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BUREAU OF AIR REGULATION

September 25, 2002

Mr. Scott Sheplak, P.E.
Administrator- Title V Section
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, FL 32301

Via FedEx
Airbill No 7927 5233 8580

Re: Tampa Electric Company
Hookers Point Station- Title V Renewal
DEP File No. 0570038-005-AV
Response to Request for Additional Information

Dear Mr. Sheplak:

Tampa Electric Company (TEC) has received the Florida Department of Environmental Protection (the Department) request for additional information dated August 29, 2002 addressing TEC's Hookers Point Station Title V Renewal. The Title V Renewal Application was submitted to the Department in June 2002.

This correspondence is intended to provide a response to each specific issue raised by the Department. For your convenience, TEC has restated each point and provided a response below each specific issue.

DEP Comment 1

The "Potential Emission Inventory Worksheet, ENG 007-036" contained in Appendix B, states that the source of Emission Factors (except for SO2 and H2SO4) is Caterpillar data at 100% load from the year 2000. Please submit a copy of this data for our files.

TEC Response

A copy of the Caterpillar emissions data, previously provided to the Department as Attachment D of the January 2001 Hookers Point Station Internal Combustion Engines Air Construction Permit Application, is provided with this letter as Attachment 1.

DEP Comment 2

The "Potential Emission Inventory Worksheet, ENG 007-036" contained in Appendix B, states that the source of the Emission Factor for SO2 is a mass balance performed by ECT in 2002. Please submit a copy of this data for our files.

TEC Response

The ECT mass balance performed for the Hourly and annual SO2 emissions was calculated as follows:

Number of Engines = 30

No. 2 Fuel Oil Usage Rate Per Engine = 128.0 gallon/hour
No. 2 Fuel Oil Density = 7.3 pounds/gallon
No. 2 Fuel Oil Sulfur Content = 0.05 weight percent
Annual Operating Hours = 737 hours/year/engine (equivalent, all 30 engines are limited to a total of 22,100 hr/yr)

Hourly SO2 Emissions
SO2 (per engine) = (128.0 gal/hr) x (7.3 lb/gal) x (0.05 lb S / 100 lb) x (2 lb SO2 / lb S)
SO2 (per engine) = 0.934 lb/hr
SO2 (all engines) = (0.934 lb/hr) x (30) = 28.0 lb/hr

Annual SO2 Emissions
SO2 (per engine) = (0.934 lb/hr) x (737 hr/yr) x (ton / 2,000 lb)
SO2 (per engine) = 0.344 ton/yr
SO2 (all engines) = (0.344 ton/yr) x (30) = 10.3 ton/yr

DEP Comment 3

The "Potential Emission Inventory Worksheet, ENG 007-036" contained in Appendix B, states that the source of the Emission Factor for H2SO4 is Table 1.3-1, AP-42, EPA September 1998. However, this table is for the external combustion of fuel oil. Please explain why this table was used.

TEC Response

The section of AP-42 most applicable to the Hookers Point Station internal combustion engines is Section 3.4, *Large Stationary Diesel and All Stationary Dual-Fuel Engines*. This section of AP-42 indicates that oxidation of SO2 will form sulfur trioxide (SO3) which will subsequently react with water to form sulfuric acid (H2SO4); reference Section 3.4.3.5. However, Section 3.4 does not include any estimates of SO2 oxidation rates or H2SO4 emission factors for internal combustion engines. The H2SO4 formation from combustion processes is expected to be primarily influenced by fuel sulfur content and the amount of excess combustion air. H2SO4 emissions from the Hookers Point Station internal engines were estimated using procedures from AP-42, Section 1.3, *Fuel Oil Combustion*. Section 1.3.3.2 indicates that more than 95 percent of fuel sulfur is converted to SO2 and about 1 to 5 percent is further oxidized to sulfur trioxide. Section 1.3.3.2 further indicates that SO3 will readily react with water to form H2SO4 mist. The Caterpillar performance data sheet indicates expected exhaust oxygen content of 11 percent by volume at 100 percent load. The SO2 to SO3 oxidation rate of 1 to 5 percent indicated by AP-42 Section 1.3 for fuel oil combustion is reasonably consistent with estimates provided by vendors of combustion turbines; i.e., typically 5 percent. Combustion turbines, similar to internal combustion engines, operate with high levels of excess combustion air.

