your permit review for the Key West CES project. If you have any questions regarding these comments, please contact Wayne King of our Air Quality Division at (3Ø3) 969-2Ø72.

PM
9-29-88
Atlanta, GA

file copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

SEP 29 1988

4APT/APB-aes

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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, Florida 32399

Re: Key West Diesel Engine Generating Station

Dear Mr. Fancy:

10-4-88

We have reviewed the permit application, ~~preliminary determination and draft permit~~ for the construction of the Key West Diesel Generating Station. The permit was reviewed under the Region IV Overview of State Programs Policy. We offer the following comments:

Emission Limits

As you know, EPA now requires that PM_{10} emissions be addressed in air permits (ref: Federal Register (52 FR 24634)); therefore, an emission limit for PM_{10} should be included in the discussion of the projected pollutant emissions for this facility.

Compliance Testing

To be more sufficient, the permit must include test methods to be used in compliance testing for each pollutant. When designating each test method, include which version of the 40 CFR Parts 60 and 61 to be used. Also, for pollutants not subject to testing provisions contained in 40 CFR Parts 60 or 61, include a testing protocol, specifying each pollutant's sample volume, sample time and the number of test runs for each test method specified.

Air Quality Analysis

The summary of the downwash modeling did not explain why a downwash analysis for the diesel generator was done for the Prevention of Significant Deterioration (PSD) increment analysis but was not done for the Ambient Air Quality Analysis. Also, it was not explained why the Key West gas turbine was eliminated from the downwash analysis.

Concerning the modeling for the steam unit, it was not clear whether both diesel generators are vented through the same stack and if the steam unit also exits through that same stack.

Thank you for the opportunity to provide you with our comments. If you have any questions or comments, please contact me or Karrie-Jo Shell of my staff at (404) 347-2864.

Sincerely yours,

Bruce P. Miller

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

cc: R.W. Beck and Associates
City of Key West, Florida

copied: Pradeep Raval
Barry Andrews
Shao-Hang Chu
David Knowles, SF Dist.
CHF/ET

R.W. BECK
AND ASSOCIATES

Denver National Bank Building, Suite 1900 ■ 1125 Seventeenth Street ■ Denver, Colorado 80202-2015
Telephone (303) 295-2000 ■ Fax (303) 297-2515

FC-5801-CA1-CA

September 22, 1988

Mr. Clair Fancy
Central Air Permitting
Bureau of Air Quality Management
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: PSD Application for Two 10-MW Diesel Generators
at Key West, Florida
Permit Nos. AC44-152197, AC44-152198 and PSD-FL-135

Dear Mr. Fancy:

The purpose of this letter is to correct the September 19, 1988 presentation of downwash impact calculations for the Stock Island Steam unit and the proposed diesel generators. The ISCST model outputs attached to the September 19, 1988 letter include separate impacts from the steam unit and the diesel generators, and have been utilized for the correction. Table 13, 9 and 10 as revised on September 19, 1988 consider the impacts separately. Corrections are hereby made (and Tables 13 and 9 revised accordingly) which consider the combined impacts of the sources on a short-term basis for the five years of analysis and for comparison to AAQS. For comparison to PSD increments in Table 10, no revision is necessary since only the downwash impact of the diesel generators (per Table 13 revised September 19, 1988) was assumed.

As the values in both Tables 9 and 10 indicate, compliance with AAQS and PSD Class II increments is achieved.

It is further noted that on July 1, 1987 EPA set the significant emission limit for PM-10 at 15 TPY, above which BACT analysis is required. The particulate matter emissions for the proposed diesel generators are conservatively expected to be 100% PM-10 and to exceed 15 TPY. However, as indicated in the July 14, 1988 application there are no known particulate collection installations on diesel engines and consequently no BACT analysis has been done.

If you have any questions relative to this information please contact the undersigned. CES appreciates the diligence directed to this permit application thus far and anticipates expeditious development of a preliminary determination.

Sincerely,

R. W. BECK AND ASSOCIATES

Michael D. Henderson
Principal Engineer

MDH:cl (0973W)
Enclosures

cc: R. Padron
R. Wallace
R. Garcia
R. Rodriguez
B. Pattinson

copied: Pradeep Raval
Barry Andrews
Shao-Hang Chu
David Knowles, SF Dist.
Wayne Aronson, EPA
Miguel Flores, NPS
CH-F/BT

TABLE 9

COMPLIANCE WITH AAQS

Revised September 22, 1988

Pollutant	Average Time (hr)	Standard (ug/m^3)	Background (ug/m^3) (1)	Two 10-MW Diesel Impact (ug/m^3)	Total (ug/m^3)
CO	8	10,000	5,500)	31 (4)	5,531
	1	40,000	11,000	39	11,039
Pb	2,190	1.5	0.15	0.0001 (5)	0.15
NO_2	8,760	100	35	5.8	43.8
O_3	1	250	210 (2)	20 (6)	230
SO_2	8,760	60	15	1.2	25 (7)
	24	260	65	146 (9)	211
	3	1,300	325	458 (9)	783
TSP (8)	8,760	50	41 (3)	0.2	41.2
	24	150	99 (3)	1.9	100.9

---

(1) Values for state-wide background level from:

State of Florida Department of Environmental Regulations
Bureau of Air Quality Management, November, 1987 "Ambient Air Quality in Florida 1986."

