

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NOTICE OF FINAL PERMIT

In the Matter of an  
Application for Permit by:

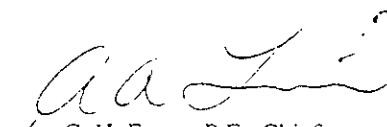
Mr. Charles A. Russell, CEO/General Manager  
Florida Keys Electric Cooperative Assoc., Inc.  
Post Office Box 700377  
Tavernier, Florida 33070-0377

DEP File No. 0870004-004-AC, PSD-FL-285  
Marathon Generation Plant  
Monroe County

Enclosed is final permit Number 0870004-004-AC, PSD-FL-285. This permit authorizes the Florida Keys Electric Cooperative Association, Inc., to construct Unit 9 at the Marathon Generation Plant located at 3421 Overseas Highway, Marathon, Monroe County. This permit is issued pursuant to Chapter 403, Florida Statutes.

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

Executed in Tallahassee, Florida.

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

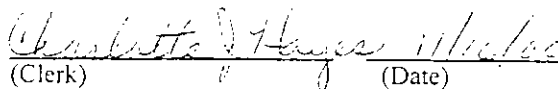
**CERTIFICATE OF SERVICE**

The undersigned duly designated deputy agency clerk hereby certifies that this Notice of Final Permit (including the final permit) was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on 11/16/00 to the person(s) listed:

Mr. Charles A. Russell, FKEC \*  
Mr. Gregg Worley, EPA  
Mr. John Bunyak, NPS  
Mr. Ron Blackburn, DEP SD  
Ms. Amy Hacker, RW Beck

Clerk Stamp

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

  
(Clerk) \_\_\_\_\_ (Date)

Place this label on the back of the mailpiece,  
or on the front if space permits.

1. Article Addressed to:

Mr. Charles A. Russell  
CEO & General Manager  
Florida Keys Electric  
Cooperative Assoc., Inc.  
91605 Overseas Highway  
Tavernier, FL 33070

☒ Registered ☐ Addressee  
D. Is delivery address different from item 1? ☐ Yes  
If YES, enter delivery address below ☐ No

3. Service Type

☒ Certified Mail ☐ Express Mail  
☐ Registered ☐ Return Receipt for Merchandise  
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

☐ Yes

Article Number (Copy from service label)

93408 0000 1452 9900

3811, July 1999

Domestic Return Receipt

102595-99-M-1789

U.S. Postal Service  
**CERTIFIED MAIL RECEIPT**  
(Domestic Mail Only; No Insurance Coverage Provided)

Article Sent to:

Mr. Charles A. Russell

Postage \$

Certified Fee

Return Receipt Fee  
(Endorsement Required)

Restricted Delivery Fee  
(Endorsement Required)

Total Postage & Fees \$

Florida Keys  
Electric

Postmark  
here

Name (Please Print Clearly, to be completed by sender)  
Mr. Charles A. Russell

Street Address (to be completed by sender)  
91605 Overseas Highway

City, State ZIP+4  
Tavernier, FL 33070

PS Form 3800, July 1999

See Reverse for Instructions

## **FINAL DETERMINATION**

Florida Keys Electric Cooperative Association, Inc.  
Marathon Generation Plant  
DEP File No. 0870004-004-AC, PSD-FL-285

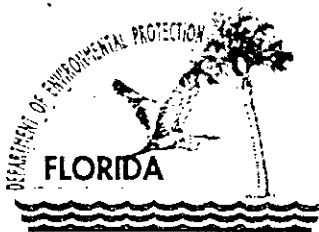
The Department distributed a public notice package on October 9, 2000 to allow the applicant to construct Unit 9 at the Florida Keys Electric Cooperative Association, Inc. Marathon Generation Plant located at 3421 Overseas Highway, Marathon, Monroe County. The Public Notice of Intent to Issue was published in the Miami Herald on October 11, 2000.

### **COMMENTS/CHANGES**

No comments were received by the Department from the public, the applicant or the federal land manager. EPA Region 4 stated in a letter dated November 9, 2000 that they had no additional comments beyond those previously submitted during review of the application.

### **CONCLUSION**

The final action of the Department is to issue the permit with no changes.



Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

## PERMITTEE:

Florida Keys Electric Cooperative Association, Inc.  
91605 Overseas Highway  
Tavernier, Florida 33070

### *Authorized Representative:*

Charles A. Russell  
Chief Executive Officer and General Manager

<b>FID No.</b>	0870004
<b>PSD No.</b>	PSD-FL-285
<b>SIC No.</b>	4911
<b>Project:</b>	Unit 9
<b>Permit No.</b>	0870004-004-AC
<b>Expires:</b>	December 31, 2001

## PROJECT AND LOCATION:

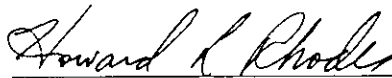
Permit for the construction of a 3.58 megawatt diesel electric generator at the Marathon Generation Power Plant, 3421 Overseas Highway, Marathon, Monroe County. UTM coordinates are Zone 17; 490.7 km E; 2732.7 km N.

## STATEMENT OF BASIS:

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

## Attached appendices are made a part of this permit:

Appendix BD	BACT Determination
Appendix GC	Construction Permit General Conditions

  
Howard L. Rhodes, Director  
Division of Air Resources  
Management

# AIR CONSTRUCTION PERMIT 0870004-004-AC AND PSD-FL-285

## SECTION I. FACILITY INFORMATION

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### SUBSECTION A. FACILITY DESCRIPTION

The Florida Keys Electric Cooperative Association (FKEC) Marathon Generating Plant presently consists of two nominal 2.0 Megawatt (MW) diesel generators designated as Units 1 and 2, three nominal 3.0 MW diesel generators (Units 3, 4 and 5), two 2.5 MW diesel generators (Units 6 & 7), and one nominal 3.58 MW diesel generator (Unit 8). This permit is to construct another 3.58 MW diesel generator designated as Unit 9.

### SUBSECTION B. REGULATORY CLASSIFICATION

The Marathon Generation Power Plant is classified as a Major Source of Air Pollution or Title V Source because it emits or has the potential to emit at least 100 tons per year of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO). It is also a Major Facility with respect to preconstruction review because it emits or has the potential to emit at least 250 tons per year of NO<sub>x</sub> and CO.

### SUBSECTION C. PERMIT SCHEDULE:

- 02-17-00: Date of Receipt of Application
- 08-24-00: Application deemed complete
- 10-09-00: Intent issued
- 10-11-00: Notice published in the Miami Herald

### SUBSECTION D. RELEVANT DOCUMENTS:

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

- Application received 2-17-00
- Department letters dated 3-15-00, 5-16-00, and 7-19-00
- Company letters dated 4-17-00, 6-20-00, and 8-24-00
- Technical Evaluation and Preliminary Determination dated 10-06-00
- Best Available Control Technology determination (issued concurrently with permit)

**SECTION II. EMISSION UNIT(S) GENERAL REQUIREMENTS**

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**SUBSECTION A. ADMINISTRATIVE**

- A.1 Regulating Agencies: All documents related to applications for permits to operate, reports, tests, minor modifications and notifications shall be submitted to the Department of Environmental Protection, South District Office located at 2295 Victoria Avenue, Suite 364, Ft. Myers, Florida 33901, and phone number (941) 332-6975. All applications for permits to construct or modify an emission unit(s) *subject to the Prevention of Significant Deterioration (PSD)* should be submitted to the Bureau of Air Regulation (BAR), Florida Department of Environmental Protection (FDEP) located at 2600 Blainstone Road, Tallahassee, Florida 32399-2400 and phone number (850)488-0114.
- A.2 General Conditions: The owner and operator is subject to and shall operate under the attached General Permit Conditions G.1 through G.15 listed in *Appendix GC* of this permit. General Permit Conditions are binding and enforceable pursuant to Chapter 403 of the Florida Statutes. [Rule 62-4.160, F.A.C.]
- A.3 Terminology: The terms used in this permit have specific meanings as defined in the corresponding chapters of the Florida Administrative Code.
- A.4 Forms and Application Procedures: The permittee shall use the applicable forms listed in Rule 62-210.900, F.A.C. and follow the application procedures in Chapter 62-4, F.A.C. [Rule 62-210.900, F.A.C.]
- A.5 Expiration: This air construction permit shall expire on December 31, 2001. [Rule 62-210.300(1), F.A.C.]. The permittee may, for good cause, request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit. However, the permittee shall promptly notify the permitting authority office of any delays in completion of the project which would affect the startup day by more than 90 days. [Rule 62-4.090, F.A.C.]
- A.6 Applicable Regulations: The facility is subject to the following regulations: Florida Administrative Code Chapters 62-4; 62-103; 62-204; 62-210; 62-212, 62-213, 62-296, and 62-297. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements or regulations. [Rule 62-210.300, F.A.C.]

**SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS****SUBSECTION A. LISTING OF EMISSIONS UNITS**

This permit addresses the following emission units.

EMISSIONS UNIT NO.	SYSTEM	EMISSIONS UNITS DESCRIPTION
008#	Power	3.58 MW Diesel Electric Generator
009*	Power	3.58 MW Diesel Electric Generator

# Existing Emission unit

\* New Emission unit

**SUBSECTION B. SPECIFIC CONDITIONS (UNIT 008):**

The following Specific Conditions apply to the following emission unit:

EMISSION UNIT NO.	SYSTEM	EMISSION UNIT DESCRIPTION
009	Power	3.58 MW Diesel Electric Generator

**EMISSION LIMITATIONS**

- B.1 The maximum allowable emission rates for NO<sub>x</sub> for Unit No. 009 shall not exceed 68 pounds per hour (lb/hr) and 298 tons per year (TPY) pursuant to the Best Available Control Technology (BACT) Determination. [Rule 62-212.400, F.A.C.]
- B.2 Visible emissions shall not exceed 20% opacity. [Rule 62-296.310, F.A.C.]
- B.3 In order to minimize excess emissions during startup/shutdown/malfunction this emission unit shall adhere to best operational practices. [Rule 62-210.700, F.A.C.]

**OPERATIONAL LIMITATIONS**

- B.4 The emission unit is allowed to operate continuously (8760 hours/year) [Rule 62-210.200, F.A.C., Definitions: Potential-to-Emit].
- B.5 Only No. 2 fuel oil can be fired in the diesel generator. The maximum sulfur content of the No. 2 fuel oil shall not exceed 0.05 percent, by weight. [Rule 62-210.200, F.A.C., Definitions: Potential-to-Emit].
- B.6 The maximum heat input rate to Unit No. 009 shall not exceed 30.2 million Btu per hour (MMBtu/hr) [Rule 62-210.200, F.A.C., Definitions: Potential-to-Emit].
- B.7 The maximum No. 2 fuel oil consumption allowed to be burned in Unit No. 009 is 2,015,000 gallons per year, which is equivalent to 8760 hours per year of operation at full load. [Rule 62-210.200, F.A.C., Definitions: Potential-to-Emit]

**SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS**

**TEST METHODS AND PROCEDURES**

- B.8 Compliance with the allowable emission limiting standards for NO<sub>x</sub> in B.1 shall be determined by using EPA Reference Method 7E (or equivalent) as described in 40 CFR 60, Appendix A (1999, version) adopted by reference in Rule 62-204.800, F.A.C. An annual compliance test shall be performed on the unit if operated for more than 400 hours in the preceding 12-month period. [Rule 62-297.310, F.A.C.]
- B.9 The fuel shall be monitored initially and annually for the sulfur content using ASTM D4294 Method (or equivalent). [Rule 62-297.440, F.A.C.]
- B.10 The permittee shall maintain daily records of fuel oil consumption for the emission unit. [Rule 62-210.200, F.A.C.]
- B.11 Compliance with the visible emission standard shall be demonstrated with EPA Reference Method 9 as described in 40 CFR 60, Appendix A (1996, version) adopted by reference in Rule 62-204.800, F.A.C. [Rule 62-297.401, F.A.C.]

**RECORDKEEPING AND REPORTING REQUIREMENTS**

- B.12 All measurements, records, and other data required to be maintained by this facility shall be retained for at least five (5) years following the data on which such measurements, records, or data are recorded. These data shall be made available to the Department upon request. [Rule 62-4.070(3), F.A.C.]
- B.13 Two copies of the results of the emission tests for the pollutant listed in Condition B.1 for Unit No. 8 shall be submitted within forty-five days of the last sampling run to the South District office in Ft. Myers. All reports shall be in a format consistent with and shall include the information in accordance with Rule 62-297.310 (8), F.A.C. [Rule 62-297.310(8), F.A.C.]

