



Florida Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

August 24, 1993

Mr. David M. Lefebvre
Black & Veatch
P.O. Box 8405
Kansas City, Missouri 64114

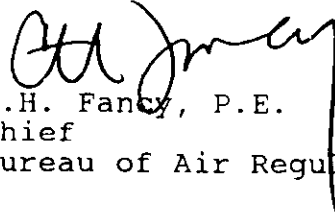
Dear Mr. Lefebvre:

Re: Permit No. AC49-205703, PSD-FL-182
Cane Island Combustion Turbine Project
Kissimmee Utility Authority

This is in reply to your letters dated June 1 and July 27, 1993, requesting revised carbon monoxide concentration levels for the Cane Island combustion turbine project. The requested changes are based on recent information from the turbine manufacturer and would result in an increase in allowable concentrations of 48 ppmvd (gas) and 81 ppmvd (oil) for the 40 MW gas turbine and 25 ppmvd (gas) for the 120 MW gas turbine.

Although we understand the reasons for requesting the changes now, we recommend waiting until the performance test has been completed. At that time the Department will adjust the limits as called for by the data. This approach avoids the need for further changes later. Your letter will remain on file as a pending request for adjustment of the limits prior to issuing the operation permit.

Sincerely,



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

CHF/TH/bb



BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Kissimmee Utility Authority
Cane Island

B&V Project 17645
B&V File 32.0402
July 27, 1993

Bureau of Air Regulation
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: CO Emission Calculations

Attention: Mr. C. H. Fancy, P.E.

Gentlemen:

Based on a conversation with Teresa Heron on June 22, 1993, the Kissimmee Utility Authority (KUA) Cane Island construction permit can be amended as soon as she receives the carbon monoxide (CO) emission calculations showing the calculation from ppmvd to lb/h for the Unit 1 (GE LM6000) and Unit 2 (GE 7EA) combustion turbines. Attachment 1 shows this calculation for Units 1 and 2 in a form prepared by Black & Veatch. Attachment 2 shows the original calculation for Units 1 and 2 prepared by GE. This information was also provided to Teresa via facsimile on July 27, 1993.

The CO emission calculations include the conversion from ppmvd to lb/h for Unit 1 firing distillate fuel and natural gas. In addition, the CO emission calculations showing the conversion from ppmvd to lb/h for Unit 2 on natural gas are included.

If you have any questions regarding these emission calculations, please contact me at (913) 339-2028 or Amy Carlson at (913) 339-7425.

Very truly yours,

BLACK & VEATCH

D. D. Schultz

ALC:rs
Enclosures

cc: A. K. Sharma, KUA

J. Heron
C. Holladay
A. Zahon, C. Diet,

RECEIVED

JUL 30 1993

Division of Air
Resources Management

Attachment 1

CO (ppmvd to lb/h) Emission Calculations for Units 1 and 2

UNIT 1: GE LM6000 CO(ppm) to CO(lb/hr) Conversion

General Equation:

$$CO\left(\frac{lb}{hr}\right) = CO_{ppmvd @ 15\% O_2} \times \frac{\text{moles dry}}{\text{moles wet}} \times \frac{\text{Mol Weight CO}}{\text{Avg Mol Wt Exhaust Gas}} \times \text{Exhaust Gas Flow}\left(\frac{lb}{sec}\right) \times 3600 \frac{sec}{hr}$$

Distillate Fuel:

From Engine Test for Distillate Fuel Operation at Guarantee Pointt:

CO ppmvd @ 15% O₂ = 80.8308 ppmvd

moles dry /moles wet = 0.9192

Mol Weight CO = 28.01

Avg Mol Wt Exhaust Gas = 28.5149

Exhaust Gas Flow = 280.2429 lb/sec

Therefore, using the general equation:

$$CO\left(\frac{lb}{hr}\right) = (80.8308 \times 10^{-6})(0.9192)\left(\frac{28.01}{28.5149}\right)(280.2429)(3600)$$

CO = 73.6282 lb/hr, Rounded to 74 lb/hr

UNIT 1: GE LM6000 CO(ppm) to CO(lb/hr) Conversion, (cont.)