(2) Value from Lee County.

(3) Value from Monroe County.

(4) Conservative value actually for 3-hour impact.

(5) Value actually for annual-average impact.

(6) Conservative value actually for HC, O_3 indeterminate.

(7) Includes interaction with Stock Island steam unit.

(8) Standard revised July 1, 1987 to consider only particles less than or equal to 10 um size.

(9) Includes combined downwash impacts from Stock Island steam unit.

TABLE 10

COMPLIANCE WITH PSD INCREMENTS

Revised September 19, 1988

Pollutant	Average Time (hr)	Class II Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	512	117 (2)	0	0	117
	24	91	46 (2)	0	0	46
	8,760	20	1.2	0	0.8	0.4
TSP	24	37	9.2 (2)	0	0	9.2
	8,760	19	0.2	0	0	0.2
NO_2	8,760	25	5.8	0	0.2	5.6

Pollutant	Average Time (hr)	Class I Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	25	2.0	0.9	10.8	0
	24	5	0.3	0.3	2.4	0
	8,760	2	0.010	0.008	0.092	0
TSP	24	10	0.04	0.02	0.09	0
	8,760	5	0.002	0.001	0.003	0
NO_2	8,760	2.5	0.05	0.005	0.02	0.04

(1) Value equal to diesel impact + gas turbine impact - steam impact and negative numbers set equal to zero.

(2) Includes downwash impact due to Stock Island steam building.

TABLE 13

DOWNWASH at STOCK ISLAND
COMBINED SO_2 IMPACT with 70 FOOT BUILDING

Revised September 22, 1988

	Year	Second High 3-Hour Steam and Diesel	Second High 24-Hour Steam and Diesel
Impact (ug/m^3)	1981	364	104
Direction		120	130
Distance		0.35	0.4
Day		78	78
Impact (ug/m^3)	1982	353	72
Direction		240	250
Distance		0.4	0.45
Day		125	125
Impact (ug/m^3)	1983	411	62
Direction		290	50
Distance		0.35	0.35
Day		20	59
Impact (ug/m^3)	1984	350	55
Direction		20	270
Distance		0.4	0.5
Day		88	362
Impact (ug/m^3)	1985	458	146
Direction		230	230
Distance		0.35	0.4
Day		323	322

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

September 21, 1988

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Michael D. Henderson
Principal Engineer
R. W. Beck and Associates
Denver National Bank Building, Suite 1900
1125 Seventeenth Street
Denver, Colorado

Dear Mr. Henderson:

This letter is to inform you that on September 20, 1988, the Bureau received the ISCST Model outputs and the corresponding impact summary for the two 10-MW diesel generators at Key West, Florida. The Bureau is now in the process of determining if this most recent submittal is sufficient to complete the application.

If you have any questions, please call Shao-Hang Chu (modeling), Barry Andrews (BACT), or Pradeep Raval (permitting), 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/BA/a

cc: D. Knowles, SF District
W. Aronson, EPA
M. Flores, NPS

R.W. BECK
AND ASSOCIATES

Denver National Bank Building, Suite 1900 ■ 1125 Seventeenth Street ■ Denver, Colorado 80202-2015
Telephone (303) 295-6900 ■ Fax (303) 297-2811

FC-5801-CA1-CA

September 19, 1988

Mr. Clair Fancy
Central Air Permitting
Bureau of Air Quality Management
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: PSD Application for Two 10-MW Diesel Generators
at Key West, Florida
Permit Nos. AC44-152197, AC44-152198 and PSD-FL-135

Dear Mr. Fancy:

The purpose of this letter is to respond to your staff's informal request for downwash analysis of the Stock Island steam unit and the proposed diesel generators, with consideration of direction-dependent building dimensions. Prior information submitted on August 23, 1988 used a single set of building dimensions and should be disregarded. In order to perform this analysis, direction dependent projected widths have been calculated for the combination of the two buildings, as indicated in the modeling input listing. The ISCST model utilizes the Schulman-Scire downwash procedure when the regulation default option is specified and the physical stack height is less than the building height plus one-half the lesser of building height or width. At Stock Island the direction dependent projected building widths are all less than the building height. Consequently, a conservative building height of 70 feet (approximate distance between top of elevator shaft and ground level as indicated in elevation views of the Stock Island steam building enclosed with August 23, 1988 submittal) was utilized to permit use of the Schulman-Scire procedure.

Complete analyses with five years of meteorological data were made of downwash at the steam unit and diesel generators in 36 wind directions and 9 downwind distances. These results are submitted in enclosed Table 13 (complete ISCST outputs for the years 1981, 1982, 1983, 1984 and 1985 for the diesel generators are also enclosed) and incorporated into enclosed Tables 9 and 10. For comparison to AAQS, the downwash impact of the Stock Island steam

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Department/Floor No.:

Street Address: [redacted]

City: [redacted] **State:** [redacted] **ZIP Required:** [redacted]

To (Recipient's Name) Please Print: Mr. Clair Fancy

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

Company: Bureau of Air Quality Management
Florida Department of Environ. Regs.

Department/Floor No.:

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unit was considered with the non-downwash impact of the diesel generators. For comparison to PSD increments, the downwash impact of the diesel generators was assumed.

As the values in both Tables indicate, compliance with AAQS and PSD Class II increments is achieved.