For small combustion units (less than 100 MMBtu/hr), Table 1.3-1 of Section 1.3 shows SO2 and SO3 emission factors (in units of pounds per thousand gallons) of 142 and 2 times the fuel oil sulfur content, respectively. For No. 2 fuel oil containing 0.05 weight percent sulfur, the AP-42 SO2 emission factor equates to 7.1 lb SO2/10^3 gal.

For No. 2 fuel oil containing 0.05 weight percent sulfur, the AP-42 SO3 emission factor equates to 0.10 lb SO3/103 gal. Accordingly, the AP-42 Section 1.3 emission factor for SO3 premises a SO2 to SO3 oxidation rate of 1.4 percent [((0.10 lb SO3 /10^3 gal) / (7.1 lb SO2 /10^3 gal)) x 100].

Due to the higher excess air rates occurring in internal combustion engines compared to steam boilers, the estimates of H2SO4 mist emissions were revised based on a conservative assumption of 5.0 percent conversion of SO2 to SO3 and complete (100 percent) conversion of SO3 to H2SO4 mist as follows:

Hourly H2SO4 Emissions
SO2 (per engine) = 0.934 lb/hr (see response to FDEP Comment No. 1 above)
SO3 (per engine) = (0.934 lb/hr) x (0.05) = 0.0467 lb/hr
H2SO4 (per engine) = (0.0467 lb/hr) x (98 lb H2SO4 / 80 lb SO3) = 0.0572 lb/hr
H2SO4 (all engines) = (0.0572 lb/hr) x (30) = 1.72 lb/hr

Annual H2SO4 Emissions
H2SO4 (per engine) = (0.0572 lb/hr) x (737 hr/yr) x (ton / 2,000 lb)
H2SO4 (per engine) = 0.0211 ton/yr
H2SO4 (all engines) = (0.0211 ton/yr) x (30) = 0.63 ton/yr

Note that the estimates of SO2 and H2SO4 mist emissions are considered conservative in that fuel sulfur emissions are "double-counted"; i.e., once for SO2 and again for H2SO mist. A revised Potential Emission Inventory Worksheet for Engines 007-036 is provided with this letter as Attachment 2.

DEP Comment 4

Also in Appendix B, the source of the Hazardous Air Pollutant Potential Emission Estimates for the IC Engines is stated to be "ECT, 2002". Please provide more information as to how these emission factors were derived. They are not the same as the emission factors that are found in Tables 3.4-3 and 3.4-4, AP-42, EPA October 1996. These tables are for Large Uncontrolled Stationary Diesel Engines.

TEC Response

The emission factors for hazardous air pollutants (HAP) provided in Appendix B were obtained from EPA's Technology Transfer Network (TNN) Air Toxics Website. EPA has compiled HAP emission factors for internal combustion engines as part of the agency's development of Maximum Achievable Control Technology (MACT) standards for the reciprocating internal combustion engine (RICE) source category. The HAP emission factors in EPA's RICE database represent the latest available test data from internal combustion engines and are considered to be more accurate than the emission factors shown in the six year old Section 3.4 of AP-42 dated October 1996. The EPA RICE emission factor data can be obtained at the following link:
http://www.epa.gov/ttn/atw/combust/engine/ricepg.html

The HAP emission factors shown in Appendix B of the Hookers Point Station application were extracted from the EPA RICE database for diesel fuel engines. The extracted EPA RICE database emission factors are provided with this letter as Attachment 3.

DEP Comment 5

Please provide a sulfur analysis (using Method ASTM D4294 or equivalent) of the No. 2 low sulfur fuel oil fired in the internal combustion engine units 007-036.

TEC Response

A copy of a recent fuel analysis of the No. 2 fuel oil combusted in the internal combustion engine units 007-036 is provided with this letter as Attachment 4.

If further questions or concerns arise pertaining to the additional information TEC has provided please contact Dru Latchman or me (813) 641-5034.