General Equation:

$$CO\left(\frac{lb}{hr}\right) = CO_{ppmvd @ 15\% O_2} \times \frac{\text{moles dry}}{\text{moles wet}} \times \frac{\text{Mol Weight CO}}{\text{Avg Mol Wt Exhaust Gas}} \times \text{Exhaust Gas Flow}\left(\frac{lb}{sec}\right) \times 3600 \frac{sec}{hr}$$

Natural Gas Fuel:

From Engine Test for Distillate Fuel Operation at Guarantee Point:

CO ppmvd @ 15% O₂ = 46.8075 ppmvd

moles dry / moles wet = 0.9035

Mol Weight CO = 28.01

Avg Mol Wt Exhaust Gas = 28.1867

Exhaust Gas Flow = 279.5446 lb/sec

Therefore, using the general equation:

$$CO\left(\frac{lb}{hr}\right) = (46.8075 \times 10^{-6})(0.9035)\left(\frac{28.01}{28.1867}\right)(279.5446)(3600)$$

CO = 42.2907 lb/hr, Rounded to 42 lb/hr

UNIT 2: GE 7EA CO(ppm) to CO(lb/hr) Conversion

From Kissimmee Utility Authority

Base load at 59F, 60% R.H. Natural Gas Fuel

$$CO\left(\frac{lb}{hr}\right) = \frac{CO\text{ ppmvd}}{10^6} \times \frac{\text{Mol Wt CO}}{\text{Mol Wt Exhaust}} \times \left(1 - \frac{\% H_2O \text{ by Vol}}{100}\right) \times \text{Exhaust Flow}\left(\frac{lb}{hr}\right)$$

$$CO\left(\frac{lb}{hr}\right) = \left(\frac{25}{10^6}\right) \left(\frac{28}{28.46}\right) \left(1 - \frac{7.07}{100}\right) (2344 \times 10^3)$$

CO = 53.577 lb/hr, Rounded to 54 lb/hr

Attachment 2

GE and KUA CO (ppmvd to lb/h) Emission Calculations for Units 1 and 2

**GAS TURBINE
PRODUCTION SYSTEMS ENGINEERING
FAX TRANSMITTAL**

TO:

DATE: 7/22/93

TO: Amy Carlson 7405 PS

LOCATION: B+V, KS

FAX NUMBER: (913) 389-2934

NUMBER OF PAGES TO FOLLOW THIS COVER:

PAGE: 3

FROM:

Erin K. Barrett

GENERAL ELECTRIC COMPANY

1 RIVER ROAD BLDG 53 ROOM 401

SCHENECTADY, NEW YORK 12345 U.S.A.

IN CASE OF A PROBLEM SENDER CAN BE REACHED AT:

(518) 385-3594



GE Power Generation

*Production Systems Engineering
General Electric Company
One River Road, 53-401, Schenectady, NY 12345 USA
(518) 385-7864, Fx: (518) 385-1474, Tx: 145354*

July 22, 1993

Mr. Steve Edwards
Black & Veatch
1500 Meadow Lake Parkway
Kansas City, Missouri 64114
Tel. (913) 339-2000

Subject: Kissimmee Utility Authority

Dear Mr. Edwards:

This letter is in response to your letter of June 25, 1993, pertaining to CO emission conversions. Please find attached the conversion from CO ppm to CO lb/hr for both Distillate and Natural Gas fuel operation per your request.

Please advise if you have any questions or comments.