If you have any questions relative to this information please contact the undersigned. CES appreciates the diligence directed to this permit application thus far and anticipates expeditious development of a preliminary determination.

Sincerely,

R. W. BECK AND ASSOCIATES

Michael D. Henderson
Principal Engineer

MDH:lef (1486F)
Enclosures (5 copies of modeling results)

cc; R. Padron
R. Wallace
R. Garcia (w/o modeling results)
R. Rodriquez (w/o modeling results)
B. Pattinson (w/o modeling results)

copied: Pradeep Raval
Barry Andrews
Shao-Hang Chu
David Howekamp, SF Dist.
Wayne Aronson, EPA
Miguel Solares, NPS
CHF/BT

TABLE 9

COMPLIANCE WITH AAQS

Revised September 19, 1988

Pollutant	Average Time (hr)	Standard (ug/m^3)	Background (ug/m^3) (1)	Two 10-MW Diesel Impact (ug/m^3)	Total (ug/m^3)
CO	8	10,000	5,500)	31 (4)	5,531
	1	40,000	11,000	39	11,039
Pb	2,190	1.5	0.15	0.0001 (5)	0.15
NO_2	8,760	100	35	5.8	43.8
O_3	1	250	210 (2)	20 (6)	230
SO_2	8,760	60	15	1.2	25 (7)
	24	260	65	9.5	175 (9)
	3	1,300	325	27	710 (9)
TSP (8)	8,760	50	41 (3)	0.2	41.2
	24	150	99 (3)	1.9	100.9

---

(1) Values for state-wide background level from:

State of Florida Department of Environmental Regulations
Bureau of Air Quality Management, November, 1987 "Ambient Air Quality in Florida 1986."

(2) Value from Lee County.

(3) Value from Monroe County.

(4) Conservative value actually for 3-hour impact.

(5) Value actually for annual-average impact.

(6) Conservative value actually for HC, O_3 indeterminate.

(7) Includes interaction with Stock Island steam unit.

(8) Standard revised July 1, 1987 to consider only particles less than or equal to 10 um size.

(9) Includes downwash impacts from Stock Island steam unit.

TABLE 10

COMPLIANCE WITH PSD INCREMENTS

Revised September 19, 1988

Pollutant	Average Time (hr)	Class II Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	512	117 (2)	0	0	117
	24	91	46 (2)	0	0	46
	8,760	20	1.2	0	0.8	0.4
TSP	24	37	9.2 (2)	0	0	9.2
	8,760	19	0.2	0	0	0.2
NO_2	8,760	25	5.8	0	0.2	5.6

Pollutant	Average Time (hr)	Class I Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	25	2.0	0.9	10.8	0
	24	5	0.3	0.3	2.4	0
	8,760	2	0.010	0.008	0.092	0
TSP	24	10	0.04	0.02	0.09	0
	8,760	5	0.002	0.001	0.003	0
NO_2	8,760	2.5	0.05	0.005	0.02	0.04

(1) Value equal to diesel impact + gas turbine impact - steam impact and negative numbers set equal to zero.

(2) Includes downwash impact due to Stock Island steam building.

TABLE 13

DOWNWASH at STOCK ISLAND
SO_2 IMPACT with 70 FOOT BUILDING

Revised September 19, 1988

	Year	Second High Diesel	3-Hour Steam	Second High Diesel	24-Hour Steam
Impact (ug/m^3)	1981	96	272	45	65
Direction		240	120	240	130
Distance		0.25	0.35	0.25	0.35
Day		45	78	97	75
Impact (ug/m^3)	1982	89	252	30	46
Direction		280	240	280	250
Distance		0.25	0.4	0.25	0.45
Day		30	125	337	125
Impact (ug/m^3)	1983	86	281	32	37
Direction		290	290	170	50
Distance		0.25	0.35	0.25	0.35
Day		20	20	365	59
Impact (ug/m^3)	1984	86	224	27	28
Direction		280	20	270	270
Distance		0.25	0.4	0.25	0.5
Day		266	88	362	362
Impact (ug/m^3)	1985	117	358	46	100
Direction		230	230	230	230
Distance		0.25	0.35	0.25	0.4
Day		322	323	322	322

Shoa Hang Chu

M. Chu please find attached the following ISC runs:

1981
1982
1985.

For each year I have included the ISC output and input data set.

The ISC runs were made using a polar grid with receptors @ 100, 150, 200, 250, 300, 350, 400, 450 and 500 meters in 36 directions covering 360° in 10° increments. The 36 Direction specific projected widths were entered, a building height of 21.34 meters was used for all directions as a maximum worst case, and a stack of 31.7 meters was used for Stork Roland Steam

Please feel free to call me @ 303-295-6900 with any questions regarding the above

Kenneth D Kosdal

ISCST (DATED 88207)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 1. GUIDELINE MODELS
IN UNAMAP (VERSION 6) JUNE 88.
SOURCE: UNAMAP FILE ON EPA'S UNIVAC AT RTP, NC.