Sincerely,

Dru Latchman for

Laura R. Crouch
Manager - Air Programs
Environmental Affairs

EA/bmr/DNL128

Enclosure

c/enc: Mr. Jerry Campbell, EPCHC
Ms. Cindy Phillips, FDEP
Mr. Jerry Kissel - FDEP SW

Attachment 1

Caterpillar Emissions Data

CATERPILLAR DIESEL GENERATOR SET PERFORMANCE DATA

MODEL: 3516B RATED: 1825 KW PRIME 1800 RPM
A/C TEMPERATURE 140 F
YEAR 2000 EPA CERTIFIED

-GKGPE1- TMI - ENGINE AND COMP PERF DATE: 12/07/00
09 - PACKAGE SET PERFORMANCE TIME: 08:38:15
3516B DI TA SC DRY MANF TURBO QTY 4 PARALLEL ADEM GOV
DM4501-02 PGS PRIME 60 HERTZ EXH STK DIA 8.0 IN
GEN 1825.0 W/F EKW 1880.0 W/O F EKW W/F BHP 2628 W/O F BHP @ 1800 RPM
A/C TEMP: DEG F 140
INFO CODE 05 - EMISSIONS DATA * * * * * RATED SPEED * * * * STANDARD TIMING
"NOT TO EXCEED DATA"

GEN PWR EKW	% LOAD	ENG PWR BHP	NOX (AS NO2) * * * * * * * *	CO	TOTAL HC LB/HR	PART MATTER * * * * * * * *	O2 (DRY) IN EXH (VOL) %	SMOKE OPAC %	BOSCH SMOKE NO.
1825.0	100	2593.0	52.69	.97	.97	.480	11.00	1.4	1.28
1368.8	75	1957.7	29.36	1.09	.96	.490	12.00	1.7	1.28
912.5	50	1327.6	17.66	1.37	.76	.430	12.70	2.5	1.28
456.3	25	703.6	9.48	1.44	.53	.300	14.00	2.1	1.28

EMISSIONS DATA MEASUREMENT IS CONSISTENT WITH THOSE DESCRIBED IN EPA CFR 40 PART 86 SUBPART D AND ISO 8178-1 FOR MEASURING HC, CO, PM AND NOX.

THIS ENGINE'S EXHAUST EMISSIONS ARE IN COMPLIANCE WITH THE FOLLOWING US EPA AND CALIFORNIA NONROAD REGULATIONS

EXHAUST EMISSIONS LIMITS
G/HP-HR

HC	CO	NOX	PM
1.0	8.5	6.9	.40

WET EXHAUST MASS	26433 LB/HR
WET EXHAUST FLOW (808 DEG F STACK TEMP)	14267 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)...	5534 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)...	5092 STD CFM
FUEL FLOW RATE	122.8 GAL/HR

Attachment 2

Revised Engine Emission Estimates

POTENTIAL EMISSION INVENTORY WORKSHEET

Tampa Electric Company, Hookers Point IC Engine Project

ENG 007-036

EMISSION SOURCE TYPE

HEAVY DUTY OIL-FIRED ENGINES - CRITERIA POLLUTANTS

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	4-Cycle Rich Burn Engine
Emission Control Method(s)/ID No.(s):	None
Emission Point Description:	1.825 MW Engine/Generator, Caterpillar Model XQ2000 Power Module

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Engine Power Output (hp) x Pollutant Emission Factor (lb/hp-hr)

Emission (ton/yr) = Engine Power Output (hp) x Pollutant Emission Factor (lb/hp-hr) x Operating Period (hrs/yr) x (1 ton/ 2,000 lb)

Source: ECT, 2002.

INPUT DATA (PER ENGINE) AND EMISSIONS CALCULATIONS

Operating Hours:	24	Hrs/Day	7	Days/Wk	
Operating Hours:	737	Hrs/Yr (equivalent).			
Fuel Usage:	128.0	gal/hr	94,293	gal/yr (equivalent). Total fuel limited to 2,828,800 gal/yr.	
Engine Heat Input:	17.5	10^6 Btu/hr (LHV)	Power Output:	1,825	kW
Engine Power Output:	2,593	HP	Fuel Oil Sulfur Content:	0.05	weight %
Oil Heat Content:	137,000	Btu/gal (LHV)	Heat Rate:	9,609	Btu/kW-hr
Number of Engines:	30	Oil Consumed:	0.1280	10^3 gal/hr	94.29 10^3 gal/yr