Best regards,

Erin K. Barrett
LM6000 Engineer

Copies to-

A. Carlson
R. Mills,
C. Shook,
V. Hoepfner,
J. Sanders,

B&V, 11401 Lamar, Overland Park, KS
S&S, Houston, TX
S&S, Houston, TX
37-2ANX
53-401

^{SE}
LM6000
CO(ppm) to CO(lb/hr) CONVERSION

GENERAL EQUATION:

$$\underline{CO \text{ (lb/hr)}} = CO_{\text{ppmud @ 15\% O}_2} \times \frac{\text{moles dry}}{\text{moles wet}} \times \frac{\text{Mol Wt CO}}{\text{Avg Mol Wt Exh Gas}} \times \text{Exhaust Gas Flow, lb/sec} \times 3600 \text{ sec/hr}$$

DISTILLATE FUEL:

From Engine Test for Distillate Fuel Operation at Guare Pt:

$$CO_{\text{ppmud @ 15\% O}_2} = 80.8308 \text{ ppmud}$$

$$\text{moles dry / moles wet} = 0.9192$$

$$\text{Mol Wt CO} = 28.01$$

$$\text{Avg. Mol Wt Exhaust Gas} = 28.5149$$

$$\text{Exhaust Gas Flow} = 280.2429 \text{ lb/sec}$$

Therefore, using the General Equation:

$$CO \text{ (lb/hr)} = (80.8308 \times 10^{-6})(0.9192) \left(\frac{28.01}{28.5149} \right) (280.2429)(3600)$$

$$CO = 73.6282 \text{ lb/hr, rounded to } 74 \text{ lb/hr}$$

NATURAL GAS FUEL:

From Engine Test for Natural Gas Operation at Guare Pt:

$$CO_{\text{ppmud @ 15\% O}_2} = 46.8075 \text{ ppmud}$$

$$\text{moles dry / moles wet} = 0.9035$$

$$\text{Mol Wt CO} = 28.01$$

$$\text{Avg Mol. Wt. Exhaust Gas} = 28.1867$$

$$\text{Exhaust Gas Flow} = 279.5446 \text{ lb/sec}$$

Therefore, using the General Equation:

$$CO (lb/hr) = (46.8075 \times 10^{-6}) (0.9035) \left(\frac{28.01}{28.1867} \right) (279.5446) (3600)$$

$$CO = 42.2907 \text{ lb/hr, rounded to } 42 \text{ lb/hr.}$$

TRANSMITTAL SHEET

DOC NO: FAX32942 TOTAL PAGES SENT: 2 (INCLUDING THIS PAGE)

FROM: W.J. HUDSON - FAX NO. (803) 675-2400 TEL NO. (803) 675-2429

GE POWER GENERATION 300 GARLINGTON ROAD P.O. BOX 648 GREENVILLE, SC 29602
--

CC: GINGER HOEPPNER	37-2 ANNEX
WALT POUA	53-200
STEVE EDWARDS	B&V

JULY 15, 1993

COMPANY: **BLACK & VEATCH, ENGINEERS-ARCHITECTS**

ATTENTION: **MS. AMY CARLSON**

CITY: KANSAS CITY STATE: MISSOURI COUNTRY: USA

FAX PHONE NO. AT RECEIVING LOCATION: (913) 339-2934 (ALT 339-2936)

REFERENCE: KUA/FMPA	GE DM# GR0281
JOB NO. 23175.62.1003	GE ML# 7A1PEA91
CANE ISLAND UNIT #2	TB SN# 296047

SUBJECT: CO (LBS/HR) CALCULATIONS @ 59 DEG F AND 60% HUMIDITY

ATTACHED HANDWRITTEN SHEET SHOWS METHOD OF CALCULATING THE 54 LBS/HR OF CARBON MONOXIDE FOR KISSIMMEE PROJECT AT ISO CONDITIONS.