IBM-PC VERSION (1.62)

SERIAL NUMBER 5503 SOLD TO R. W. BECK & ASSOC.
RUN BEGAN ON 09-13-88 AT 07:28:56

Key West
81
360° @ 10° Inc.
Direction Specific Scenario

*** DER Key West 360 deg Downwash Scenario for 1981 b70 ***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)	ISW(1) = 1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)	ISW(2) = 2
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)	ISW(3) = 1
TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)	ISW(4) = 0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)	ISW(5) = 0
LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)	ISW(6) = 1
COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)	
WITH THE FOLLOWING TIME PERIODS:	
HOURLY (YES=1,NO=0)	ISW(7) = 1
2-HOUR (YES=1,NO=0)	ISW(8) = 0
3-HOUR (YES=1,NO=0)	ISW(9) = 1
4-HOUR (YES=1,NO=0)	ISW(10) = 0
6-HOUR (YES=1,NO=0)	ISW(11) = 0
8-HOUR (YES=1,NO=0)	ISW(12) = 0
12-HOUR (YES=1,NO=0)	ISW(13) = 0
24-HOUR (YES=1,NO=0)	ISW(14) = 1
PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)	ISW(15) = 0
PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE	
SPECIFIED BY ISW(7) THROUGH ISW(14):	
DAILY TABLES (YES=1,NO=0)	ISW(16) = 0
HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)	ISW(17) = 1
MAXIMUM 50 TABLES (YES=1,NO=0)	ISW(18) = 1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)	ISW(19) = 1
RURAL-URBAN OPTION (RU.=0,UR. MODE 1=1,UR. MODE 2=2,UR. MODE 3=3)	ISW(20) = 0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)	ISW(21) = 1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)	ISW(22) = 1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)	ISW(23) = 0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)	ISW(24) = 1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)	ISW(25) = 2
PROGRAM USES BUOYANCY INDUCED DISPERSION (YES=1,NO=2)	ISW(26) = 1
CONCENTRATIONS DURING CALM PERIODS SET = 0 (YES=1,NO=2)	ISW(27) = 1
REG. DEFAULT OPTION CHOSEN (YES=1,NO=2)	ISW(28) = 1
TYPE OF POLLUTANT TO BE MODELLED (1=SO2,2=OTHER)	ISW(29) = 1
DEBUG OPTION CHOSEN (YES=1,NO=2)	ISW(30) = 2
ABOVE GROUND (FLAGPOLE) RECEPTORS USED (YES=1,NO=0)	ISW(31) = 0
NUMBER OF INPUT SOURCES	NSOURC = 2
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)	NGROUP = 2
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)	IPERD = 0
NUMBER OF X (RANGE) GRID VALUES	NXPNTS = 9
NUMBER OF Y (THETA) GRID VALUES	NYPNTS = 36
NUMBER OF DISCRETE RECEPTORS	NXWYPT = 0
SOURCE EMISSION RATE UNITS CONVERSION FACTOR	TK =.10000E+07
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED	ZR = 7.00 METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA	IMET = 9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION	DECAY = .000000E+00
SURFACE STATION NO.	ISS = 12839
YEAR OF SURFACE DATA	ISY = 81
UPPER AIR STATION NO.	IUS = 12844
YEAR OF UPPER AIR DATA	IUY = 81
ALLOCATED DATA STORAGE	LIMIT = 43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN	MIMIT = 12193 WORDS