Criteria Pollutant	Pollutant Emission Factors		Potential Emission Rates (Per Engine)		Potential Emission Rates (All Engines)	
	(g/hp-hr)	(lb/hp-hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
NO_x	9.22	0.02032	52.7	19.41	1,580.7	582.2
CO	0.17	0.00037	0.97	0.36	29.1	10.7
THC	0.17	0.00037	0.97	0.36	29.1	10.7
SO_2	0.16	0.00036	0.93	0.34	28.0	10.3
PM/PM_{10}	0.08	0.00019	0.48	0.18	14.4	5.3
H_2SO_4[1]	0.8653	0.00191	0.057	0.021	1.72	0.63

SOURCES OF INPUT DATA

Parameter	Data Source
Operating Hours	ECT, 2002. Total fuel consumption for all 30 engines limited to avoid PSD review.
Fuel Usage Data	TEC, 2002.
Engine Power Output	Caterpillar, 2000.
Fuel Oil Sulfur Content	TEC, 2002.
Emission Factors (except SO_2 and H_2SO_4)	Caterpilar (100% load), 2000.
Emission Factor, SO_2	Mass balance, ECT, 2002.
Emission Factor, H_2SO_4	Table 1.3-1, AP-42, EPA, September 1998.

NOTES AND OBSERVATIONS

[1] H_2SO_4 emissions assumes 5% conversion of SO_2 to SO_3 and 100% conversion of SO_3 to H_2SO_4.

DATA CONTROL

Data Collected by:	T.Davis	Date:	Sep-02
Data Entered by:	T.Davis	Date:	Sep-02
Reviewed by:	D. Latchman	Date:	Sep-02

Attachment 3

Diesel Fuel Internal Combustion Engines Hazardous Air Pollutant Emission Factors

Emission Factor Report for All Pollutants

26-Apr-02

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)		EF (lb/MMBtu)	Runs Count	ND Count	Control Device
1,3-Butadiene										
8.3	Diesel	Caterpillar	D398	850	100	<<	7.29E-06	3	3	NR
16	Diesel	Cummins	D092331CX02	335	50		3.12E-03	3	0	NR
					Avg EF =		**1.56E-03**			
					Std Dev =		**2.20E-03**			
					Count =		**2**			
					RSD(%) =		**140.8%**			
Acetaldehyde										
16	Diesel	Cummins	D092331CX02	335	50		6.08E-03	3	0	NR
15.2	Diesel	NR	NR	350	100		4.66E-04	3	0	NR
15.1	Diesel	NR	NR	850	100		2.52E-05	3	0	NR
1.1	Diesel	NR	NR	350	100		1.07E-03	3	0	NR
					Avg EF =		**1.91E-03**			
					Std Dev =		**2.81E-03**			
					Count =		**4**			
					RSD(%) =		**147.2%**			

Acrolein

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
16	Diesel	Cummins	D092331CX02	335	50	4.25E-04	3	0	NR
1.1	Diesel	NR	NR	350	100	< 3.73E-05	3	2	NR
15.1	Diesel	NR	NR	850	100	< 6.07E-06	3	2	NR
15.2	Diesel	NR	NR	350	100	1.34E-04	3	0	NR
					Avg EF =	**1.51E-04**			
					Std Dev =	**1.91E-04**			
					Count =	**4**			
					RSD(%) =	**126.7%**			

Benzene

8.3	Diesel	Caterpillar	D398	850	100	1.56E-03	3	0	NR
5	Diesel	Caterpillar	NR	680	75	2.03E-03	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50	1.79E-03	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	1.18E-04	3	0	NR
1.1	Diesel	NR	NR	350	100	5.35E-04	3	0	NR
15.1	Diesel	NR	NR	850	100	7.72E-04	3	0	NR
15.2	Diesel	NR	NR	350	100	1.33E-03	3	0	NR

