GF2 Fuel Enhancer Formula

Final Report
With the

Comision Federal de Electridad;
San Carlos, B.C.S. Plant

Utilizing the
Carbon Mass Balance Test Procedure

June 2010

CONTENTS

Appendices

WHAT IS THE CARBON MASS BALANCE TEST PROCEDURE?

PREFACE

Fuel consumption measurements by reliable and accredited methods have been under constant review for many years. The weight of engineering evidence and scientific theory favors the Carbon Mass Balance method by which carbon measured in the engine exhaust gas is related to the carbon content of the fuel consumed. This method has certainly proven to be the most suitable for field-testing where minimizing equipment down time is a factor.

The inquiries of accuracy and reliability to which we refer include discussions from international commonwealth and government agencies responsible for the test procedure discussed herein. This procedure enumerates the data required for fuel consumption measurements by the “Carbon Mass Balance” or “exhaust gas analysis” method. The studies conducted show that the Carbon Mass Balance has been found to be a more precise fuel consumption test method than the alternative volumetric-gravimetric methods.

The Carbon Mass Balance test is a fundamental part of the Australian Standards **AS2077-1982**. Further, the Carbon Mass Balance test procedure has proven to be an intricate part of the United States EPA, FTP and HFET Fuel Economy Tests. Also, Ford Motor Company characterized the Carbon Mass Balance test procedure as being “at least as accurate as any other method of volumetric-gravimetric testing.” (**SAE Paper No. 750002 Bruce Simpson, Ford Motor Company**) Finally, the Carbon Mass Balance procedure is incorporated in the Federal Register Voluntary Fuel Economy Labeling Program, Volume 39.

The following photographic report captures a few of the applicable steps necessary for conducting a reliable and accurate Carbon Mass Balance test. As will be documented, every effort is made to insure that each test is consistent, repeatable, and precise. More importantly, it will be even clearer as to why the Carbon Mass Balance Test has such a high degree of acceptance and reliability.

EXECUTIVE SUMMARY

The GF2™ fuel catalyst manufactured and marketed by “Tecnologia y Servicios Administrativos Empresariales S.A. de C.V.” has proven, in laboratory and field-testing, to reduce fuel consumption in the range 3% to 10% under comparable load conditions. It also has proven to significantly reduce carbon emissions. Scientific studies identify the active ingredient as a soluble organo-metallic chemistry that helps to reduce ignition delay by improving combustion chamber mixing through improved molecular dispersion.

Following discussions with Eric Martineau of “Tecnologia y Servicios Administrativos Empresariales S.A. de C.V.” part of “Grupo Latino America and executives with Comision Federal de Electridad (referred to as CFE hereafter). It was determined that a fuel consumption analysis should be conducted utilizing a large scale, on-line Generator set at the San Carlos, BCS power generation site. The designated equipment for this study includes a Man B & W, 39.375 Megawatt generator set (unit number 3).

An integral part of this evaluation is determining the catalyst’s effect on large scale engine operations fueled with number six (6) bunker fuel. This engine was specifically of interest due to its location and primary importance economically and ecologically to the local community and CFE.

In particular, the purpose for this evaluation was to determine the effects of GF2™ fuel catalyst on particulate emissions, as well as unburned hydrocarbons, carbon monoxide, carbon dioxide and oxides of nitrogen. Further, this fuel consumption evaluation was conducted in an attempt to compare fuel consumed for a baseline (untreated) operational segment and compare the data to the fuel consumed during the treated (GF2™ Formula) operational segment of the evaluation. The method utilized to determine fuel consumption (the Carbon Mass Balance Test Procedure), hereafter referred to as the CMB, and is previously discussed in the **Preface** of this document. As important, concurrent studies were performed to determine the effectiveness of GF2™ in the reduction of carbon buildup on internal engine components, fuel solids levels, visual soot (smoke) levels and various other pertinent areas of operation as described in this report. It is understood that reductions in harmful carbon buildup will be demonstrated, which will dramatically reduce the frequency for scheduled generator shutdowns to de- carbon internal engine components.

This Final Report is being provided as a result of a significant test paradigm conducted with CFE and ongoing discussions with Eric Martineau and executives with Comision Federal de Electridad. This document will summarize the decisions outlined as part of the evaluation paradigm utilized to assess the effectiveness of GF2™ fuel catalyst in the daily operation of a Mann/B&W power generation engine located in San Carlos, B.C.S. This document will also outline the necessary steps utilized to initiate and conduct the baseline and treated segments of the fuel catalyst test. It should be noted that the data for this report was supplied by GF2's supplier under the auspices of the plant chemist.

A baseline test was conducted after which the test engine's fuel source was treated by introducing the GF2™ fuel catalyst at a ratio of 1:5000 from 209 litre drums of GF2™ fuel catalyst into the test engines bulk fuel storage tank. At a later date, the catalyst treated fuel test was then repeated following the same parameters. The results are contained within the body of this report.

CFE is the primary producer of electricity on the Baja peninsula. The remote nature and topography of the region are void of coal and natural gas reserves wherein the residents rely heavily on bunker 6 fuel shipped to the region to provide the necessary fuel for electrical power.

A baseline test (untreated) was conducted on December 3, 2009 using the Carbon Mass Balance test procedure after which the pre-selected test equipment was treated by adding the GF2™ fuel catalyst to the bunker six (6) fuel contained in an on-site storage tank. On January 15, 2010 the first of two treated tests were performed with GF2™ fuel catalyst utilizing the same parameters as those used during the baseline segment of the evaluation. The final catalyst treated segment of the treated phase of the evaluation took place on April 15, 2010 wherein the same process was then repeated (GF2™ treated) following the same parameters. The results are contained within this report.

The data showed that the average improvement in fuel consumption, for the January 15, 2010 treated segment was 7.57%, during steady state testing, using the Carbon Mass Balance test procedure. Further, data extracted from the same test engine on April 15, 2010 documented a 12.17% improvement utilizing the same Carbon Mass Balance test procedure.

A Concurrent fuel consumption study was also performed utilizing the onsite emissions data accumulated by CFE under the auspices of the Plant Chemist. The data showed an average improvement (carbon only) in fuel consumption of 4.6%. This information will be further discussed in the body of this report.

The treated engines also demonstrated a large percentage reduction in soot particulates, in the range 29.6%, and reductions in harmful exhaust related carbon fractions. Carbon dioxide reductions, based upon the measured reduction in fuel consumption, are also substantial.

Other numerous improvements coinciding with the implementation of the catalyst are discussed in further detail in the **“Conclusion”** section of this report.

INTRODUCTION

Baseline (untreated) fuel efficiency tests were conducted on the selected generator set on December 3, 2010, employing the Carbon Mass Balance (CMB) test procedure.

GF2™ Supplier Latino America supplied the GF2™ formula fuel catalyst in 209 litre drums wherein the fuel catalyst was utilized to dose/treat the fuel storage tank for the generator set (unit number 3) utilized throughout the course of this evaluation. The test unit was then operated on GF2™ fuel catalyst treated fuel for nearly 3,500 hours in order to achieve the complete conditioning period, which is documented in many laboratory and field studies as a requirement for affective catalytic oxidation stabilization. Tests conducted provide critical documentation, which proves that equipment operated with less than sufficient operating hours with the catalyst demonstrate lower fuel consumption improvements because of the catalytic stabilization affects that take place while using the GF2™ fuel combustion catalyst.

During the two treated phase tests (January 15, 2010 and April 15, 2010) the engine tests were repeated, reproducing all engine parameters. The final results, along with the data sheets, are contained within this report.

TEST METHOD

Carbon Mass Balance (CMB) is a procedure whereby the mass of carbon in the exhaust is calculated as a measure of the fuel being burned. The First Law of Thermodynamics clearly states that “energy can neither be created nor destroyed. In any process, the total energy of the universe remains the same”. Energy can only change form! The fundamental basis for the CMB test procedure is to measure the form of energy (carbon) as it exits in the exhaust stream. Since “the amount of energy lost in a steady state process cannot be greater than the amount of energy gained”, measured exhaust carbon can only be reduced if the volume of fuel to the engine is reduced. If the volume of fuel is reduced to the engine to produce the same load, then the net increase is only a result of heat gained through improved combustion. The “Law of Conservation of Energy has become the most secure of all basic laws of science; at present, it is unquestioned!”

The elements measured in this test include the exhaust gas composition, its temperature and the gas flow rate calculated from the differential pressure and exhaust stack cross sectional area. The CMB is central to the both US-EPA (FTP and HFET) and Australian engineering standard tests (AS2077-1982), although in field-testing we are unable to employ a chassis dynamometer. However, in the case of a stationary equipment test, the engine can be affectively loaded to demonstrate fuel consumption trends and potential.

The Carbon Mass Balance formula and equations employed in calculating the carbon flow are a supplied, in part, by doctors' of Combustion Engineering at the university and scientific research facility level.

The Carbon Mass Balance test procedure follows a prescribed regimen, wherein every possible detail of engine operation is monitored to insure the accuracy of the test procedure. Cursory to performing the test, it is imperative to understand the quality of fuel utilized in the evaluation. As important, the quality of fuel must be consistent throughout the entirety of the process.

Fuel density and temperature tests are performed for both the baseline and treated segments of the evaluation to determine the energy content of the fuel. A Precision Hydrometer, columnar flask and fuel temperature are utilized to determine the fuel density for each prescribed segment of the evaluation.