*** DER Key West 360 deg Downwash Scenario for 1981 b70 ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 0
```

*** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
(NSOGRP)

1, 1,

*** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
(IDSOR)

1, 2,

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
B	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
C	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
D	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
E	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00
F	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** RANGES OF POLAR GRID SYSTEM ***
(METERS)

100.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0,

*** RADIAL ANGLES OF POLAR GRID SYSTEM ***

(DEGREES)

10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0,
110.0, 120.0, 130.0, 140.0, 150.0, 160.0, 170.0, 180.0, 190.0, 200.0,
210.0, 220.0, 230.0, 240.0, 250.0, 260.0, 270.0, 280.0, 290.0, 300.0,
310.0, 320.0, 330.0, 340.0, 350.0, 360.0,

*** DER Key West 360 deg Downwash Scenario for 1981 b70 ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	0	0	0	.12600E+02	.0	.0	.0	30.48	589.00	30.00	1.20	-21.34	29.71	29.71
2	0	0	0	.15059E+03	.0	.0	.0	31.70	460.00	44.81	1.52	-21.34	29.71	29.71

Diesels
SI
steam

*** DER Key West 360 deg Downwash Scenario for 1981 b70 ***

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE 1

IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE
1	21.3,	82.9,	0	2	21.3,	87.2,	0	3	21.3,	88.4,	0	4	21.3,	87.2,	0	5	21.3,	83.2,	0	6	21.3,	76.8,	0
7	21.3,	68.0,	0	8	21.3,	57.3,	0	9	21.3,	55.2,	0	10	21.3,	50.9,	0	11	21.3,	45.1,	0	12	21.3,	40.2,	0
13	21.3,	40.0,	0	14	21.3,	54.0,	0	15	21.3,	60.0,	0	16	21.3,	64.6,	0	17	21.3,	67.4,	0	18	21.3,	76.5,	0
19	21.3,	82.9,	0	20	21.3,	87.2,	0	21	21.3,	88.4,	0	22	21.3,	87.2,	0	23	21.3,	83.2,	0	24	21.3,	76.8,	0
25	21.3,	68.0,	0	26	21.3,	57.3,	0	27	21.3,	55.2,	0	28	21.3,	50.9,	0	29	21.3,	45.1,	0	30	21.3,	40.2,	0
31	21.3,	40.0,	0	32	21.3,	54.0,	0	33	21.3,	60.0,	0	34	21.3,	64.6,	0	35	21.3,	67.4,	0	36	21.3,	76.5,	0

SOURCE 2

IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE	IFV	BH	BW	IWAKE
1	21.3,	82.9,	0	2	21.3,	87.2,	0	3	21.3,	88.4,	0	4	21.3,	87.2,	0	5	21.3,	83.2,	0	6	21.3,	76.8,	0
7	21.3,	68.0,	0	8	21.3,	57.3,	0	9	21.3,	55.2,	0	10	21.3,	50.9,	0	11	21.3,	45.1,	0	12	21.3,	40.2,	0
13	21.3,	40.0,	0	14	21.3,	54.0,	0	15	21.3,	60.0,	0	16	21.3,	64.6,	0	17	21.3,	67.4,	0	18	21.3,	76.5,	0
19	21.3,	82.9,	0	20	21.3,	87.2,	0	21	21.3,	88.4,	0	22	21.3,	87.2,	0	23	21.3,	83.2,	0	24	21.3,	76.8,	0
25	21.3,	68.0,	0	26	21.3,	57.3,	0	27	21.3,	55.2,	0	28	21.3,	50.9,	0	29	21.3,	45.1,	0	30	21.3,	40.2,	0
31	21.3,	40.0,	0	32	21.3,	54.0,	0	33	21.3,	60.0,	0	34	21.3,	64.6,	0	35	21.3,	67.4,	0	36	21.3,	76.5,	0

* CALM HOURS (=1) FOR DAY 2 *	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 3 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
* CALM HOURS (=1) FOR DAY 7 *	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 15 *	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 16 *	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 18 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
* CALM HOURS (=1) FOR DAY 19 *	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	
* CALM HOURS (=1) FOR DAY 20 *	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 23 *	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
* CALM HOURS (=1) FOR DAY 26 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 27 *	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 28 *	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 29 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 30 *	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
* CALM HOURS (=1) FOR DAY 31 *	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 38 *	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 42 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
* CALM HOURS (=1) FOR DAY 50 *	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 55 *	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 56 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
* CALM HOURS (=1) FOR DAY 57 *	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 59 *	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 60 *	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 61 *	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 69 *	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 72 *	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 74 *	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 77 *	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 91 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
* CALM HOURS (=1) FOR DAY 92 *	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 119 *	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 130 *	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 135 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 141 *	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* CALM HOURS (=1) FOR DAY 158 *	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 159 *	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 160 *	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 161 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
* CALM HOURS (=1) FOR DAY 162 *	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 172 *	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
* CALM HOURS (=1) FOR DAY 173 *	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
* CALM HOURS (=1) FOR DAY 176 *	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 179 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 184 *	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 185 *	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
* CALM HOURS (=1) FOR DAY 186 *	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 187 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 190 *	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 192 *	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 197 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 199 *	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 200 *	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 201 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 202 *	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 211 *	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 212 *	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 214 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
* CALM HOURS (=1) FOR DAY 215 *	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
* CALM HOURS (=1) FOR DAY 216 *	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 219 *	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 233 *	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 234 *	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 235 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
* CALM HOURS (=1) FOR DAY 237 *	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
* CALM HOURS (=1) FOR DAY 238 *	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 239 *	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 242 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
* CALM HOURS (=1) FOR DAY 246 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 247 *	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 248 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 250 *	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
* CALM HOURS (=1) FOR DAY 251 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 253 *	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 254 *	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
* CALM HOURS (=1) FOR DAY 255 *	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 256 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
* CALM HOURS (=1) FOR DAY 257 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 259 *	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
* CALM HOURS (=1) FOR DAY 260 *	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 261 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 263 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
* CALM HOURS (=1) FOR DAY 264 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 265 *	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
* CALM HOURS (=1) FOR DAY 268 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 274 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
* CALM HOURS (=1) FOR DAY 275 *	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 277 *	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 280 *	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 281 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
* CALM HOURS (=1) FOR DAY 282 *	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 283 *	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 284 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
* CALM HOURS (=1) FOR DAY 300 *	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* CALM HOURS (=1) FOR DAY 301 *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

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* CALM HOURS (=1) FOR DAY 302 *  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 322 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0
* CALM HOURS (=1) FOR DAY 323 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1
* CALM HOURS (=1) FOR DAY 328 *  0  0  1  1  1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 332 *  0  1  0  0  1  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 341 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1
* CALM HOURS (=1) FOR DAY 342 *  0  0  1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 347 *  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 348 *  1  0  0  0  1  1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 352 *  0  0  1  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
* CALM HOURS (=1) FOR DAY 359 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1
* CALM HOURS (=1) FOR DAY 362 *  1  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
```

R.W. BECK
AND ASSOCIATES

Denver National Bank Building, Suite 1900 ■ 1125 Seventeenth Street ■ Denver, Colorado 80202-2615
Telephone (303) 295-6900 ■ Fax (303) 297-2811

FC-5801-CA1-CA

August 23, 1988

Mr. Clair Fancy
Central Air Permitting
Bureau of Air Quality Management
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: PSD Application for Two 10-MW Diesel Generators
at Key West, Florida
Permit Nos. AC44-152197, AC44-152198 and PSD-FL-135

Dear Mr. Fancy:

The purpose of this letter is to respond to your request for additional information in order to complete the subject application. The items are addressed below in the order of your letter of August 11, 1988. We appreciate the assistance of your staff in bringing these matters to our attention in an expeditious matter and providing feedback during preparation of our response.