All Diesel Engines – No Controls

Pollutant ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)		EF (lb/MMBtu)	Runs Count	ND Count	Control Device
					Avg EF =		1.16E-03			
					Std Dev =		7.04E-04			
					Count =		7			
					RSD(%) =		60.5%			
Beryllium										
12.1	Diesel	Norberg	FS-138-ISC	1270	100	<<	5.93E-07	3	3	NR
12.4	Diesel	Norberg	FS-138-ISC	1270	80	<<	7.84E-07	3	3	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100	<<	4.92E-07	3	3	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100		0.00E+00	3	2	NR
					Avg EF =		4.67E-07			
					Std Dev =		3.34E-07			
					Count =		4			
					RSD(%) =		71.5%			
Cadmium										
12.4	Diesel	Norberg	FS-138-ISC	1270	80	<	4.43E-06	3	2	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100		0.00E+00	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100		8.40E-05	3	0	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100		1.37E-06	3	0	NR

All Diesel Engines – No Controls

Pollutant ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)		EF (lb/MMBtu)	Runs Count	ND Count	Control Device
					Avg EF =		**2.24E-05**			
					Std Dev =		**4.11E-05**			
					Count =		**4**			
					RSD(%) =		**183.0%**			
Chromium										
16	Diesel	Cummins	D092331CX02	335	50		4.41E-06	3	0	NR
12.4	Diesel	Norberg	FS-138-ISC	1270	80		6.34E-06	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100		0.00E+00	3	0	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100		5.45E-06	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100		2.33E-06	3	0	NR
					Avg EF =		**3.71E-06**			
					Std Dev =		**2.55E-06**			
					Count =		**5**			
					RSD(%) =		**68.9%**			
Ethylbenzene										
8.3	Diesel	Caterpillar	D398	850	100	<	4.50E-05	3	1	NR
5	Diesel	Caterpillar	NR	680	75		4.81E-05	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50		7.88E-05	3	0	NR

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)		EF (lb/MMBtu)	Runs Count	ND Count	Control Device
					Avg EF =		**5.73E-05**			
					Std Dev =		**1.87E-05**			
					Count =		**3**			
					RSD(%) =		**32.6%**			

Formaldehyde

19.2	Diesel	Caterpillar	3406	230	100		1.18E-04	3	0	NR
23	Diesel	Caterpillar	3406	230	100		1.11E-04	3	0	NR
8.3	Diesel	Caterpillar	D398	850	100	<<	6.99E-05	3	3	NR
5	Diesel	Caterpillar	NR	680	75		1.04E-03	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50		1.25E-02	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100	<	2.31E-04	3	2	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	<	1.55E-04	3	2	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100		2.46E-04	3	0	NR
12.5	Diesel	Norberg	FS-138-ISC	1270	100	<<	4.97E-05	3	3	NR
12.3	Diesel	Norberg	FS-138-ISC	1270	60		4.33E-04	3	0	NR
12.2	Diesel	Norberg	FS-138-ISC	1270	80	<<	7.09E-05	3	3	NR
9	Diesel	NR	248EMD	1600	100		3.13E-02	3	0	NR
30	Diesel	NR	248-EMD	1600	NR	<<	2.19E-05	3	3	NR

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)		EF (lb/MMBtu)	Runs Count	ND Count	Control Device
1.1	Diesel	NR	NR	350	100		1.38E-03	3	0	NR
6.2	Diesel	NR	NR	NR	100	<<	1.84E-05	3	3	NR
6.3	Diesel	NR	NR	NR	100	<<	1.36E-05	3	3	NR
6.4	Diesel	NR	NR	NR	100		6.10E-04	3	0	NR
18	Diesel	NR	NR	800	100		9.97E-05	3	0	NR
6.6	Diesel	NR	NR	NR	100	<<	1.16E-05	3	3	NR
6.1	Diesel	NR	NR	NR	100	<<	1.43E-05	3	3	NR
15.1	Diesel	NR	NR	850	100		7.83E-05	3	0	NR
15.2	Diesel	NR	NR	350	100		9.88E-04	3	0	NR
6.5	Diesel	NR	NR	NR	100		2.36E-04	3	0	NR
17	Diesel	Waukesha	VLRDB	625	100		1.77E-04	3	0	NR
					Avg EF =		**2.08E-03**			
					Std Dev =		**6.71E-03**			
					Count =		**24**			
					RSD(%) =		**322.4%**			

Lead

12.1	Diesel	Norberg	FS-138-ISC	1270	100		1.09E-05	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100		0.00E+00	3	0	NR