Next, and essential to the CMB test procedure, is test equipment that is mechanically sound and free from defect. Careful consideration and equipment screening is utilized to verify the mechanical stability of each piece of test equipment. Preliminary data is scrutinized to disqualify all equipment that may be mechanically suspect. Once the equipment selection process is complete, the CMB test procedure takes only a few short minutes to perform (pending required data collection requirements).

Once the standards are met and the decision is made to test a certain piece of equipment, pertinent engine criteria needs to be evaluated as the Carbon Mass Balance procedure continues.

When the selection process is complete, engine RPM is increased and locked in position. This allows the engine fluids, block temperature, and exhaust stream gasses to stabilize. Data cannot be collected when there is irregular fluctuation in engine RPM and exhaust constituent levels. Therefore, all engine operating conditions must be stable and consistent.

In many cases, an aftermarket throttle position lock, a factory installed throttle lock and/or a cruise control unit are utilized, as a few methods to secure engine RPM. However, this application relies on controlled generator speed to affix RPM, wherein load to the desired application is allowed to gravitate based on outside load requirement. Should the engine RPM fluctuate erratically and uncontrollably, the test unit would be disqualified from further consideration.

Next, engine RPM and fluid temperatures are monitored throughout the Carbon Mass Balance evaluation. As important, exhaust manifold temperatures are monitored to ensure that engine combustion is consistent in all cylinders. It is imperative that the engine achieve normal operating conditions before any testing begins.

Once engine fluid levels have reached normal operating conditions the Carbon Mass Balance study may begin. The above photograph shows that the engine RPM is locked in place at 102.33 RPM and 37.88 MW. It should be noted that any deviation in RPM, temperature, either fluid or exhaust, would cause this unit to be eliminated from the evaluation due to mechanical inconsistencies.

Once all of the mechanical criteria are met, data acquisition can commence; it is necessary to monitor the temperature and pressure of the exhaust stream. Carbon Mass Balance data cannot be collected until such time as the engine exhaust temperature has stabilized. Exhaust temperature is monitored carefully for this reason.

Once the exhaust temperature has stabilized, the test unit has reached its peak operating temperature. Exhaust temperature is critical to the completion of a successful evaluation, since temperature changes identify changes in load and RPM. As previously discussed, RPM and load must remain constant during the Carbon Mass Balance study.

When all temperatures are stabilized, and desired operating parameters are achieved; it is time to insert the emissions sampling probe into the generator exhaust testing port utilized in this study. The probe has a non-dispersive head, which allows for random exhaust sampling throughout the cross section of the exhaust.

While the emission-sampling probe is in place, and data is being collected, exhaust temperature and pressure are monitored throughout the entirety of the Carbon Mass Balance procedure. The following photograph shows the typical location of the exhaust emissions sampling probe.

While data is being collected, exhaust pressure is monitored, once again, as a tool to control load and RPM fluctuations. Exhaust pressure is proportional to load. Therefore, as one increases, or decreases, so in turn does the other. The Carbon Mass Balance test is unique in that all parameters that can and will have a dramatic affect on fuel consumption, in a volumetric test, are controlled and monitored throughout the entirety evaluation. This ensures the accuracy of the data being collected. Exhaust pressure is nothing more than an accumulation of combustion events that are distributed through the exhaust matrix.

The above photograph shows one method in which exhaust pressure can be monitored during the Carbon Mass Balance test procedure. In this case, exhaust pressure is ascertained through the use of an inlet velocity probe to the analyzer. To determine air inlet quantity to the generator set, (see below) a Magnahelic gauge was utilized to monitor engine air inlet velocities. This type of stringent regime further documents the inherent accuracy of the Carbon Mass Balance test procedure.

At the conclusion of the Carbon Mass Balance test, a soot particulate test is performed to determine the engine exhaust particulate level. This valuable procedure helps to determine the soot particulate content in the exhaust stream. Soot particulates are the most obvious and compelling sign of pollution. Any attempt to reduce soot particulates places that industry in a favorable position with global environmental policy and the general public.

The above photograph demonstrates a typical method in which soot particulate volume is monitored during the Carbon Mass Balance test. This method is the Bacharach Smoke Spot Test. It is extremely accurate, portable, and repeatable. It is a valuable tool in smoke spot testing when comparing baseline (untreated) exhaust to catalyst treated exhaust.

Finally, the data being recorded is collected through a non-dispersive, infrared analyzer. Equipment such as this is EPA approved and CFR 40 rated. This analyzer has a high degree of accuracy, and repeatability. It is central to the Carbon Mass Balance procedure in that it identifies baseline carbon and oxygen levels, relative to their change with catalyst treated fuel, in the exhaust stream. The data accumulated is highly accurate, as long as the criteria leading up to the accumulation of data follows the same echelon of accuracy. For this reason, the Carbon Mass Balance test is superior to any other test method utilized. It eliminates a plethora of variables that can adversely affect the outcome and reliability of any fuel consumption evaluation.

The above photograph identifies one type of analyzer used to perform the Carbon Mass Balance test. The analyzer is calibrated with known reference gases before the baseline and treated test segments begin. The data collected with this analyzer is then computed wherein the carbon data from the baseline segment of the evaluation is compared to the carbon data accumulated from the catalyst treated segment of the evaluation. Critical to this computation is the energy (carbon) contained within the raw diesel fuel. A fuel consumption performance factor is then calculated from the data. The baseline performance factor is compared with the catalyst treated performance factor. The difference between the two performance factors identifies the change in fuel consumption during the Carbon Mass Balance test procedure.

Note: essential to performing the aforementioned test procedure is the method in which the task for dosing fuel is performed. It is critical to the success of the Carbon Mass Balance procedure to insure that the equipment evaluated be given meticulous care and consideration to advance the process of testing.

INSTRUMENTATION

Precision state of the art instrumentation was used to measure the concentrations of carbon containing gases in the exhaust stream, and other factors related to fuel consumption and engine performance. The instruments and their purpose are listed below:

> *Measurement of exhaust gas constituents HC, CO, CO_2 and O_2, by ECOM J2KN, multi gas infrared analyser.*

Note: The ECOM J2KN emissions analyzer is calibrated with the same reference gas for both the baseline and treated segments of the evaluation.

Temperature measurement; by Fluke Model 52K/J digital thermometer and ECOM.

Exhaust differential pressure by Dwyer Magnahelic and ECOM.

Ambient pressure determination by use of Brunton ADC altimeter/barometer.

The exhaust soot particulates are also measured during this test program.

Exhaust gas sample evaluation of particulate by use of a Bacharach True Spot smoke meter and ECOM.

The ECOM infrared gas analyzer was serviced and calibrated prior to each phase of CMB engine efficiency tests.

TEST RESULTS

Fuel Efficiency

A summary of the CMB fuel efficiency results achieved, in this test program, is provided in the following tables and appendices. **See Table I, and Individual Carbon Mass Balance results in Appendix III.**

Table I: provides the final test results for the test unit (unit number three (3) included in this evaluation, before and after GF2™ fuel catalyst treatment **(see graph II, Appendix II, Graphs, Fuel Consumption and Smoke)**.

Table I

Test Segment	Miles/Hrs.	Fuel Change by %
1-15-2010		
Treated	1,032 hrs.	**- 7.6%**
4-15-2010		
Treated	3,192 hrs.	**- 12.17%**
CFE In house		
Treated	3,192 hrs.	**- 4.6%**

The computer printouts of the calculated CMB test results are located in **Appendix III, Carbon Mass Balance Computation.** The raw engine data sheets used to calculate the CMB are contained in **Appendix V, Raw Data Sheets**. The CMB sample calculation is located in **Appendix XII, CMB Equation,** of this final report. The raw data sheets, and Carbon Mass Balance sheets show and account for the environmental and ambient conditions during the evaluation. The ECOM analyzer does not measure unburned hydrocarbons. As such, the un-invasively low hydrocarbon levels were held constant and calculated as a constant for the CMB evaluation.

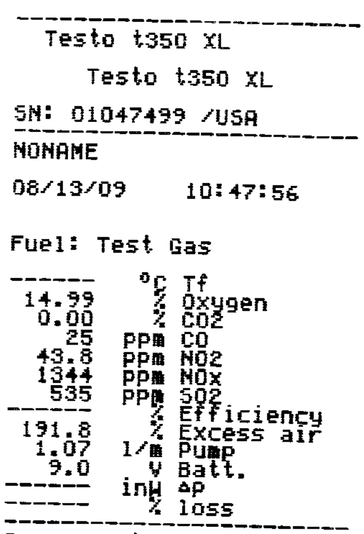
Soot Particulate Tests

Concurrent with CMB data extraction, soot particulate measurements were conducted. The results of these tests are summarized in **Table II**. Reductions in soot particulates are the most apparent and immediate. Laboratory testing indicates that carbon and solid particulate reductions occur before observed fuel reductions. Studies show that a minimum 2,000 to 3,000 hours GF2™ Formula treated engine operation, are necessary before the conditioning period is complete. Then, and only then, will fuel consumption improvements be observed. For the purpose of this evaluation, observed stack soot accumulation had diminished significantly between baseline and treated segments of the evaluation.