**SUBSECTION C. SPECIFIC CONDITIONS (UNIT 008)**

The following Specific Conditions apply to the following emission unit:

EMISSIONS UNIT NO.	SYSTEM	EMISSIONS UNITS DESCRIPTION
008	Power	3.58 MW Diesel Electric Generator

- C.1 The emission unit will comply with all the requirements of 0870004-001-AV issued on March 17, 1999. [Title V Permit Requirements]
- C.2 The permittee shall raise the stack height for the emission unit from 38.7 feet to 45 feet. This should be completed prior to the operation of Emission Unit 9. [Per Application]



**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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**Marathon Generation Plant Unit No. 9**  
**Florida Keys Electric Cooperative Association**  
**PSD-FL-285 and 0870004-004-AC**  
**Marathon, Monroe County**

The Florida Keys Electric Cooperative Association (FKEC) plans to install a new Diesel Engine Generator at its existing Marathon Generation Plant (MGP) in Marathon, Monroe County. The unit is a General Motors Electro-Motive Diesel generator model 20-710G4B with a nominal base load rating of 3.58 megawatts (MW) at 32°C and 718 mm Hg. The facility currently consists of eight (8) diesel engine generators used for peaking power. Units 1 & 2 are each rated at 2.0 MW. Units 3, 4 and 5 are each rated at 3.0 MW, Units 6 & 7 are 2.5 MW each, and Unit 8 is rated at 3.58 MW and is identical to the new Unit 9. Units 1-7 are allowed to burn No. 2 fuel oil with a sulfur content of 0.5 percent or less, by weight. Unit 8 and the new Unit 9 will burn No. 2 low sulfur fuel oil with a sulfur content not to exceed 0.05 percent, by weight, and each will have a fuel oil consumption limit of 2.015 million gallons per year. The facility also has four fuel oil storage tanks and other electrical generating support equipment.

FKEC has indicated that the maximum annual air pollutant emission rates in tons per year for the Unit 9 diesel generator, based on consumption of 2.015 million gallons of No. 2 fuel oil, with a maximum sulfur content of 0.05 percent, by weight, will be:

Pollutant	PSD Significance Levels <sup>1</sup>	Uncontrolled Emissions <sup>2</sup>	Controlled Emissions <sup>3</sup>	Expected Emissions <sup>4</sup>	Subject to PSD Review? <sup>5</sup>
NO <sub>x</sub>	40	423	289.5	21.15	Yes
CO	100	23.7		1.73	No
PM	25	9.2	<9.2	0.67	No
PM <sub>10</sub>	15	7.6	<7.6	0.55	Yes
SO <sub>2</sub>	40	7.2		0.53	No
VOC	40	13.2		0.96	No

<sup>1</sup> Table 62-212.400-2, F.A.C.

<sup>2</sup> Based on firing No. 2 fuel oil (0.05% sulfur by weight) at a maximum of 2.015 million gals/yr at full load with no emission controls.

<sup>3</sup> Based on firing No. 2 fuel oil (0.05% sulfur by weight) at a maximum of 2.015 million gals/yr at full load with good combustion control practices and NO<sub>x</sub> emissions control of timing retardation and aftercoolers.

<sup>4</sup> Based on FKEC's historical and projected actual operating hours of 640 or less.

<sup>5</sup> Annual PM<sub>10</sub> emissions from the new Unit 9 will not exceed the PSD Significance Level of 15 tpy. However, when the potential emissions from Unit 9 are combined with potential emissions from the existing major PSD source onsite (Unit 8), total PM<sub>10</sub> potential emissions from the two units (15.2 tpy) exceed the PM<sub>10</sub> Significance Level.

The Marathon Generation Power Plant is a major source of air pollution or Title V source. Additionally, since potential emissions are greater than 250 tpy for at least one criteria pollutant (NO<sub>x</sub> from Unit 8), the facility is also a Major Facility with respect to Rule 62-212.400, Prevention of Significant Deterioration. Because the project will result in a significant increase in nitrogen oxide and particulate matter (less than or equal to 10 microns) emissions per Table 62-212.400-2, F.A.C., "Regulated Air Pollutants - Significant Emissions Rates," a BACT determination is required pursuant to Rule 62-212.410, F.A.C.