1. Plot Plan and Downwash Modeling

Enclosed herewith is a marked-up version of the plot plan included in the application. The Stock Island site is approximately 450 m in the N-S direction, tapers from 250 m in the E-W direction at the inland end to 100 m at the seaward end. The existing steam unit stack is approximately 50 m and 150 m from the W and E property lines, respectively. The site of the proposed diesel generators is approximately 50 m southeast of the steam unit building and 100 m and 150 m from the SE and NW property lines, respectively.

Also pertinent to the downwash modeling is an input revision which has been made to the height of the Stock Island steam building. Enclosed herewith are elevation views of the building. We had previously considered the top of the elevator shaft (elevation 77 feet) relative to ground level (elevation 8 feet) in determining a building height of 70 feet for model input.

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Recipient's Phone Number (Very Important): ( )
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Department/Floor No:
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Further review indicates that a more reasonable datum is the roof (elevation 67 feet) due to the substantially open nature of the building above the operating floor (elevation 34 feet). Consequently, we have revised the building height to 60 feet for downwash calculations. It should also be noted that the Key West gas turbine (located some 6.6 km to the west) was included in past source lists for downwash analysis, but has been eliminated from consideration herein.

Subsequent to duplicating the DER downwash screening analysis, a further screening analysis was conducted to determine the effect of the reduced building height. The maximum one hour impact was reduced from 1396 ug/m^3 to 1113 ug/m^3 and the meteorology responsible for impacts greater than those predicted by PTPLU was limited to stability class 4 with wind speeds greater than 8 m/sec and stability class 3 with wind speeds greater than 10 m/sec.

Finally, two five-year analyses were made of downwash at the steam unit and diesel generators in the appropriate wind directions. Those results are presented in enclosed Table 13 (the 1984 and 1985 outputs for the steam unit and the 1983 and 1985 outputs for the diesel generators are also enclosed). These results have been incorporated into enclosed revised Tables 9 and 10. For comparison to AAQS, the downwash impact of the Stock Island steam unit was considered with the non-downwash impact of the diesel generators. For comparison to PSD increments, the downwash impact of the diesel generators was assumed.

As the values in both Tables indicate, compliance with AAQS and PSD Class II increments is achieved.

2. Stock Island Steam Unit Screening Modeling

In order to demonstrate the adequacy of the 0.1 km spacing grids utilized to determine final impacts from the diesel generators, the results of five-year screening analyses for the Stock Island Steam unit are presented in enclosed Table 14. As expected, the 0.1 km spacing grids used to determine final impacts for the diesel generators generally encompassed the maximum impact locations for the steam unit. However, two runs were re-made to include meteorology days which had not been identified for the diesel generators. The maximum second-high three-hour impact is 203 ug/m^3 at -0.6 km E, 0.5 km N on day 204, hours 10-12, 1982. The maximum second-high 24-hour impact is 68 ug/m^3 at -1.9 km E, 1.1 km N on day 146, 1981. These values are somewhat greater than those in the application, but less than those produced in the downwash analysis especially for the three-hour impact.

Concurrently with this effort it was discovered that the W grid used for final impact modeling of the diesel generators was improperly located too close to the source. This revision is incorporated in the enclosed revised Table 8.

3. ISCST Version

The current version of the model used herein is that supplied by Trinity Consultants pursuant to Letter Change 5 (D. Bruce Turner to Unamap 6 Users, dated June 28, 1988). This letter change incorporates correction to an earlier version of the downwash algorithm. As indicated above, the DER downwash screening analysis was duplicated with the current version of the model.

4a. Emulsified Fuel

Some information is available relative to NO_x reductions achievable via a combination of timing retardation and use of emulsified No. 2 fuel oil. The emulsified fuel serves to delay combustion, lower flame temperature and dilute flame zone oxygen. Limited pilot testing has been conducted with emulsion ranging from 10 to 50 percent water. Resulting emission reductions have ranged from less than 20 to 45 percent. No long term testing has been performed nor has fuel system optimization occurred. In light of the lack of guaranteed performance with emulsified fuel, CES believes that BACT for NO_x is the proposed 8 gm/hp-hr.

4b. Ceramic Coating

Some testing has been done on ceramic coating for wear parts on the Sebring slow-speed diesels. The purpose thereof was related more towards efficiency improvements in marine applications than to reduction in NO_x emissions. However, in conjunction with use of timing retardation and emulsified fuel, the ceramic coatings have resulted in NO_x reductions even though higher temperature operation was achieved. At present, the developers are trying to patent the process and will not discuss details. There is currently no commercial application available.

5. Combined Cycle

Another option considered in CES' power supply study was a combined-cycle (gas turbine/waste heat recovery boiler/steam turbine) of somewhat greater capacity than the diesel generators. The combined-cycle option has a lower capital cost ($900/kW versus $1250/kW), higher full-load heat rate (10,500 Btu/kWh versus 8500 Btu/kWh), greater increase in heat rate at part-load, less reliability of a single unit (compared to two diesel generators), and greater personnel requirement for operation (compared to unattended diesel operation) than the selected diesel generators. However, it is recognized that the combined-cycle option without supplemental firing would have an NSPS NO_x emission rate of approximately 1.0 gm/hp-hr. An economic analysis for the combined-cycle system would result in similar results to those for SCR installation on the diesel generators. The incremental cost of NO_x control is not as persuasive as the operating considerations in not selecting the combined-cycle option as BACT.