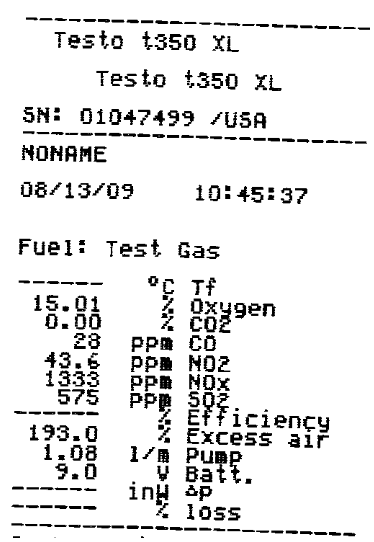
Table II

Fuel Type Density Particulates	**Soot**
Untreated	12.67 mg/m_3
Treated I	10.98 mg/m_3
Treated II	8.92 mg/m
	- 29.6%
Average (Absolute)	**- 29.6%**

The reduction in soot particulate density (the mass of the smoke particles) was reduced by an average 29.6% after fuel treatment and engine conditioning with GF2™ fuel catalyst **(See Graph 1 Appendix II).** Concentration levels were provided by Bacharach and ECOM analyzer.


Testo t350 XL
Testo t350 XL
SN: 01047499 /USA
NONAME
08/13/09 10:47:56
Fuel: Test Gas

------	°C	Tf
14.99	%	Oxygen
0.00	%	CO2
25	ppm	CO
43.8	ppm	NO2
1344	ppm	NOx
535	ppm	SO2
------	%	Efficiency
191.8	%	Excess air
1.07	l/m	Pump
9.0	V	Batt.
------	inW	Δp
------	%	loss


Testo t350 XL
Testo t350 XL
SN: 01047499 /USA
NONAME
08/13/09 10:45:37
Fuel: Test Gas

------	°C	Tf
15.01	%	Oxygen
0.00	%	CO2
28	ppm	CO
43.6	ppm	NO2
1333	ppm	NOx
575	ppm	SO2
------	%	Efficiency
193.0	%	Excess air
1.08	l/m	Pump
9.0	V	Batt.
------	inW	Δp
------	%	loss

CFE In-house Emissions Data Analysis

Concurrent with the Carbon Mass Balance test performed by IPN/GF2™ Supplier/CFE and compiled by Green Planet Emissions Consultants, LLC (GPEC), emissions data was collected by CFE personnel, under the direction of the CFE Plant Chemist, using a Bacharach PCA 2 Portable Combustion Analyzer. The data was analyzed and utilized as part of the Carbon Mass Balance equation to document and augment the Carbon Mass Balance evaluation performed by GPEC. Due to insufficient data, assumptions are asserted with regards to ambient temperature, stack temperature, barometric pressure, cross sectional pressure differential, etc. The following data by personnel, date and time identifies the data accumulated by CFE:

Assumptions:
Ambient Temperature: Constant
Barometric Pressure: Constant
Pressure Differential: Constant
Stack Temperature: Constant
Hydrocarbons: Constant

Unidad Verificada ***Tres*** ***Carga*** ***38.0 Mw***
Equipo utilizado: ***Analizador de gases Emisiones Testo t350 XL***

Fecha: ***13 de Agosto 2009*** ***Analizo*** **Eduardo Arias Higuera**

Analisis de Emisiones en Chimenea de Unidades 1,2, 3 y Generadores de Emergencia

Unidad Verificada ***Tres*** ***Carga*** ***37***
Equipo utilizado: ***Analizador de gases Emisiones Testo t350 XL***

Fecha: ***25 de Septiembre 2009*** ***Analizo*** **Eduardo Arias Higuera**

Testo t350 XL

Testo t350 XL

SN: 01047499 /USA

NONAME

09/25/09   13:12:56

Fuel: Test Gas

------	°C	Tf
14.99	%	Oxygen
0.00	%	CO2
21	ppm	CO
44.2	ppm	NO2
1357	ppm	NOx
531	ppm	SO2
------	%	Efficiency
192.0	%	Excess air
1.05	l/m	Pump
9.0	V	Batt.
------	inW	ΔP
------	%	loss

Smoke number : - - - - - -

Mean : ---
Oil derivative : ---

Heat transf.°F: --- °F

Testo t350 XL

Testo t350 XL

SN: 01047499 /USA

NONAME

09/25/09   13:14:47

Fuel: Test Gas

------	°C	Tf
15.00	%	Oxygen
0.00	%	CO2
21	ppm	CO
42.9	ppm	NO2
1349	ppm	NOx
537	ppm	SO2
------	%	Efficiency
192.2	%	Excess air
1.06	l/m	Pump
9.0	V	Batt.
------	inW	ΔP
------	%	loss

Smoke number : - - - - - -

Mean : ---
Oil derivative : ---

Heat transf.°F: --- °F

Unidad Verificada *Tres* *Carga* *37.5*

Equipo utilizado: *Testo t350 KL*

Fecha: *22 de Octubre 2009* *Analizo* Eduardo Arias Higuera

```
------------------------
  Testo t350 XL
     Testo t350 XL
SN: 01047499 /USA
------------------------
NONAME
10/22/09    10:26:57

Fuel: Test Gas
------    °C Tf
 15.10     % Oxygen
  0.00     % CO2
    29   ppm CO
  53.0   ppm NO2
  1308   ppm NOx
   523   ppm SO2
------     % Efficiency
 196.7     % Excess air
  1.08   l/m Pump
   9.0     V Batt.
------   inW ΔP
------     % loss
------------------------
```

```
------------------------
  Testo t350 XL
     Testo t350 XL
SN: 01047499 /USA
------------------------
NONAME
10/22/09    10:03:27

Fuel: Test Gas
------    °C Tf
 15.00     % Oxygen
  0.00     % CO2
    18   ppm CO
  41.7   ppm NO2
  1353   ppm NOx
   541   ppm SO2
------     % Efficiency
 192.4     % Excess air
  1.05   l/m Pump
   9.0     V Batt.
------   inW ΔP
------     % loss
------------------------
```

Unidad Verificada ______________________ *Tres* ______________________ *Carga* ______ *37.5*

Equipo utilizado: ______________________ *Testo t350 KL*

Fecha: *12 de Noviembre 2009* *Analizo* **Eduardo Arias Higuera**

Testo t350 XL

Testo t350 XL

SN: 01047499 /USA

NONAME

11/12/09 15:02:52

Fuel: Fueloil #6

302.1	°C	Tf
13.99	%	Oxygen
5.54	%	CO2
43	ppm	CO
1535	ppm	NO
18.2	ppm	NO2
1554	ppm	NOx
528	ppm	SO2
70.4	%	Efficiency
184.3	%	Excess air
0.92	l/m	Pump
8.9	V	Batt.
------	inW	Δp
29.6	%	loss
1		Dilut-factor

Testo t350 XL

Testo t350 XL

SN: 01047499 /USA

NONAME

11/12/09 15:06:33

[illegible] Fueloil #6

[illegible].1	°C	Tf
[illegible].01	%	Oxygen
5.53	%	CO2
43	ppm	CO
1528	ppm	NO
16.3	ppm	NO2
1545	ppm	NOx
540	ppm	SO2
70.4	%	Efficiency
185.1	%	Excess air
0.94	l/m	Pump
8.9	V	Batt.
------	inW	Δp
29.6	%	loss
1		Dilut-factor

Analisis de Emisiones en Chimenea de Unidades 1,2, 3 y Generadores de Emergencia

Unidad Verificada ***Tres*** ***Carga*** ***38 Mw***

Equipo utilizado: ***Analizador de gases TESTO 350 XL***

Fecha: ***04 de Dic 09*** ***Analizo*** **Eduardo Arias Higuera**

Testo t350 XL

Testo t350 XL

SN: 01047499 /USA

NONAME

04/DIC/09 14:19:03

Fuel: Fueloil #6

------	°C	Tf
14.07	%	Oxygen
5.48	%	CO2
30	ppm	CO
35.2	ppm	NO2
1454	ppm	NOx
453	ppm	SO2
------	%	Efficiency
187.5	%	Excess air
1.04	l/m	Pump
9.1	V	Batt.
------	inW	ΔP
------	%	loss

Heat transf.°F: --- °F

Testo t350 XL

Testo t350 XL

SN: 01047499 /USA

NONAME

04/DIC/09 14:13:11

Fuel: Fueloil #6

------	°C	Tf
14.24	%	Oxygen
5.34	%	CO2
34	ppm	CO
40.7	ppm	NO2
1435	ppm	NOx
443	ppm	SO2
------	%	Efficiency
194.2	%	Excess air
1.04	l/m	Pump
9.1	V	Batt.
------	inW	ΔP
------	%	loss