All Diesel Engines – No Controls

Pollutant ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
12.1	Diesel	Norberg	FS-138-ISC	1270	100	4.38E-06	3	0	NR
12.4	Diesel	Norberg	FS-138-ISC	1270	80	1.37E-05	3	0	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100	5.61E-06	3	0	NR
					Avg EF =	**6.92E-06**			
					Std Dev =	**5.43E-06**			
					Count =	**5**			
					RSD(%) =	**78.5%**			
Manganese									
12.4	Diesel	Norberg	FS-138-ISC	1270	80	5.30E-05	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	1.33E-05	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100	0.00E+00	3	0	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100	1.97E-05	3	0	NR
					Avg EF =	**2.15E-05**			
					Std Dev =	**2.25E-05**			
					Count =	**4**			
					RSD(%) =	**104.9%**			
Mercury									
12.1	Diesel	Norberg	FS-138-ISC	1270	100	9.50E-07	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100	0.00E+00	3	0	NR

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
12.6	Diesel	Norberg	FS-138-ISC	1270	100	3.44E-07	3	0	NR
12.4	Diesel	Norberg	FS-138-ISC	1270	80	4.48E-06	3	0	NR
					Avg EF =	**1.44E-06**			
					Std Dev =	**2.06E-06**			
					Count =	**4**			
					RSD(%) =	**142.9%**			

Naphthalene

23	Diesel	Caterpillar	3406	230	100	1.06E-04	3	0	NR
19.1	Diesel	Caterpillar	3406	230	100	1.03E-03	3	0	NR
8.2	Diesel	Caterpillar	D398	850	100	7.15E-05	2	0	NR
8.1	Diesel	Caterpillar	D398	850	80	1.79E-04	1	0	NR
5	Diesel	Caterpillar	NR	680	75	2.02E-04	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50	1.85E-04	3	0	NR
28.1	Diesel	GM	EMD64-5E4	3352	100	0.00E+00	1	0	NR
28.3	Diesel	GM	EMD654	3352	100	0.00E+00	1	0	NR
28.2	Diesel	GM	EMD654	3352	100	0.00E+00	1	0	NR
12.5	Diesel	Norberg	FS-138-ISC	1270	100	3.79E-04	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100	2.42E-04	3	0	NR

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
12.3	Diesel	Norberg	FS-138-ISC	1270	60	2.92E-04	3	0	NR
12.2	Diesel	Norberg	FS-138-ISC	1270	80	3.56E-04	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	2.94E-04	3	0	NR
9	Diesel	NR	248EMD	1600	100	7.45E-04	3	0	NR
30	Diesel	NR	248-EMD	1600	NR	5.50E-04	3	0	NR
6.5	Diesel	NR	NR	NR	100	2.24E-02	3	0	NR
6.1	Diesel	NR	NR	NR	100	3.67E-04	3	0	NR
6.2	Diesel	NR	NR	NR	100	8.14E-04	3	0	NR
18	Diesel	NR	NR	800	100	3.09E-04	3	0	NR
15.2	Diesel	NR	NR	350	100	1.17E-04	3	0	NR
6.4	Diesel	NR	NR	NR	100	2.56E-03	2	0	NR
1.1	Diesel	NR	NR	350	100	5.32E-05	3	0	NR
6.6	Diesel	NR	NR	NR	100	3.51E-04	3	0	NR
15.1	Diesel	NR	NR	850	100	1.30E-04	3	0	NR
6.3	Diesel	NR	NR	NR	100	5.20E-04	3	0	NR
17	Diesel	Waukesha	VLRDB	625	100	1.64E-05	3	0	NR

All Diesel Engines – No Controls

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
Pollutant									
					Avg EF =	**1.20E-03**			
					Std Dev =	**4.27E-03**			
					Count =	**27**			
					RSD(%) =	**357.1%**			
n-Hexane									
5	Diesel	Caterpillar	NR	680	75	<< 5.20E-06	3	3	NR
16	Diesel	Cummins	D092331CX02	335	50	1.90E-04	3	0	NR
					Avg EF =	**9.76E-05**			
					Std Dev =	**1.31E-04**			
					Count =	**2**			
					RSD(%) =	**133.9%**			
Nickel									
12.4	Diesel	Norberg	FS-138-ISC	1270	80	< 6.74E-06	3	1	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100	0.00E+00	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	< 3.80E-06	3	1	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100	4.82E-06	3	0	NR
					Avg EF =	**3.84E-06**			
					Std Dev =	**2.84E-06**			
					Count =	**4**			
					RSD(%) =	**73.8%**			