**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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**BACT DETERMINATION REQUESTED BY THE APPLICANT:**

<b>POLLUTANT</b>	<b>EMISSION LIMIT</b>
Nitrogen Oxides	68 lbs/hr by timing retardation and aftercoolers
Particulate Matter less than or equal to 10 microns	1.73 lbs/hr by low sulfur fuel (less than or equal to 0.05% sulfur, by weight) and good combustion practices

The Applicant proposed the control technology for BACT for the PSD pollutant NO<sub>x</sub> to be timing retardation and aftercoolers, with emissions limited to 68 lbs/hr. For the PSD pollutant PM<sub>10</sub>, the Applicant proposed good combustion practices and the exclusive use of low sulfur fuel (less than or equal to 0.05% sulfur, by weight) to limit emissions to 1.73 lbs/hr.

**DATE OF RECEIPT OF COMPLETE BACT APPLICATION:**

August 24, 2000

**BACT DETERMINATION PROCEDURE:**

In accordance with Chapter 62-212, F.A.C., this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department of Environmental Protection (Department) determines is achievable through application of production processes and available methods, systems, and techniques. This determination includes consideration of energy, environmental and economic impacts, and other costs. In addition, the regulations state that, in making the BACT determination, the Department shall give consideration to:

- Any Environmental Protection Agency determination of BACT pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 - Standards of Performance for New Stationary Sources or 40 CFR Part 61 - National Emission Standards for Hazardous Air Pollutants.
- All scientific, engineering, and technical material and other information available to the Department.
- The emission limiting standards or BACT determination of any other state.
- 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 unit in question, the most stringent control available for a similar or identical emission unit or emission unit category. If it is shown that this level of control is technically or economically unfeasible for the emission unit 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.

## APPENDIX BD

### BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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The air pollutant emissions from this facility can be grouped into categories based upon the control equipment and techniques that are available to control emissions from these emission units. Using this approach, the emissions can be classified as follows:

- **Combustion Products** (e.g., SO<sub>2</sub>, NO<sub>x</sub>, PM). Controlled generally by good combustion of clean fuels, removal in add-on control equipment.
- **Products of Incomplete Combustion** (e.g., CO, VOC). Control is largely achieved by proper combustion techniques.

Grouping the pollutants in this manner facilitates the BACT analysis because it enables the equipment available to control the type or group of pollutants emitted and the corresponding energy, economic, and environmental impacts to be examined on a common basis. Although all of the pollutants addressed in the BACT analysis may be subject to a specific emission limiting standard as a result of PSD review, the control of "non-regulated" air pollutants is considered in imposing a more stringent BACT limit on a "regulated" pollutant (i.e., PM, SO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub>, fluorides, etc.), if a reduction in "non-regulated" air pollutants can be directly attributed to the control device selected as BACT for the abatement of the "regulated" pollutants.

#### **BACT POLLUTANT ANALYSIS**

##### **NITROGEN OXIDES (NO<sub>x</sub>)**

Oxides of nitrogen (NO<sub>x</sub>) are generated during fuel combustion by oxidation of chemically bound nitrogen in the fuel (fuel NO<sub>x</sub>) and by thermal fixation of nitrogen in the combustion air (thermal NO<sub>x</sub>). As flame temperature increases, the amount of thermally generated NO<sub>x</sub> increases. Fuel type affects the quantity and type of NO<sub>x</sub> generated. Generally, natural gas is low in nitrogen. However it causes higher flame temperatures and generates more thermal NO<sub>x</sub> than oil or coal, which have higher fuel nitrogen content, but exhibit lower flame temperatures.

NO<sub>x</sub> emissions represent a significant portion of the total emissions generated by this project, and must be minimized using BACT. For control of NO<sub>x</sub>, the Applicant evaluated exhaust control technologies, combustion modifications and combustion practices.

The most stringent NO<sub>x</sub> control to be evaluated for the project was Selective Catalytic Reduction (SCR), which is an exhaust control technology. The Applicant determined that SCR was technically infeasible for the new Unit 9 due to engine design, limited guarantees provided by SCR manufacturers, back pressure limitations and limited, if any, operating experience on similar units.

The new Unit 9 is a two-stroke engine that requires injection of lube oil into the unit. Due to the two-stroke design (which includes intake of air and fuel, compression, power and exhaust in two piston strokes and one crankshaft revolution) an additional 'blower' or turbocharger must be included. The turbocharger works to 'pull' the exhaust from the chamber, resulting in lube oil being pulled into the chamber, which is then exhausted. This exhaust would pass through the SCR, thus contaminating and fouling the catalyst.