Heat transf.°F: --- °F

Unidad Verificada ***Tres*** ***Carga*** ***38 Mw***

Equipo utilizado: ***Analizador de gases TESTO 350 XL***

Fecha: ***14 de Enero 2010*** ***Analizo*** **Eduardo Arias Higuera**

```
-------------------------
  Testo t350 XL
     Testo t350 XL
SN: 01047499 /USA
-------------------------
NONAME
01/14/10    13:13:10

Fuel: Fueloil #6
------    °C  Tf
 14.44     %  Oxygen
  5.18     %  CO2
    18   ppm  CO
  55.1   ppm  NO2
  1441   ppm  NOx
   516   ppm  SO2
------     %  Efficiency
 202.9     %  Excess air
  1.03   l/m  Pump
   9.2     V  Batt.
------   inW  ΔP
------     %  loss
-------------------------
Heat transf.°F: --- °F
-------------------------
```

```
-------------------------
  Testo t350 XL
     Testo t350 XL
SN: 01047499 /USA
-------------------------
NONAME
01/14/10    13:10:33

Fuel: Fueloil #6
------    °C  Tf
 14.42     %  Oxygen
  5.20     %  CO2
    28   ppm  CO
  53.4   ppm  NO2
  1436   ppm  NOx
   535   ppm  SO2
------     %  Efficiency
 202.0     %  Excess air
  1.06   l/m  Pump
   9.2     V  Batt.
------   inW  ΔP
------     %  loss
-------------------------
Heat transf.°F: --- °F
-------------------------
```

Unidad Verificada	***Tres***	***Carga***	***36 Mw***
Equipo utilizado:	***Analizador de gases TESTO 350 XL***		
Fecha:	***20 de Febrero 2010***	***Analizo***	**Eduardo Arias Higuera/Cornelio Ramos H.**

```
------------------------
  Testo t350 XL

      Testo t350 XL

SN: 01047499 /USA
------------------------
NONAME

02/20/10     13:33:55

Fuel: Fueloil #6

------     °C Tf
 14.35      % Oxygen
  5.26      % CO2
    32   ppm CO
  42.5   ppm NO2
  1305   ppm NOx
   612   ppm SO2
------      % Efficiency
 198.7      % Excess air
  1.07   l/m Pump
   8.4      V Batt.
------   inW ΔP
------      % loss
------------------------
Heat transf.°F: --- °F

------------------------
```

```
------------------------
  Testo t350 XL

      Testo t350 XL

SN: 01047499 /USA
------------------------
NONAME

02/20/10     13:36:33

Fuel: Fueloil #6

------     °C Tf
 14.43      % Oxygen
  5.19      % CO2
    30   ppm CO
  39.3   ppm NO2
  1300   ppm NOx
   569   ppm SO2
------      % Efficiency
 202.3      % Excess air
  1.06   l/m Pump
   8.5      V Batt.
------   inW ΔP
------      % loss
------------------------
Heat transf.°F: --- °F

------------------------
```

Analisis de Emisiones en Chimenea de Unidades 1,2, 3 y Generadores de Emergencia

Unidad Verificada *Tres* ***Carga*** *36 Mw*

Equipo utilizado: *Analizador de gases TESTO 350 XL*

Fecha: *31 de Marzo 2010* ***Analizo*** **Eduardo Arias Higuera**

```
-------------------------
Testo t350 XL
    Testo t350 XL
SN: 01047499 /USA
-------------------------
NONAME
03/31/10    13:51:36

Fuel: Fueloil #6
------    °C Tf
 14.27     % Oxygen
  5.32     % CO2
    52   ppm CO
  29.6   ppm NO2
  1221   ppm NOx
   704   ppm SO2
------     % Efficiency
 195.7     % Excess air
  1.06   l/m Pump
   8.1     V Batt.
------   inW ΔP
------     % loss
-------------------------
Heat transf.°F: --- °F
-------------------------
```

```
-------------------------
Testo t350 XL
    Testo t350 XL
SN: 01047499 /USA
-------------------------
NONAME
03/31/10    13:59:24

Fuel: Test Gas
------    °C Tf
 15.10     % Oxygen
  0.00     % CO2
    29   ppm CO
  53.0   ppm NO2
  1308   ppm NOx
   523   ppm SO2
------     % Efficiency
 196.7     % Excess air
  1.08   l/m Pump
   9.0     V Batt.
------   inW ΔP
------     % loss
-------------------------
```

All data was accumulated by the same individual (Eduardo Arias Higuera), which adds to the consistency and accuracy of the data. Table III summarizes the aforementioned and affirmed test strip CFE data by month, load and computed emissions levels. Since load was not stabilized and consistent during the contiguous monthly data collection process, emissions levels will certainly be subject to relative load change. The average data by load and test segment is as follows:

Table III

Baseline Data:

Load	Oxygen	C02	C0	N0X	S02	Excess Air
37.6 MW	14.6%	5.47 %	29.2	1403	520.6	[illegible]

Treated Data:

Load	Oxygen	C02	C0	N0X	S02	Excess Air
36.7 MW	14.5%	5.23 %	31.5	1335	576.5	199.7

Percent Change to Treated Data:

Load	Oxygen	C02	C0	N0X	S02	Excess Air
-.023%	-.0068%	-.044%	+.079%	-.048%	+.11%	+.046%

Appendix III, Carbon Mass Balance Computation, Section II contains the Carbon Mass Balance test results utilizing the data provided by CFE. In order to calculate the Carbon Mass Balance equations and asserted earlier in this section, certain assumptions are held constant due to the incomplete nature of the CFE data collection process. For the purpose of the quantifiable data stream, the results are based on actual carbon change only. There is no way to compensate for data loss or insufficient data extraction. Knowing this, assumptions are made to qualify the results without impugning the data utilized to perform the calculations.

As such, for the purpose of the CFE data; for both segments of the evaluation, the assumptions are that ambient temperature, barometric pressure, exhaust pressure differential, exhaust temperature, and hydrocarbons were constant. The data unequivocally documents a reduction in fuel consumed by 4.6% utilizing only the CFE raw **"carbon"** data. Reductions in N0X with a measurable improvement in excess oxygen are also evident. Not surprisingly, S02 increased during the course of the evaluation. Generally, S02 changes increase and decrease correspondingly to a change in fuel type and quality.

Conclusion

The carefully controlled engineering standard test procedures utilizing the Carbon Mass Balance test procedure, conducted on this power generation test equipment provide clear evidence of reduced fuel consumption in the range of 7.6% for the period ending January 15, 2010. Data collected indicates fuel consumption further reduced to an average 12.17% ending April 15, 2010 **(see Table I, Test Results Section and Appendix III)**.

However, engine testing under an applied load (generator set) clearly represents an ideal testing condition, which simulates the preferable testing conditions of a dynamometer. As important, engine design and determinate test protocol (CMB) can and will produce data equal to or equivalent to data collected utilizing other methods of fuel evaluation. Further conclusions utilizing the CMB test procedure identify a 29.6% reduction in smoke particulates with a significant reduction in visual smoke **(see Appendix IV, Visual Smoke Analysis and Appendix VIII, Particulate Levels (Smoke) Analysis)**.

Accordingly, the concurrent emissions data collected by the CFE Plant Chemist provided documentation of a 4.6% reduction in fuel usage based on carbon content only **(see Test Results Section, CFE In-house Emissions Data Analysis)**. Due to insufficient data, it was not possible to correct for pertinent information such as barometric pressure, ambient temperature, cross sectional exhaust velocities, etc. These parameters were held as constants and stipulated as assumptions throughout the baseline and treated elements of the CMB equation. Considering the preponderance of conclusive evidence, these assumptions most likely diminished the true impact of the catalyst on the available data and only show a very minimal improvement from the CFE data.

In addition to the fuel consumption analysis, a detailed compilation of carbon emissions reductions were determined. The study documented a significant reduction in annual C02 emissions of 36,921 metric tonnes. Reductions in Nitrogen and Methane levels were also observed **(see Appendix IX, Carbon Footprint Calculations)**.

Additionally, N0X levels were likewise monitored during the course of the evaluation. The data was broken into test series. Each series of tests contained fifteen (15) data points **(see Appendix V: Raw Data Sheets)**. The average of each set of data is compiled by series and included in the following table by date. The data in Table IV represents many days of onsite testing with hundreds of data points. The data is as follows:

Table IV

	Baseline	1-15-2010	4-15-2010	Pct. Reduction
Series One:	1273 ppm	1041 ppm	880	- 30.9%
Series Two:	1317 ppm	1075 ppm	806	- 38.8%
Series Three:	1253 ppm	1103 ppm	893	- 28.7%

NOX information collected from the CFE data also provides documentation of a reduction in total NOX volume. The data is as follows:

CFE Data Baseline	CFE Data Treated	Pct. Reduction
1403.2	1333.8	- 4.95%

Calculated N_2O reductions support the aforementioned data with a reduction of 371 kilograms annually, based on total plant fuel usage **(see Appendix IX, Carbon Footprint Data)**. Emissions levels in general were reduced during the course of the CMB evaluation **(see Appendix XI, Emissions Averages for Carbon Mass Balance Evaluation)**.

Additional to the fuel economy benefits measured and a reduction in soot particulates, data collected manifests a significant reduction, over time, in engine related abrasive carbon build up. ASTM test procedures conducted clearly manifest a reduction in residual abrasive solid carbon of 78.6% **(see Appendix I, Engine Visual Inspection; Carbon).** Carbon reductions of this magnitude will be realized through decreased maintenance costs achieved through lower contaminant levels in the engine lubricating oil, which is a result of more complete combustion of the fuel. Engine wear rates are reduced resulting in less carbon build-up in the combustion area.