6. 0.3% S Fuel Oil

We have contacted CES' fuel oil supplier relative to the cost and availability of 0.3% S fuel oil. The price differential is approximately $0.75/B or approximately $.13/mm Btu. In order to obtain this fuel, CES would have to re-bid their fuel supply contract. Relative to the decrease in sulfur emissions, the extra cost of this fuel is approximately $1300/T. The annual cost of CES generation at 100% capacity factor would increase approximately $200,000 with this fuel. In light of these economic constraints, CES believes that BACT for SO_2 is the use of 0.5% S fuel oil.

If you or your staff have any questions relative to this information please contact the undersigned. CES appreciates the diligence directed to this permit application thus far and anticipates expeditious development of a preliminary determination.

Sincerely,

R. W. BECK AND ASSOCIATES

Michael D. Henderson
Principal Engineer

MDH:ehh (0283G)
Enclosures

cc: R. Padron
R. Wallace
R. Garcia (w/o modding results)
R. Rodriguez (w/o modding results)
B. Pattinson (w/o modding results)

Copied: Pradeep Raval
Barry Andrews
Shiu-Hong Chu
David Kinsler, SF District
Wayne Aronson, EPA
Miguel Flores, NPS
CHF/BT

TABLE 8

CLASS II IMPACTS OF DIESEL GENERATORS
WITH 100 LB/HR EMISSION RATE
(continued)

Revised August 19, 1988

3-Hour

Year	Grid	2nd/High Impact	Location E (km)	Location N (km)	Meterology Day	Meterology Hour	Stability	Wind Speed (m/sec)	Persistence (hr)
	N								
1981		25	-0.3	0.9	239	10-12	3	7	2
1982		--	--	--	--	--	--	--	--
1983		--	--	--	--	--	--	--	--
1984		--	--	--	--	--	--	--	--
1985		--	--	--	--	--	--	--	--
	W								
1981		23	-1.0	0.2	176	10-12	3	5	2
1982		26	-1.1	-0.4	113	13-15	3	8	3
1983		27	-1.1	0.2	292	13-15	3	5	3
1984		26	-1.1	-0.4	261	10-12	3	5	3
1985		26	-0.9	0.3	233	13-15	2	4.5	3
	NW								
1981		23	-1.0	0.6	253	10-12	2	3	3
1982		27	-0.6	0.8	164	13-15	2	4.5	3
1983		26	-0.9	0.5	261	10-12	3	4.5	3
1984		25	-0.7	0.8	202	10-12	3	6	2
1985		25	-0.5	0.9	90	10-12	3	5	2

24-Hour

	W								
1981		8.6	-1.5	0.2	101	--	4	7.5	12
1982		9.3	-1.6	0.5	360	--	4	6.5	13
1983		8.2	-1.2	0.2	185	--	4	4	11
1984		7.8	-1.9	0.0	292	--	4	6	15
1985		8.5	-1.3	0.5	237	--	4	6	15
	NW								
1981		9.5	-1.4	0.8	146	--	4	7.5	10
1982		7.8	-1.8	0.9	33	--	4	7.5	9
1983		7.5	-1.0	0.6	141	--	3	4.5	9
1984		7.5	-0.9	0.5	141	--	4	4	10
1985		7.6	-1.6	1.4	161	--	4	6	12

TABLE 9

COMPLIANCE WITH AAQS

Revised August 19, 1988

Pollutant	Average Time (hr)	Standard (ug/m^3)	Background (ug/m^3) (1)	Two 10-MW Diesel Impact (ug/m^3)	Total (ug/m^3)
CO	8	10,000	5,500 (1)	31 (4)	5,531
	1	40,000	11,000	39	11,039
Pb	2,190	1.5	0.15	0.0001 (5)	0.15
NO_2	8,760	100	35	5.8	43.8
O_3	1	250	210 (2)	20 (6)	230
SO_2	8,760	60	15	1.2	25 (7)
	24	260	65	9.5	144.5 (7)
	3	1,300	325	27	794 (7)
TSP (8)	8,76	50	41 (3)	0.2	41.2
	24	150	99 (3)	1.9	100.9

---

(1) Values for state-wide background level from:

State of Florida Department of Environmental Regulations
Bureau of Air Quality Management, November, 1987 "Ambient Air Quality in Florida 1986."

(2) Value from Lee County.

(3) Value from Monroe County.

(4) Conservative value actually for 3-hour impact.

(5) Value actually for annual-average impact.

(6) Conservative value actually for HC, O_3 indeterminate.

(7) Includes downwash impacts from Stock Island steam unit.

(8) Standard revised July 1, 1987 to consider only particles less than or equal to 10 um size.