All Diesel Engines – No Controls

Pollutant ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
PAH									
23	Diesel	Caterpillar	3406	230	100	1.38E-04	3	0	NR
19.1	Diesel	Caterpillar	3406	230	100	1.39E-03	3	0	NR
8.2	Diesel	Caterpillar	D398	850	100	1.05E-04	2	0	NR
8.1	Diesel	Caterpillar	D398	850	80	2.69E-04	1	0	NR
5	Diesel	Caterpillar	NR	680	75	2.75E-04	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50	6.14E-04	3	0	NR
12.3	Diesel	Norberg	FS-138-ISC	1270	60	1.40E-03	3	0	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100	1.24E-03	3	0	NR
12.5	Diesel	Norberg	FS-138-ISC	1270	100	1.10E-03	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	1.26E-03	3	0	NR
12.2	Diesel	Norberg	FS-138-ISC	1270	80	1.76E-03	3	0	NR
9	Diesel	NR	248EMD	1600	100	1.52E-03	3	0	NR
30	Diesel	NR	248-EMD	1600	NR	1.25E-03	3	0	NR
1.1	Diesel	NR	NR	350	100	1.75E-04	3	0	NR
6.6	Diesel	NR	NR	NR	100	6.86E-04	3	0	NR
6.5	Diesel	NR	NR	NR	100	4.38E-02	3	0	NR

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
15.1	Diesel	NR	NR	850	100	2.12E-04	3	0	NR
6.4	Diesel	NR	NR	NR	100	4.14E-03	2	0	NR
6.3	Diesel	NR	NR	NR	100	1.03E-03	3	0	NR
15.2	Diesel	NR	NR	350	100	1.60E-04	3	0	NR
6.2	Diesel	NR	NR	NR	100	1.50E-03	3	0	NR
6.1	Diesel	NR	NR	NR	100	9.43E-04	3	0	NR
18	Diesel	NR	NR	800	100	4.29E-04	3	0	NR
17	Diesel	Waukesha	VLRDB	625	100	2.22E-05	3	0	NR
					Avg EF =	**2.73E-03**			
					Std Dev =	**8.79E-03**			
					Count =	**24**			
					RSD(%) =	**322.6%**			

POMs

28.1	Diesel	GM	EMD64-5E4	3352	100	0.00E+00	1	0	NR
28.2	Diesel	GM	EMD654	3352	100	0.00E+00	1	0	NR
28.3	Diesel	GM	EMD654	3352	100	0.00E+00	1	0	NR

All Diesel Engines – No Controls

Pollutant ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)		EF (lb/MMBtu)	Runs Count	ND Count	Control Device
					Avg EF =		**0.00E+00**			
					Std Dev =		**0.00E+00**			
					Count =		**3**			
					RSD(%) =					
Selenium										
12.1	Diesel	Norberg	FS-138-ISC	1270	100	<<	2.37E-06	3	3	NR
12.4	Diesel	Norberg	FS-138-ISC	1270	80	<<	3.13E-06	3	3	NR
12.7	Diesel	Norberg	FS-138-ISC	1270	100		0.00E+00	3	3	NR
12.6	Diesel	Norberg	FS-138-ISC	1270	100	<<	1.84E-06	3	3	NR
					Avg EF =		**1.84E-06**			
					Std Dev =		**1.33E-06**			
					Count =		**4**			
					RSD(%) =		**72.6%**			
THC										
1.5	Diesel	NR	NR	550	NR		1.05E+00	3	0	NR
					Avg EF =		**1.05E+00**			
					Std Dev =					
					Count =		**1**			
					RSD(%) =					
Toluene										