Concurrent with other valuable testing included during the course of this evaluation was an ongoing evaluation of fuel oil carbon solids. ASTM test procedures performed on fuel oil carbon solids samples for the baseline and phase I treated segment of the evaluation document a reduction in fuel oil carbon solids and an increase in re-solubilized fuel of 1,120,185 litres annually. As projected by CFE, daily solids spin off; from the centrifuge is approximately .01% (1%) of total fuel throughput. By reducing fuel oil carbon solids at a rate of .0062%, this equates to a reduction in carbon solids spin off of 62% of the total 1% in solids spin off **(see Appendix VI, Fuel Oil Solids Analysis).** Phase II treated testing (just completed) for fuel oil carbon solids shows a more significant reduction in carbon solids when compared to the baseline segment. Current reductions in carbon solids comparing baseline to phase II treated data, documents a reduction in total carbon solids of 14.6%; a further significant reduction in solids and increase in net soluble fuel.

Further, an RPM data to corresponding load evaluation was performed to determine load change relative to engine RPM change. The findings of this segment of the evaluation identify an average increase in load with catalyst treated fuel of 3.15% over the course of the evaluation. Engine RPM change was only .0006% **(see Appendix VII, Load and RPM Comparison)**. Since RPM is fixed with load allowed to vary with fuel flow, the data concludes that the load increase was a function of combustion energy release, with the catalyst, not a fuel rate increase.

Finally, an analysis was performed on the available data provided by CFE, onsite observational studies, and the manufacturer of the Variant flow meters utilized on unit number three (3) and utilized by CFE to perform pertinent mathematical calculations for generator efficiency. Careful consideration must be given to the care and maintenance of the onsite flow meters. The requirements for maintaining the flow meters are intensive and are included in **Appendix X, Variant J5050Flowmeter**. Based on the totality of data collected it would not be advisable to include the data from the existing flow meters due to the irreconcilable calibration issues, as well as several periods of time wherein the flow meters were inoperable (visual inspection). Other concerns include return fuel piping, which may not be metered and will not provide a true testament as to total generator fuel consumption. Although requested, documentation to determine frequency and certification of the flow meters was never provided.

The weight and volume of evidence and the empirical nature of the data supplied during this evaluation identifies a major paradigm change in base generator operations in favor of the organo-metallic chemistry incorporated into the test procedure. The clear abundance of positive conclusions is not only compelling, but revealing. When one clearly internalizes the shear volume of compiled evidence and data; the fuel catalyst evaluated on this generator set clearly improved the quality of operation and environmental conditions for not only plant operators, but the general public atlarge.

Appendix I

Engine Visual Inspection; Carbon

Prior to the implementation of this test procedure, it was determined that a long term study be conducted relative to the type and amount of residue build up on critical internal engine, combustion related components. This element of the test paradigm required a process wherein the test engine would be disassembled and evaluated for wear and contaminant volumes. Since the engine is routinely disassembled and inspected on an annual basis, it was understood that this would be the ideal time for the first (baseline) inspection of contaminant build up. The test engine, as part of routine maintenance, was first dismantled in December, 2009, wherein pertinent data was collected as to type and volume of agglomerated solids (see following pictures). A complete ASTM chemical analysis of the combustion related remnant solids is included in this section. For the purpose of this report, carbon content of the solids was evaluated to determine the nature of the abrasive carbon substance as it pertains to the baseline segment of the evaluation.

Pictures taken subsequent to baseline testing; December 9, 2009

The pictures clearly identify a heavy, oily, carbonaceous build up. The abrasive nature of solid carbon deposits between the piston crown and thrust ring can exacerbate blow by issues by propagating a condition referred to as “bore polishing”. Further, carbon build up in this critical area makes it difficult for compression pressures to augment fire ring containment by diminishing pressure assist behind the top ring chamfer.

A subsequent or second (catalyst treated) disassembly procedure occurred in May, 2010. The dismantling process utilized in December, 2009, was repeated to evaluate type and volume of the post combustion related residue. Again, ASTM procedures were conducted on the samples removed from the piston and the results are contained later in this section of the report.

Pictures taken post Treated test period: May 19, 2010

The treated segment of this evaluation presented a revealing opposite to that which was noted during the baseline segment of this evaluation. Oily residue and tenacious carbon build had significantly diminished. Metal contact surfaces on the side of the piston were apparent. Yellow, brown, or slightly red discoloration is normal when using organo-metallic fuel chemistries. The residue is Ferric Oxide and is critical to the conductivity of combustion related events. The yellowish coating documents the nature of catalytic oxidation and its relevance to improved combustion and combustion continuity.

As alluded to earlier in this section of the report, samples of the differing post combustion solids were delivered to a renowned, certified ASTM test facility in Houston, Texas, for chemical composition testing. The ASTM D 482 test procedure for carbon content was performed to measure the level of carbon in the remnant solids samples. A summary comparison of the retained solids carbon is included at the end of this section of the document.

Carbon solids are abrasive complex structures that exacerbate wear, not only on combustion related components, but in areas of the engine that require lubrication. Carbon escapes the combustion chamber through a process referred to as “blow by” and enters the engine lubrication oil reservoir. These abrasive carbon solids are then transferred to critical sites of lubrication, under pressure, with a similar impact of sand paper on polished lubricating surfaces. Any reduction in carbon solids in the lubricating system will help negate the adverse affects of premature engine wear.

Again, samples were submitted for testing and were subjected to the ASTM D 482 test procedure for carbon content. A concurrent test procedure was further conducted to determine solids content based on a reduction in remnant abrasive carbon content. The ASTM D 1976 test procedure was utilized to determine the remnant levels of the benign organo-metallic component by volume. The organo-metallic component is not abrasive and generally manifests itself in either a yellowish, brown or red discoloration of the solids; color can be specific to catalyst treatment ratio.

The following summaries identify the carbon contained in the remnant solids following each of the test segments previously identified in this section of the report. Carbon percentage is by volume and is not all inclusive of the sample in total. Generally, Ash represents the volume of the sample by percent between the carbon content and the full scale of the sample submitted.

Certificate of Analysis

TEXAS OIL TECH Laboratories, Inc.®
SINCE 1985
Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274
TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	**REQUESTED BY:**	Mr. Kim Lebaron
SAMPLE:	Muestra Del Piston No. 8 CFE San Carlos	**REPORT DATE:**	June 4, 2010
LABORATORY NO:	59751-01	**PURCHASE ORDER NO:**	Pending

TEST **RESULTS**

Carbon Content using ASTM D 482, wt%..	27.73

Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

Certificate of Analysis

SINCE 1985
Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274
TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	**REQUESTED BY:**	Mr. Kim Lebaron
SAMPLE:	125 ml Plastic Containing Yellowish Sample	**REPORT DATE:**	June 4, 2010
LABORATORY NO:	59751-02	**PURCHASE ORDER NO:**	Pending

TEST	RESULTS
Carbon Content using ASTM D 482, wt%...	5.94
Ferric Oxide (Fe_2O_3) ASTM D 1976 ,ppm	5233

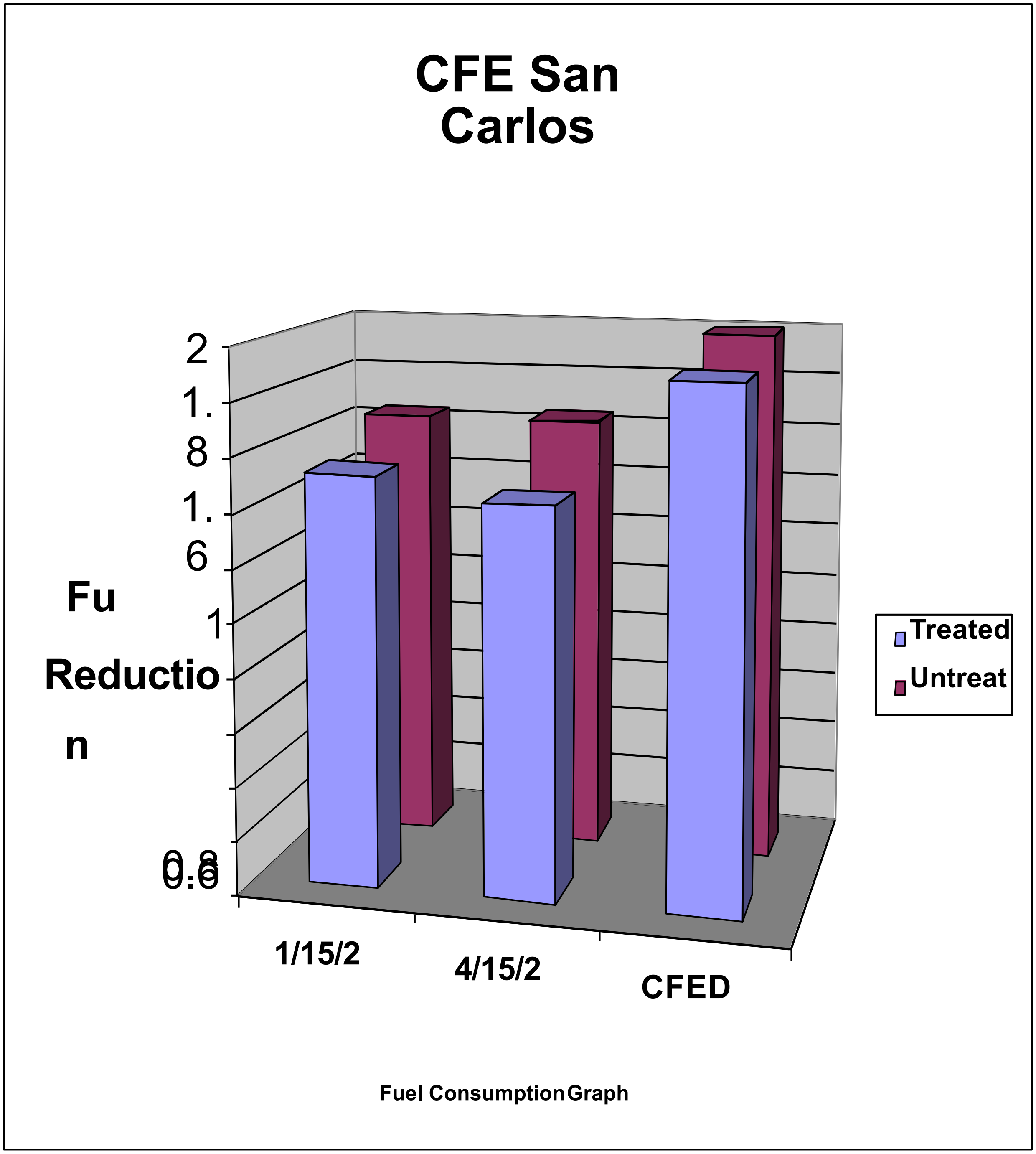
Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