TABLE 10

COMPLIANCE WITH PSD INCREMENTS

Revised August 19, 1988

Pollutant	Average Time (hr)	Class II Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	512	73 (2)	0	0	73
	24	91	35 (2)	0	0	35
	8,760	20	1.2	0	0.8	0.4
TSP	24	37	7 (2)	0	0	7
	8,760	19	0.2	0	0	0.2
NO_2	8,760	25	5.8	0	0.2	0.6

Pollutant	Average Time (hr)	Class I Standard (ug/m^3)	Two 10-MW Diesel Impact (ug/m^3)	Key West Gas Turbine Impact (ug/m^3)	Key West Steam Impact (ug/m^3)	Total (ug/m^3) (1)
SO_2	3	25	2.0	0.9	10.8	0
	24	5	0.3	0.3	2.4	0
	8,760	2	0.010	0.008	0.092	0
TSP	24	10	0.04	0.02	0.09	0
	8,760	5	0.002	0.001	0.003	0
NO_2	8,760	2.5	0.05	0.005	0.02	0.04

(1) Value equal to diesel impact + gas turbine impact - steam impact and negative numbers set equal to zero.

(2) Includes downwash impact due to Stock Island steam building.

TABLE 13

DOWNWASH at STOCK ISLAND
SO_2 IMPACT with 60 FOOT BUILDING

	Year	2nd-High 3-Hour Impact Direct	Steam	2nd-High 24-Hour Impact Diesel	Steam
Impact (ug/m^3)	1981	73	279	27	51
Direction (deg)		315	90	315	180
Distance (km)		0.2	0.2	0.2	0.2
Day		95	231	41	343
Impact (ug/m^3)	1982	65	326	23	42
Direction (deg)		315	90	315	90
Distance (km)		0.2	0.2	0.2	0.2
Day		31	96	47	96
Impact (ug/m^3)	1983	61	261	33	58
Direction (deg)		315	90	315	90
Distance (km)		0.2	0.2	0.2	0.2
Day		63	77	32	77
Impact (ug/m^3)	1984	59	442	19	65
Direction (deg)		135	180	315	180
Distance (km)		0.2	0.2	0.2	0.2
Day		59	327	113	342
Impact (ug/m^3)	1985	73	373	35	70
Direction (deg)		315	90	315	90
Distance (km)		0.2	0.2	0.2	0.2
Day		43	137	166	305

TABLE 14

DOWNWASH at STOCK ISLAND
SO_2 SCREENING IMPACTS
STOCK ISLAND STEAM

3-Hour

Year	1981	1982	1983	1984	1985
2nd-High Impact (ug/m^3)	178	189	188	179	181
Direction (deg)/Grid	340 N	290 NW	310 NW	310 NW	290 W
Distance (km)	1.0	1.0	1.0	1.0	1.0
Day	239	194	142	258	233
1st-High Impact (ug/m^3)	208	210	219	214	197
Direction (deg)/Grid	330 N	320 NW	340 NW	300 NW	240 W
Distance (km)	1.0	1.0	1.0	1.0	1.0
Day	195	164	123	135	182

24-Hour

Year	1981	1982	1983	1984	1985
2nd-High Impact (ug/m^3)	66	60	54	53	61
Direction (deg)/Grid	300 NW	280 W	270 W	270 W	290 W
Distance (km)	2.0	2.0	2.0	2.0	2.0
Day	146	30	185	292	237
1st-High Impact (ug/m^3)	74	65	70	63	107
Direction (deg)/Grid	240 W	290 W	170 S	300 NW	230 W
Distance (km)	2.0	2.0	2.0	1.0	2.0
Day	305	46	359	119	258

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

August 11, 1988

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Robert R. Padron
Key West City Electric System
1006 James Street
Key West, Florida 33041

Dear Mr. Padron:

Re: Completeness Review, Two Diesel Generators, Permit Nos. AC44-152197, AC44-152198, and PSD-FL-135

The Department has reviewed the above referenced application package dated July 14, 1988. The application has been deemed incomplete. Please submit the following information needed to complete the application:

I. Modeling

1. Please state the distances between the sources (buildings) modeled, for downwash considerations. Also enclose a plot plan showing distances from the sources to the facility boundary line (which precludes public access).

2. Please model all the sources in the facility at 360°, not just the proposed sources, to evaluate short term impacts. The sector approach is acceptable only for long term impacts.

3. Use the latest version of ISCST model, UNAMAP 6 (change 7 is the most recent), for evaluating short term impacts.

II. BACT Analysis

4. In addition to techniques addressed by you for nitrogen oxides (NO_x) reduction, please evaluate:

   a. The use of emulsified or homogenized mixtures of water and No. 2 diesel fuel.

   b. The use of ceramic coatings on cylinder heads, piston crowns, and valves.

5. Please evaluate, as an alternative control measure, the use of a combined cycle configuration since it is a power production option that should be comparative in cost to the proposed diesel engine.

6. With regard to sulfur dioxide (SO_2) emissions, the use of 0.3% sulfur content No. 2 fuel oil has recently been judged to be BACT for another project. Please evaluate the economics of using 0.3% sulfur content fuel oil instead of the proposed 0.5%, for your project.

If you have any questions please call Shao-Hang Chu (modeling), Barry Andrews (BACT), or Pradeep Raval (permitting), 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

CF/PR/plm

cc. D. Knowles, SF District
W. Aronson, EPA
M. Flores, NPS
D. Swann, P.E., RW Beck
M. Henderson, RW Beck

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3. Article Addressed to:
Mr. Robert P. Padron
Key West City Electric System
1006 James Street
Key West, FL 33041

4. Article Number
P 702 177 475

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P 702 177 475

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PS Form 3800, June 1985