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
8.3	Diesel	Caterpillar	D398	850	100	2.81E-04	3	0	NR
5	Diesel	Caterpillar	NR	680	75	6.04E-04	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50	1.14E-03	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	1.43E-03	3	0	NR
15.2	Diesel	NR	NR	350	100	5.33E-04	3	0	NR
1.1	Diesel	NR	NR	350	100	2.63E-04	3	0	NR
15.1	Diesel	NR	NR	850	100	2.72E-04	3	0	NR
					Avg EF =	**6.46E-04**			
					Std Dev =	**4.64E-04**			
					Count =	**7**			
					RSD(%) =	**71.8%**			

Xylene

8.3	Diesel	Caterpillar	D398	850	100	< 7.07E-05	3	1	NR
5	Diesel	Caterpillar	NR	680	75	1.07E-04	3	0	NR
16	Diesel	Cummins	D092331CX02	335	50	3.48E-04	3	0	NR
12.1	Diesel	Norberg	FS-138-ISC	1270	100	1.50E-03	3	0	NR
1.1	Diesel	NR	NR	350	100	3.11E-04	3	0	NR
15.2	Diesel	NR	NR	350	100	2.58E-04	3	0	NR

All Diesel Engines – No Controls

Pollutant

ID	Fuel Type	Manufacturer	Model	Rating (HP)	Load (%)	EF (lb/MMBtu)	Runs Count	ND Count	Control Device
15.1	Diesel	NR	NR	850	100	1.95E-04	3	0	NR
					Avg EF =	**3.99E-04**			
					Std Dev =	**4.96E-04**			
					Count =	**7**			
					RSD(%) =	**124.5%**			

Attachment 4

No. 2 Fuel Oil Analysis

ATTN: MARTY

SMW.TXT
□E□&l0□□&l28p0e28F□9□&l0L□&l1E□&a6L□(3@□*t300R□(s12H□&l6D

BP Products North America Inc.
Texas City Refinery
Product Inspection Report
For Ship Texas

Material : Low Sulfur Diesel Fuel
Grade : GNLMFL
Brand : 23366

Destination : 2002GNLMTX0849
Sampled by : INSPECTRAT
Date : 30-AUG-2002

Test	Property		TK-56	LSDF-MARIN
	LIMS Id.		1508354	1508441
	Sx.Date		28-AUG-02	29-AUG-02
	Sx.Time		14:00	18:10
	Property		TANK-FINAL	STATIC
	Volume	Bbls.	36739	36739
APPEARANCE	APPEARANCE		Clear and Bright	Clear and Bright
GRAV-DMA	SPECIFIC G		0.8553	0.8554
	API GRAVIT		33.9	33.9
COL-ASTM	ASTM COLOR		1.5	1.5
COLOR	COLOR		Undyed	Undyed
HAZE-RATE	HAZE RT	NO-UNITS	1	1
CORROS-LIQ	CORROSION		1A	
CLOUD-AUTO	CLOUD PT	DEG-F	9	
POUR-AUTO	POUR PT	DEG-F	-10	
FLASH-PMCC	PMCC FLASH	DEG-F	152	148
DIST86-H	IBP	DEG-F	324.2	
	5% REC	DEG-F	388.1	
	10% REC	DEG-F	409.7	
	20% REC	DEG-F	438.5	
	30% REC	DEG-F	461.5	
	40% REC	DEG-F	482.7	
	50% REC	DEG-F	501.8	
	60% REC	DEG-F	523.2	
	70% REC	DEG-F	545.2	
	80% REC	DEG-F	571.5	
	90% REC	DEG-F	609.1	
	95% REC	DEG-F	641.3	
	FBP	DEG-F	658.7	
	RECOVERY	VOL%	97.9	
	RESIDUE	VOL%	1.3	
	LOSS	VOL%	0.8	
CETANE-IND	CETANE IND	NO-UNITS	44.2	
RAMSC10B	RAMSCARBON	wt%	0.10	
NALCO-PAD	RATING	NO-UNITS	1	
WS	BS&W	VOL%	0.001	
ASH	ASH	WT%	<0.001	
VIS40CAUT	VIS40C	cSt	44.223	
SULF-WT	SULFUR	WT%	0.036	
NACE	RATING		B++	
ADDITIVES	METAL DEAC	LB/MBBL	0.00	
	CORR INHIB	WT-PPM	2	

Signed by : _____
Laurietta Y. Williams for S. A. Chaudhry
Analytical Technology & Laboratory Services
Texas City, Texas