As represented in the aforementioned ASTM test procedures, abrasive carbon content was reduced by 78.6%. A non-abrasive Ferric Oxide replaced the post combustion residue at a level of only 5,233 ppm, as was previously discussed in this section of the report.

Appendix II

Exhaust Particulate and Fuel Graphs


CFE San
Carlos
2
1.
8
1.
6
1
0.8
0.6
Fu
Reductio
n
1/15/2
4/15/2
CFED
Treated
Untreat
Fuel Consumption Graph

Appendix III

Carbon Mass Balance Compilation Sheets

CARBON BALANCE RESULTS

COMPANY :	CFE			LOCATION :	San Carlos, BCS		
EQUIPMENT :	Mann B&W			UNIT NR. :	No. 3		
ENG. TYPE :	Generator set			TIME:	Early a.m. data stream		
RATING :	39,375 mw			FUEL :	Bunker 6		
AVE. LOAD:	37.92 mw						
BASELINE TEST				**DATE :**	**12/03/09**		
ENG. HOURS :	0			Engine Load	39,375 mw		
AMB. TEMP (C) :	18.3			STACK(mm):	1188		
BAROMETRIC(mb):	1008			LOAD:	39,375 mw		
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	480.5	481.9	482.1	482.96	483.5	482	0.24
HC (ppm) :	120	120	120	120	120	120.0	0.00
CO (%) :	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00000
CO2 (%) :	4.47	4.50	4.50	4.50	4.50	4.49	0.30
O2 (%) :	15.30	15.30	15.30	15.30	15.30	15.30	0.00
CARB FLOW(g/s):	1.635	1.645	1.644	1.643	1.643	1.642	0.23
REYNOLDS NR. :	3.27E+02						
TREATED TEST				**DATE :**	**01/15/10**		
ENG. HOURS :	1,032			Engine Load	39,375 mw		
AMB. TEMP (C) :	19.5			STACK(mm):	1188		
BAROMETRIC(mb):	1011			LOAD:	39,375 mw		
AVE. LOAD:	38.41 mw						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	480.1	480.1	480.1	480.1	480.1	480	0.00
HC (ppm) :	120	120	120	120	120	120.0	0.00
CO (%) :	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	39.123
CO2 (%) :	4.13	4.20	4.16	4.00	4.06	4.11	1.95
O2 (%) :	15.86	15.73	15.76	15.76	15.90	15.80	0.47
CARB FLOW(g/s):	1.515	1.541	1.526	1.469	1.490	1.508	1.91
REYNOLDS NR. :	3.28E+02		TOTAL HOURS ON TREATED FUEL :			1032	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-8.2**	%

				CARBON BALANCE RESULTS			
COMPANY :	CFE			LOCATION :	San Carlos, BCS		
EQUIPMENT :	Mann B&W			UNIT NR. :	No. 3		
ENG. TYPE :	Generator set			TIME:	Mid morning data stream		
RATING :	39,375 mw			FUEL :	Bunker 6		
BASELINE TEST				**DATE :**	**12/03/09**		
ENG. HOURS :	0			Engine Load	39,375 mw		
AMB. TEMP (C) :	28.2			STACK(mm):	1188		
BAROMETRIC(mb):	1009			LOAD:	39,375 mw		
AVE. LOAD:	37.92 mw						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	496.6	496.6	495.5	495.3	495.2	496	0.14
HC (ppm) :	150	150	150	150	150	150.0	0.00
CO (%) :	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00000
CO2 (%) :	4.62	4.57	4.55	4.52	4.43	4.54	1.55
O2 (%) :	15.10	15.20	15.20	15.30	15.40	15.24	0.75
CARB FLOW(g/s):	1.679	1.661	1.655	1.644	1.612	1.650	1.49
REYNOLDS NR. :	3.24E+02						
TREATED TEST				**DATE :**	**01/15/10**		
ENG. HOURS :	1,032			Engine Load	39,375 mw		
AMB. TEMP (C) :	21			STACK(mm):	1188		
BAROMETRIC(mb):	1010			LOAD:	39,375 mw		
AVE. LOAD:	38.41 mw						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	496.6	496.6	495.5	495.3	495.2	496	0.14
HC (ppm) :	150	150	150	150	150	150.0	0.00
CO (%) :	0.00002	0.00002	0.00002	0.00002	0.00001	0.00002	24.845
CO2 (%) :	4.16	4.21	4.20	4.21	4.19	4.19	0.49
O2 (%) :	15.86	15.73	15.76	15.76	15.90	15.80	0.47
CARB FLOW(g/s):	1.515	1.533	1.531	1.534	1.527	1.528	0.50
REYNOLDS NR. :	3.25E+02		TOTAL HOURS ON TREATED FUEL :			1032	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						-7.4	%

CARBON BALANCE RESULTS

COMPANY	CFE	LOCATION :	San Carlos, BCS
EQUIPMENT	Mann B&W	UNIT NR. :	No.3
ENG. TYPE	Generator set	TIME:	Late morning/aftern.oon
RATING	39,375 mw	FUEL	Bunker 6
AVE. LOAD:	37.92 mw		

BASELINE TEST — **DATE : 12/03/09**

ENG. HOURS	0	Engine Load	39,375 mw
AMB. TEMP (C) :	26.1	STACK(mm):	1188
BAROMETRIC(mb):	1010	LOAD:	39,375 mw

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	489.5	490.7	490.7	489.8	489.6		0.12
Hc ppm	140	140	140	140	140	140.0	0.0
CO (%)	0.00003	0.0000	0.0000	0.00003	0.00003	0.00003	0.00000
CO2 (%)	4.51	4.52	4.52	4.53	4.51	4.52	0.19
O2 (%)	15.40	15.40	15.50 15.60		15.60	15.50	0.65
CARB FLOW (g/s):	1.646	1.648	1.648	1.652	1.645	1.648	0.17
REYNOLDS NR. :	3.26E+02						

TREATED TEST — **DATE : 01/15/10**

ENG. HOURS	1 032	Engine Load	39,375 mw
AMB. TEMP (C) :	22.8	STACK(mm):	1188
BAROMETRIC(mb):	1010	LOAD:	39,375 mw
AVE. LOAD:	38.41 mw		

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa).	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	489.5	490.7	490.7	489.8	489.6	490	0.12
Hc wpm	140	140	140	140	140	140.0	0.00
CO (%)	0.00002	0.00002	0.00002	0.00001	0.00001	0.00002	34.233
CO2 (%)	4.20	4.19	4.17	4.19	4.21	4.19	0.35
O2 (%)	15.53	15.37	15.40	15.43	15.40	15.43	0.40
CARB FLOW(g/s):	1.535	1.530	1.523	1.531	1.538	1.532	0.38

REYNOLDS NR. : 3.26E+02 TOTAL HOURS ON TREATED FUEL : 1032

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : **-7.1** %

Phase II CMB Evaluation
Catalyst Treated Data
April 15, 2010

				CARBON BALANCE RESULTS			
COMPANY :	CFE			LOCATION :	San Carlos, BCS		
EQUIPMENT :	Mann B&W			UNIT NR. :	No. 3		
ENG. TYPE :	Generator set			TIME:	Late Morning/Early Afternoon		
RATING :	39,375 mw			FUEL :	Bunker 6		
AVE. LOAD:	37.92 mw						
BASELINE TEST				**DATE :**	**12/03/09**		
ENG. HOURS :	0			Engine Load	39,375 mw		
AMB. TEMP (C) :	26.1			STACK(mm):	1188		
BAROMETRIC(mb):	1010			LOAD:	39,375 mw		
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	489.5	490.7	490.7	489.8	489.6	490	0.12
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00000
CO2 (%) :	4.51	4.52	4.52	4.53	4.51	4.52	0.19
O2 (%) :	15.40	15.40	15.50	15.60	15.60	15.50	0.65
CARB FLOW(g/s):	1.646	1.648	1.648	1.652	1.645	1.648	0.17
REYNOLDS NR. :	3.26E+02						
TREATED TEST				**DATE :**	**04/15/10**		
ENG. HOURS :	3,192			Engine Load	39,375 mw		
AMB. TEMP (C) :	23.6			STACK(mm):	1188		
BAROMETRIC(mb):	1008			LOAD:	39,375 mw		
AVE. LOAD:	38.15						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.0099	0.0099	0.0099	0.0099	0.0099	0.01	1.12
EXHST TEMP (C):	524.2	518.2	518.9	516.5	509.3	517	1.04
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00004	0.00004	0.00004	0.00004	0.00003	0.00004	11.532
CO2 (%) :	4.27	3.97	3.87	4.10	4.03	4.05	3.71
O2 (%) :	15.56	16.00	16.10	15.75	15.86	15.85	1.33
CARB FLOW(g/s):	1.516	1.417	1.382	1.464	1.446	1.445	3.51
REYNOLDS NR. :	3.20E+02		TOTAL HOURS ON TREATED FUEL :			3192	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-12.3**	**%**