REGARDS, JACK HUDSON



Project	23175	
Files	62.1003.06	
Date	7-15-93	
DISTRIBUTION		
	ACTION	INFO
[REDACTED]		X
SLE		X
NJA		X
HLJ/FILE		

SETEA

July 17/93

Kissimmee Utility Authority

Base load at 59°F, 60% R.H.
 Natural gas fuel.

$$\begin{aligned}
 \text{CO (lb/hr)} &= \frac{\text{PRMVD CO}}{1.06} \times \frac{28}{\text{MW}_{\text{Exh}}} \times \left(1 - \frac{\% \text{H}_2\text{O}}{100}\right) \times \text{Exh. flow (lb/hr)} \\
 &= \frac{25}{1.06} \times \frac{28}{28.46} \times \left(1 - \frac{7.07}{100}\right) \times 2344 \times 10^3 \\
 &= 53,577 \text{ lb/hr} \\
 &\approx 54 \text{ lb/hr.}
 \end{aligned}$$

~~Post-it brand fax transmittal memo 5/1 6 of pages 6~~

To: Jack Hudson	From: W. P. ...
Dept:	Phone: 3600
Fax: 8-288-240	

A.K. (BEN) SHARMA, P.E.
DIRECTOR OF POWER SUPPLY



P.O. BOX 423219 KISSIMMEE, FLORIDA 34742-3219
(407) 833-7777 • FAX: (407) 847-0787

June 9, 1993

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

RE: Kissimmee Utility Authority
Amendment of Permitted CO Emissions
AC49-205703, PSD-FL-182

Dear Mr. Fancy:

Enclosed is a check for \$250.00 to cover the processing fee for the above referenced permit amendment as requested in your letter to Mr. David Lefebvre of Black & Veatch dated June 3, 1993.

Sincerely,

A. K. Sharma

A. K. (Ben) Sharma, P.E.
Director of Power Supply

AKS/css

Enclosure

001031

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DEF--MAIL ROOM
1993 JUN 16 AM 8:46

P 230 524 362

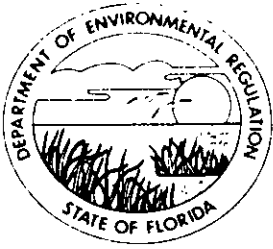


Receipt for Certified Mail

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

To: DAVID Lefebvre	
Blacic & Veatch	
Kansas City, MO	
Postage	\$
Certified Fee	
Special Delivery Fee	<i>None</i>
Restricted Delivery Fee	<i>None</i>
Return Receipt Showing to Whom & Date Certified	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	6-4-93
AC 49-205703	
PSD-FI-182	

PS Form 3800, June 1991



Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

June 3, 1993

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. David M. Lefebvre
Black & Veatch
P. O. Box No. 8405
Kansas City, MO 64114

Dear Mr. Lefebvre:

RE: Kissimmee Utility Authority
Amendment of Permitted CO Emissions
AC49-205703, PSD-FL-182

The Bureau of Air Regulation received your May, 27, 1993, request for the above referenced project. On October 30, 1991, Rule 17-4.050(4)(o), F.A.C., was changed to require a \$250 processing fee for a permit amendment: therefore, we will not be able to take action on your request until the fee is received. If you have any questions, please call Patty Adams at (904) 488-1344.

Sincerely,

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

CHF/pa

cc: Teresa Heron



BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114 (913)337-2000

RECEIVED

JUN 01 1993

Division of Air
Resources Management

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0402
May 27, 1993

Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Amendment of Permitted CO
Emissions

Attention: Mr. C. H. Fancy, PE, Chief

Gentlemen:

The Kissimmee Utility Authority (KUA) recently received an Authority to Construct (#AC49-205703/PSD-FL-182) for its Cane Island Combustion Turbine Project. In its final negotiations with General Electric (GE), its selected combustion turbine vendor, KUA was unable to receive guarantees from GE for several permit limits on carbon monoxide (CO) emissions. Therefore, KUA requests that the Bureau amend the permit to reflect these slightly higher CO emissions limits guaranteed by GE. The minor differences between the permitted CO emissions and the guaranteed CO emissions are described below.