Siemens Westinghouse was contacted by the Applicant to provide information on the feasibility of installing an SCR catalyst on the project. Due to the typical oil consumption of a two-stroke engine, Siemens Westinghouse would not offer a SCR system because the catalyst would become excessively contaminated.

## APPENDIX BD

### BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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The Applicant then contacted SCR vendor Johnson Matthey to obtain information about an SCR system for the proposed Project. Although Johnson Matthey did provide cost data for an SCR that could potentially be placed on Unit 9, the guarantees provided for performance are limited. In the information provided, Johnson Matthey did not provide a guarantee for the catalyst life for a two-stroke diesel engine due to the operating conditions found on these engines. Additionally, Johnson Matthey would only provide a performance guarantee for 8,000 hours after exhaust gas initially passes across the catalyst, or one-year after start-up, whichever occurs first.

The Applicant also evaluated the increased exhaust back pressure due to the addition of an SCR system. The maximum allowed back pressure for the 20-710GB unit is 5 inches H<sub>2</sub>O. According to calculations done by the engine vendor, the expected exhaust back pressure of the unit to be installed at Marathon will be approximately 4 inches H<sub>2</sub>O. Johnson Matthey indicated that they could possibly increase the exhaust ducting size to meet back pressure requirements of the exhaust system. However, Johnson Matthey has not conducted a site visit to determine the feasibility of increasing duct size and the placement of the SCR in relation to the engine and engine building. Due to space constraints, the Applicant has indicated that increased ducting would be difficult, if not infeasible, and as a result installation costs may be significantly higher than those provided by the Vendor.

A review of EPA's BACT/LAER Clearinghouse (BACT Clearinghouse) information by the Applicant indicates that process control and good combustion practices minimize NO<sub>x</sub> emissions for most small facilities. Only two facilities (both owned and operated by the same entity) have installed SCR on two-stroke diesel engines. However, both facilities have limited operating experience and one facility had difficulty meeting its NO<sub>x</sub> permit limits. Additionally, the SCR at each plant serves seven and ten units, respectively. Four facilities with SCR on small diesel units, listed in the California Air Resources Board's (CARB) database, were also evaluated. Three facilities have four-stroke engines, which cannot be compared to the operating characteristics of a two-stroke engine. The fourth facility's enforceable permit NO<sub>x</sub> limit with SCR is similar to the NO<sub>x</sub> emission rate for the new Unit 9 with timing retardation and aftercoolers, which are considered more technically feasible controls by the Applicant.

The next most stringent NO<sub>x</sub> control evaluated by the Applicant was the modification of the combustion process through a combination of fuel injection timing retardation and cooling of combustion air resulting in exhaust temperature reduction. The design specific to FKEC's 20-710G4B includes a 4° injection timing retardation and a 4-pass aftercooler circuit with the addition of a separately cooled aftercooler circuit. The combination of retarded injection timing and lowered combustion air temperature results in less NO<sub>x</sub> formation.

Vendor's data indicate that retarding injection timing will reduce NO<sub>x</sub> formation by about 20 percent, but will increase PM emissions by about 10 percent and fuel consumption by 1.5 percent. The 4-pass aftercooler will reduce both NO<sub>x</sub> and PM emissions by about 10 percent while reducing fuel consumption by about 0.7 percent. The separately cooled aftercooling circuit will decrease both NO<sub>x</sub> and PM by another 10 percent and fuel consumption by 0.5 percent. The net result will be a 30 to 40 percent reduction in NO<sub>x</sub>, a 5 percent increase in PM and about 0.3 percent increase in fuel consumption. The use of low sulfur fuel oil will minimize PM emissions thus reducing or eliminating the increase in PM caused by NO<sub>x</sub> controls.

**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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**PARTICULATE MATTER LESS THAN OR EQUAL TO 10 MICRONS (PM<sub>10</sub>)**

Emissions of particulate matter are primarily the result of fuel impurities and byproducts of incomplete combustion. Primary particulate matter control consists of burning clean fuel oil in combination with proper engine design, operation and maintenance. Post-combustion controls for particulate matter include cyclones, electrostatic precipitators, baghouses and scrubbers.