				CARBON BALANCE RESULTS			
COMPANY :	CFE			LOCATION :	San Carlos, BCS		
EQUIPMENT :	Mann B&W			UNIT NR. :	No. 3		
ENG. TYPE :	Generator set			TIME:	Late Morning/Early Afternoon		
RATING :	39,375 mw			FUEL :	Bunker 6		
AVE. LOAD:	37.92 mw						
BASELINE TEST				**DATE :**	**12/03/09**		
ENG. HOURS :	0			Engine Load	39,375 mw		
AMB. TEMP (C) :	26.1			STACK(mm):	1188		
BAROMETRIC(mb):	1010			LOAD:	39,375 mw		
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	489.5	490.7	490.7	489.8	489.6	490	0.12
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00000
CO2 (%) :	4.51	4.52	4.52	4.53	4.51	4.52	0.19
O2 (%) :	15.40	15.40	15.50	15.60	15.60	15.50	0.65
CARB FLOW(g/s):	1.646	1.648	1.648	1.652	1.645	1.648	0.17
REYNOLDS NR. :	3.26E+02						
TREATED TEST				**DATE :**	**04/15/10**		
ENG. HOURS :	3,192			Engine Load	39,375 mw		
AMB. TEMP (C) :	23.8			STACK(mm):	1188		
BAROMETRIC(mb):	1008			LOAD:	39,375 mw		
AVE. LOAD:	37.98						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.0099	0.0099	0.0099	0.0099	0.0099	0.01	1.12
EXHST TEMP (C):	522.3	516	515.7	504.4	482.3	508	3.11
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003	14.821
CO2 (%) :	4.20	4.20	4.00	4.00	3.70	4.02	5.10
O2 (%) :	15.73	15.60	15.86	15.80	16.23	15.84	1.49
CARB FLOW(g/s):	1.494	1.500	1.430	1.440	1.354	1.443	4.09
REYNOLDS NR. :	3.22E+02		TOTAL HOURS ON TREATED FUEL :			3192	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-12.4**	**%**

CARBON BALANCE RESULTS

COMPANY :	CFE			LOCATION :	San Carlos, BCS		
EQUIPMENT :	Mann B&W			UNIT NR. :	No. 3		
ENG. TYPE :	Generator set			TIME:	Early Afternoon		
RATING :	39,375 mw			FUEL :	Bunker 6		
AVE. LOAD:	37.92 mw						
BASELINE TEST				**DATE :**	**12/03/09**		
ENG. HOURS :	0			Engine Load	39,375 mw		
AMB. TEMP (C) :	26.1			STACK(mm):	1188		
BAROMETRIC(mb):	1010			LOAD:	39,375 mw		
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	489.5	490.7	490.7	489.8	489.6	490	0.12
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00000
CO2 (%) :	4.51	4.52	4.52	4.53	4.51	4.52	0.19
O2 (%) :	15.40	15.40	15.50	15.60	15.60	15.50	0.65
CARB FLOW(g/s):	1.646	1.648	1.648	1.652	1.645	1.648	0.17
REYNOLDS NR. :	3.26E+02						
TREATED TEST				**DATE :**	**04/15/10**		
ENG. HOURS :	3,192			Engine Load	39,375 mw		
AMB. TEMP (C) :	22.3			STACK(mm):	1188		
BAROMETRIC(mb):	1008			LOAD:	39,375 mw		
AVE. LOAD:	38.23						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.0099	0.0099	0.0099	0.0099	0.0099	0.01	1.12
EXHST TEMP (C):	522.9	523.3	527.8	525.5	526.8	525	0.41
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00003	0.00004	0.00004	0.00004	0.00004	0.00004	11.769
CO2 (%) :	4.10	4.10	4.20	4.06	4.00	4.09	1.78
O2 (%) :	15.80	15.70	15.70	15.80	15.90	15.78	0.53
CARB FLOW(g/s):	1.458	1.458	1.489	1.442	1.420	1.453	1.73
REYNOLDS NR. :	3.18E+02		TOTAL HOURS ON TREATED FUEL :			3192	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-11.8**	%

Section II: CFE
Compilation Sheet
Carbon Mass Balance

				CARBON BALANCE RESULTS			
COMPANY :	CFE; CFE Data			LOCATION :	San Carlos, BCS		
EQUIPMENT :	Mann B&W			UNIT NR. :	No. 3		
ENG. TYPE :	Generator set			TIME:	CFE Data; Aug. to Dec. 2009		
RATING :	39,375 mw			FUEL :	Bunker 6		
AVE. LOAD:	37.6 mw						
BASELINE TEST				**DATE :**	**01/08/09**		
ENG. HOURS :	0			Engine Load	39,375 mw		
AMB. TEMP (C) :	26			STACK(mm):	1188		
BAROMETRIC(mb):	1008			LOAD:	39,375 mw		
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	490	490	490	490	490	490	0.00
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00003	0.00002	0.00002	0.00004	0.00003	0.00003	0.00000
CO2 (%) :	5.48	5.45	5.53	5.54	5.46	5.49	0.74
O2 (%) :	15.00	15.00	15.10	14.00	14.16	14.65	3.60
CARB FLOW(g/s):	1.990	1.979	2.007	2.012	1.984	1.994	0.74
REYNOLDS NR. :	3.25E+02						
TREATED TEST				**DATE :**	**03/31/10**		
				TIME:	Jan. to Mar. 2010		
ENG. HOURS :	3,192			Engine Load	39,375 mw		
AMB. TEMP (C) :	26			STACK(mm):	1188		
BAROMETRIC(mb):	1008			LOAD:	39,375 mw		
AVE. LOAD:	36.7 mw						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	0.01	0.01	0.01	0.01	0.01	0.01	0.00
EXHST TEMP (C):	490	490	490	490	490	490	0.00
HC (ppm) :	140	140	140	140	140	140.0	0.00
CO (%) :	0.00002	0.00004	0.00004	0.00002	0.00004	0.00003	34.233
CO2 (%) :	5.19	5.23	5.32	5.19	5.23	5.23	1.01
O2 (%) :	14.43	14.27	14.69	14.43	14.27	14.42	1.19
CARB FLOW(g/s):	1.887	1.902	1.933	1.887	1.902	1.902	0.99
REYNOLDS NR. :	3.25E+02		TOTAL HOURS ON TREATED FUEL :			3192	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-4.6**	%

Data Accumulation Average for All Test Conditions

Appendix IV

Visual Smoke Analysis

Observational determinations were utilized to establish comparative stack particulate changes during the transition period from the baseline test period (December 9, 2009) to the final GF2 fuel catalyst treated segment (April 15, 2010). The observational evaluation was conducted from the same location, at approximately the same time each day (+ or - 30 minutes). The observational window was maintained to insure the consistency of the data collected with regards to environmental conditions.

December 9, 2009 (Baseline, untreated)

April 15, 2010 (Treated)

Understanding that this is not a true EPA AERMOD evaluation, pertinent information can still be derived from an observational analysis. Given the interaction of stack gases and individual emissions levels relative to the absolute ambient environmental conditions, observational imperatives are every much as important as the data collected through the use of sophisticated test equipment. These types of observational studies best identify the nature of a problem most recognized by the general public. The above expressed photographs identify the San Carlos power plant, unit number three (3) at the same time of day, under the same type of combustion load. Similar ambient and environmental conditions were in play with regards to barometric pressure, humidity, ambient temperature, etc. Observational data such as this identifies an observed reduction in solid particulate levels during the catalyst treated segment of the evaluation.