- LM6000 simple cycle unit - The permit limits CO emissions to 40 lb/hr (30 ppm_{dv}) when burning natural gas and to 76 lb/hr (63 ppm_{dv}) when burning fuel oil. However, GE only anticipates achieving CO emissions as low as 42 lb/hr (48 ppm_{dv}) for natural gas and 75 lb/hr (81 ppm_{dv}) for fuel oil. Therefore, KUA requests that the permit be amended to increase the permitted CO emissions by 2 lb/hr (18 ppm_{dv}) for natural gas and by 18 ppm_{dv} for fuel oil. No adjustment in the lb/hr CO emission rate is needed for fuel oil.
- 7EA combined cycle unit - KUA negotiated with GE to buy a low NO_x combustor capable of achieving NO_x emissions as low as 9 ppm for this unit when burning natural gas. Although the use of this combustor will not increase CO mass emission rates (lb/hr) for either natural gas or fuel oil, this combustor does have slightly higher CO emissions concentrations (ppm_{dv}) when burning natural gas than allowed by the permit. Therefore, KUA requests the Bureau increase the allowable CO emission concentrations from 20 ppm_{dv} for natural gas in the existing permit to 25 ppm_{dv}.

Bureau of Air Regulation
Mr. C. H. Fancy, PE, Chief

B&V Project 17645
May 27, 1993

Since these deviations from the permitted limits are minor, KUA does not believe that the project's CO impacts will significantly change. Therefore, KUA requests that the Bureau amend KUA's permit to reflect these slightly increased CO emissions from both units.

If you have any questions concerning this request or if you need any further information to process this request, please call me at (913) 339-2164. Thank you for your cooperation in this matter.

Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

cc: Mr. A. K. "Ben" Sharma, KUA



BLACK & VEATCH

P.O. Box No. 8405
Kansas City, Missouri 64114

AP

Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attn: Mr. C. H. Fancy, PE, Chief



BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114 (913) 333-2000

RECEIVED

JUN 01 1993

Division of Air
Resources Management

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0402
May 27, 1993

Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: Amendment of Permitted CO
Emissions

Attention: Mr. C. H. Fancy, PE, Chief

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Bureau of Air Regulation
Mr. C. H. Fancy, PE, Chief

B&V Project 17645
May 27, 1993

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Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

cc: Mr. A. K. "Ben" Sharma, KUA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4APT-AEB

MAY 7 1993

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

RE: Kissimmee Utility Authority, Cane Island Project (PSD-FL-182)

Dear Mr. Fancy:

This is to acknowledge receipt of the final determination and Prevention of Significant Deterioration (PSD) permit for the above referenced facility, by your letter dated April 9, 1993. The facility will consist of one simple cycle combustion turbine, nominally rated at 40 megawatts of electrical generating capacity, one combined cycle combustion turbine, nominally rated at 120 MW, a heat recovery steam generator, and a steam turbine generator. The combustion turbines will have the capability to fire either natural gas or No. 2 distillate fuel oil.

Your determination proposes to limit NO_x emissions through the use of maximum water injection and low-NO_x combustion technology (through 12/31/97), to limit NO_x emissions through the use of advanced low-NO_x combustion technology, selective catalytic reduction (on the combined-cycle unit), or another equivalent NO_x control technology (after 12/31/97), to limit SO₂ and H₂SO₄ emissions through limiting the sulfur content of the No. 2 distillate fuel oil, to limit CO and VOC emissions through the use of efficient combustion, to limit PM/PM₁₀ emissions through efficient combustion and the use of clean fuels, and to limit Be, Hg, and Pb emissions through fuel quality limits.

We have reviewed the package as submitted and have no adverse comments. Thank you for the opportunity to review and comment on this package. If you have any questions or comments, please contact Mr. Scott Davis of my staff at (404) 347-5014.

Sincerely yours,

Brian L. Beals, Chief
Source Evaluation Unit
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

cc: J. Nelson
C. Holladay
G. Zahm, C. Dist.
A. R. Sharma, RU
G. Remyski, NPS

RECEIVED

MAY 11 1993

Division of Air
Resources Management