A review of BACT Clearinghouse information indicates that no post-combustion particulate control systems, such as electrostatic precipitators or baghouses, have been employed on diesel engines. The high gas velocities and volumetric flow rates, along with the high combustion efficiency associated with diesel engines, make the application of post-combustion particulate control devices technically infeasible. Rather, particulate emissions from diesel engines are controlled through combustion controls via proper engine design, operation and maintenance. With respect to combustion controls, there are no significant economic, energy or environmental impacts. The combination of good combustion control practices and low sulfur fuel oil (less than or equal to 0.05% sulfur, by weight) results in lower PM<sub>10</sub> emission rates.

**Based on the above information, the Applicant proposes BACT as the combination of NO<sub>x</sub> controls (timing retardation and aftercoolers), proper engine design, good combustion practices, and the use of low sulfur fuel, which should provide effective emissions control for the new Unit 9.**

**BACT DETERMINATION BY DEP:**

Based on the information provided by the Applicant and the information searches conducted by the Department, lower emissions limits can be obtained employing the top-down BACT approach for NO<sub>x</sub>.

**NO<sub>x</sub> DETERMINATION**

The top-down BACT approach for diesel fired internal combustion engines listed in order from most stringent control to least:

1. Selective Catalytic Reduction (SCR)
2. Combined technologies of injection timing retardation, turbocharger with aftercoolers
3. Good combustion design/practices

The following table summarizes the feasibility of using these control technologies with the EMD 20-710G4B as designed for installation in FKEC's Marathon Generation Plant.

Control Technology	Emission Reduction (%)	Technically Feasible	Cost Effective	Adverse Environ. Impacts	Adverse Energy Impacts
SCR with ammonia	60-90	Yes	No	Yes	Yes
SCR with urea	62.5	Yes	No	No	Yes
Timing retard; turbo charger aftercoolers	30-40	Yes	Yes	No	Yes
Dry/Low NO <sub>x</sub>	18	No	N/A	N/A	N/A

SCR has become more widely used in the United States and the technology is being improved such that the hazards and costs have been reduced. It remains, however, a costly technology for small applications and has

## APPENDIX BD

### BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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hazards associated with the use and storage of ammonia. Additionally, SCR is not generally used with diesel engines of this size. The Applicant rejected SCR because it was found to be technically infeasible for the new Unit 9.

The Department's review of the BACT/LAER database lists only two facilities (both owned and operated by the same entity) which use SCR on diesel engines. SCR was selected because a local ordinance mandated strict limits on emissions without regards to cost. Additionally, seven units at one facility exhaust through one SCR, while at the other facility, ten units exhaust through one SCR. Therefore, an SCR is more cost effective for these units on a dollar per kW and dollar per ton basis, when compared to Unit 9, due to the larger total capacity exhausting through each SCR and a greater NO<sub>x</sub> reduction: based on total emissions passing through the SCR.

The Department understands that SCR systems are normally not installed on small diesel engines and SCR manufacturers may not recommend this type of control equipment with these engines. However, SCR systems have been placed on other similar units, as shown in the BACT/LAER database and in the data provided by SCR manufacturer Johnson Matthey. These examples indicate that SCR on the new unit 9 may not be technically infeasible. Nevertheless, it appears that the costs for SCR to operate properly and efficiently on Unit 9 will outweigh the benefits of the NO<sub>x</sub> reduction from this control technology. Based on the limited cost data provided by Johnson Matthey, the cost of NO<sub>x</sub> removal may range from \$4,000 to \$5,000 per ton.

Johnson Matthey provided only limited guarantees: there is no guarantee for catalyst life with a two-stroke diesel engine due to the operating conditions found on these engines and there is a limited performance guarantee of 8,000 hours after exhaust gas initially passes across the catalyst, or one-year after start-up, whichever occurs first. The costs to frequently replace the catalyst and service the engine may be prohibitive. Additionally, the potential back pressure that the SCR would add to the system may exceed the ducting increase expectations of Johnson Matthey, especially when considered in combination with the space constraints at the Marathon Plant. Subsequent to more detailed design, Johnson Matthey may find that increased ducting is infeasible or installation and material costs may significantly increase. The unknown additional costs for installing SCR on Unit 9 and the more cost effective arrangement of the facilities in the BACT/LAER database (many units exhausting through one SCR), indicates that this control technology would be cost prohibitive for Unit 9.

For NO<sub>x</sub> emissions, the Department accepts the Applicants proposed use of injection timing retardation and cooling of combustion air as BACT for this project.

#### **PM<sub>10</sub> DETERMINATION**

The Department's review of the BACT/LAER database indicates that no post-combustion particulate control systems have been installed on small diesel engines. Instead, particulate emissions are controlled through good combustion practices.

For PM<sub>10</sub> emissions, the Department accepts the Applicant's proposed use of good combustion control practices and the exclusive use of low sulfur fuel oil (less than or equal to 0.05% sulfur, by weight).

The BACT emission levels established by the Department are as follows:

**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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POLLUTANT	EMISSION LIMIT
Nitrogen Oxides (NO <sub>x</sub> )	68 lbs/hr (297.8 TPY)
Visible Emissions	20%

**COMPLIANCE**

Compliance with the visible emission limitations shall be in accordance with the EPA Reference Method 9 as contained in 40 CFR 60, Appendix A.


Compliance with the NO<sub>x</sub> limitations shall be in accordance with the EPA Reference Method 7E as contained in 40 CFR 60, Appendix A.

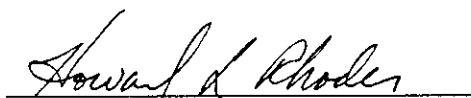
**DETAILS OF THE ANALYSIS MAY BE OBTAINED BY CONTACTING:**

Syed Arif, Review Engineer (prepared BACT)  
Department of Environmental Protection  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Recommended By:

Approved By:

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

  
Howard L. Rhodes, Director  
Division of Air Resources Management

11/16/00  
Date: \_\_\_\_\_

11/16/00  
Date: \_\_\_\_\_

**APPENDIX GC**  
**GENERAL PERMIT CONDITIONS [F.A.C. 62-4.160]**

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- G.1 The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
- G.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 or exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
- G.3 As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey and vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver 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.
- G.4 This permit conveys no title to land or water, does not constitute State recognition or acknowledgment 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.
- G.5 This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
- G.6 The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.
- G.7 The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:
- (a) Have access to and copy and records that must be kept under the conditions of the permit;
  - (b) Inspect the facility, equipment, practices, or operations regulated or required under this permit, and,
  - (c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.
- Reasonable time may depend on the nature of the concern being investigated.
- G.8 If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:
- (a) A description of and cause of non-compliance; and
  - (b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.



**APPENDIX GC**  
**GENERAL PERMIT CONDITIONS [F.A.C. 62-4.160]**

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

- G.9 In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.
- G.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.
- G.11 This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.
- G.12 This permit or a copy thereof shall be kept at the work site of the permitted activity.
- G.13 This permit also constitutes:
- (a) Determination of Best Available Control Technology (X)
  - (b) Determination of Prevention of Significant Deterioration (X); and
  - (c) Compliance with New Source Performance Standards ( ).
- G.14 The permittee shall comply with the following:
- (a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
  - (b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application or this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
  - (c) Records of monitoring information shall include:
    - 1. The date, exact place, and time of sampling or measurements;
    - 2. The person responsible for performing the sampling or measurements;
    - 3. The dates analyses were performed;
    - 4. The person responsible for performing the analyses;
    - 5. The analytical techniques or methods used; and
    - 6. The results of such analyses.
- G.15 When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

## Memorandum

## Florida Department of Environmental Protection

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TO: Howard L. Rhodes

THRU: ~~Clair Fancy~~  
Al Linero *aal*

FROM: Joe Kahn *JK*

DATE: November 15, 2000

SUBJECT: Florida Keys Electric Cooperative Association, Inc.  
Marathon Generation Plant, Unit 9  
0870004-004-AC, PSD-FL-285

*BAR*

Attached for approval and signature is the final permit to allow the cooperative association to construct Unit 9 at its existing Marathon Generation Plant. The Public Notice requirements have been met on October 11, 2000 by publishing in the Miami Herald.

Unit 9 is a 3.58 MW diesel electric generator. Emissions of NOx will be controlled by fuel injector timing retardation and turbocharger aftercooling. The application was reviewed and the draft permit and intent package were prepared by Syed Arif before he left for his vacation. No comments were received regarding the permit and no changes have been made from the draft.

Day 90 is December 13, 2000. Today is day 62 of 90.

Attachments

/jk