Appendix V

Raw Data Sheets (Sample)

Tabla para colectar data en el procedimiento de

La Limpieza de los Motores

Compañía: CFE Lugar: San Carlos B.C.S. Fecha: 5/Diciembre/09

Diámetro del escape: 48 in Evaluación: Linea Base Si

Maquina marca/modelo B&W MAN Diesel

de Unidad: 3 Gravedad esp. Comb: 1.010 / 15ºC Tipo de equipo: ECOM

RPM: 102 Carga Max: 39.375 MW Tipo de Combustoleo: Bunker 6

Temp. Del Gas en ºF.	Temp. Ambiental ºF.	Pulgadas Pascal de H_2O	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
480.5	63.5	0.01	15.4	31	4.4	1231	48	1279	34.83	102.32	2.05	30-Nov-09	8:33
480.3	63.5	0.01	15.3	30	4.5	1232	45	1276	35.00	102.31	2.05	30-Nov-09	8:35
480.7	63.6	0.01	15.3	30	4.5	1232	44	1277	34.93	102.34	2.03	30-Nov-09	8:37
481.4	63.8	0.01	15.3	29	4.5	1232	43	1274	35.25	102.34	2.03	30-Nov-09	8:39
482.1	63.8	0.01	15.3	30	4.5	1234	40	1274	34.72	102.31	2.03	30-Nov-09	8:41
482.1	64.2	0.01	15.3	30	4.5	1231	37	1268	35.34	102.38	2.02	30-Nov-09	8:43
482.1	64.4	0.01	15.3	30	4.5	1238	36	1274	35.47	102.36	2.02	30-Nov-09	8:45
482.0	64.9	0.01	15.3	30	4.5	1240	36	1277	35.36	102.39	2.02	30-Nov-09	8:47
482.3	65.0	0.01	15.3	30	4.5	1240	35	1275	36.02	102.37	2.01	30-Nov-09	8:49
482.5	65.8	0.01	15.3	29	4.5	1244	31	1275	36.17	102.36	2.00	30-Nov-09	8:51
483.0	65.6	0.01	15.3	28	4.5	1247	28	1273	36.55	102.32	2.00	30-Nov-09	8:53
483.4	66.3	0.01	15.3	28	4.5	1251	27	1277	35.64	102.20	1.99	30-Nov-09	8:55
483.6	66.3	0.01	15.3	28	4.5	1238	25	1272	36.23	102.38	2.00	30-Nov-09	8:57
483.0	66.7	0.01	15.3	28	4.5	1252	24	1276	36.02	102.36	2.01	30-Nov-09	8:59
483.9	67.1	0.01	15.3	28	4.5	1253	24	1276	35.76	102.33	2.01	30-Nov-09	9:01

Temp. Del Gas en ºF.	Temp. Ambiental ºF.	Pulgadas Pascal de H_2O	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
499.1	92.1	0.01	15.3	34	4.5	1284	23	1307	38.39	102.28	2.18	30-Nov-09	12:19
497.6	91.0	0.01	15.3	34	4.5	1285	54	1325	38.63	102.27	2.17	30-Nov-09	12:21
498.5	91.1	0.01	15.1	31	4.6	1283	49	1329	38.20	102.26	2.18	30-Nov-09	12:23
498.9	90.3	0.01	15.1	33	4.6	1284	41	1326	38.48	102.36	2.16	30-Nov-09	12:25
499.6	90.3	0.01	15.1	33	4.6	1281	38	1316	38.50	102. 27	2.15	30-Nov-09	12:27
498.5	90.5	0.01	15.2	33	4.6	1286	39	1325	38.62	102.32	2.16	30-Nov-09	12:29
499.1	90.8	0.01	15.1	32	4.6	1282	47	1329	38.82	102.31	2.18	30-Nov-09	12:31
497.6	92.5	0.01	15.0	32	4.7	1281	36	1310	38.22	102.30	2.14	30-Nov-09	12:33
4967.3	96.6	0.01	15.0	33	4.7	1283	32	1315	38.10	102.28	2.09	30-Nov-09	12:35
498.3	95.1	0.01	15.1	33	4.7	1280	29	1308	38.09	102.25	2.09	30-Nov-09	12:37
498.5	93.2	0.01	15.1	32	4.7	1283	27	1310	38.39	102.30	2.06	30-Nov-09	12:39
498.3	92.6	0.01	15.1	32	4.6	1294	26	1320	38.22	102. 32	2.06	30-Nov-09	12:41
498.2	92.1	0.01	15.0	32	4.6	1290	21	1310	38.35	102.26	2.06	30-Nov-09	12:43
498.7	91.5	0.01	15.1	32	4.6	1290	21	1311	38.37	102.25	2.04	30-Nov-09	12:45
498.2	91.2	0.01	15.1	32	4.6	1293	22	1315	38.65	102.35	2.04	30-Nov-09	12:47

Temp. Del Gas en ºF.	Temp. Ambiental ºF.	Pulgadas Pascal de H_2O	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
500.9	88.1	0.01	15.2	33	4.6	1276	30	1306	37.74	102.37	2.05	30-Nov-09	16:12
501.0	88.3	0.01	15.2	34	4.6	1277	28	1305	37.48	102.30	2.03	30-Nov-09	16:14
501.2	88.2	0.01	15.2	34	4.6	1275	28	1305	37.59	102.32	2.02	30-Nov-09	16:16
500.9	88.5	0.01	15.2	34	4.6	1265	27	1290	37.92	102.31	2.01	30-Nov-09	16:18
501.2	88.1	0.01	15.2	34	4.6	1275	26	1301	37.78	102.27	2.01	30-Nov-09	16:20
501.4	87.6	0.01	15.2	34	4.6	1272	28	1300	37.40	102.28	2.00	30-Nov-09	16:22
500.9	87.6	0.01	15.3	34	4.5	1272	26	1298	37.29	102.29	2.00	30-Nov-09	16:24
500.9	87.8	0.01	15.3	33	4.5	1275	24	1297	37.67	102.29	2.00	30-Nov-09	16:26
501.6	87.4	0.01	15.3	33	4.5	1278	24	1298	37.06	102.26	2.00	30-Nov-09	16:28
501.0	87.2	0.01	15.3	32	4.5	1270	24	1294	37.12	102.25	1.96	30-Nov-09	16:30
501.8	87.2	0.01	15.3	33	4.5	1277	24	1300	37.48	102.25	2.00	30-Nov-09	16:32
501.8	86.9	0.01	15.3	33	4.5	1284	22	1306	37.39	102.29	2.07	30-Nov-09	16:34
501.9	86.8	0.01	15.3	33	4.5	1279	21	1300	37.46	102.30	2.07	30-Nov-09	16:36
501.4	86.5	0.01	15.3	33	4.5	1274	20	1294	37.56	102.29	2.04	30-Nov-09	16:38
501.9	86.1	0.01	15.3	33	4.5	1278	20	1298	37.67	102.21	2.02	30-Nov-09	16:40

Tabla para colectar data en el procedimiento de

La Limpieza de los Motores

Compañía: CFE Lugar: San Carlos B.C.S. Fecha: 15 de enero 2010 CAPTURO JUAN MANUEL VAZQUEZ

Diámetro del escape: 48 in Evaluación: Línea Base Si

Maquina marca/modelo B&W MAN Diesel OBSERVADOR

\# de Unidad: 3 Gravedad esp. Comb: 1.010 / 15°C Tipo de equipo: ECOM

RPM: 102 Carga Max: 39.375 MW Tipo de Combustoleo: Bunker 6 OPACIDAD # 7

Temp. Del Gas en °F.	Temp. Ambiental °F.	Presión Barometrica hPa	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
32.0	64.7	1008	16.9	16	3.2	847	14	861	38.80	102.32	1.36	30-Nov-09	9:02
32.0	65.1	1008	16.3	14	3.7	983	15	968	38.62	102.26	1.27	30-Nov-09	9:04
32.0	65.4	1008	16.6	13	3.5	868	9	877	38.97	102.27	1.15	30-Nov-09	9:06
32.0	65.8	1008	16.4	13	3.6	919	12	931	38.90	102.21	0.89	30-Nov-09	9:08
32.0	66	1008	16	13	3.9	999	15	1014	39.11	102.24	0.84	30-Nov-09	9:10
32.0	66.3	1008	16.1	13	3.9	1006	11	1017	38.41	102.26	0.84	30-Nov-09	9:12
32.0	66.7	1008	16.1	10	3.9	910	9	919	38.35	102.28	0.86	30-Nov-09	9:14
32.0	66.9	1008	16.5	9	3.5	884	7	891	38.12	102.23	0.77	30-Nov-09	9:16
32.0	67.4	1008	16.7	9	3.4	903	2	905	38.44	102.27	0.87	30-Nov-09	9:18
32.0	67.6	1008	16.4	9	3.6	977	5	982	38.22	102.28	0.86	30-Nov-09	9:20
32.0	67.8	1008	16.4	9	3.6	938	0	938	38.03	102.14	0.78	30-Nov-09	9:22
32.0	68.1	1008	16.2	8	3.8	958	4	962	38.62	102.28	0.76	30-Nov-09	9:24
32.0	68.3	1008	17	8	3.4	915	0	915	38.65	102.25	0.96	30-Nov-09	9:26
32.0	68.5	1008	16.2	7	3.8	975	0	975	38.44	102.2	0.78	30-Nov-09	9:28
32.0	68.5	1008	16.6	6	3.5	904	0	904	38.92	102.18	0.78	30-Nov-09	9:30

15-Jan-10 OPACIDAD # 6.5

Temp. Del Gas en °F.	Temp. Ambiental °F.	Presión Barometrica hPa	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
32.0	69.0	1008	16.2	14	3.8	984	57	1041	38.56	102.24	0.96	30-Nov-09	9:35
32.0	69.0	1008	16.5	17	3.6	955	34	989	38.10	102.33	0.87	30-Nov-09	9:37
32.0	69.0	1008	16.3	17	3.8	980	29	1009	38.39	102.24	0.72	30-Nov-09	9:39
32.0	69.2	1008	16.8	16	4.0	1022	28	1050	38.01	102.32	0.83	30-Nov-09	9:41
32.0	69.0	1008	16.2	17	3.7	958	17	975	38.39	102.16	0.92	30-Nov-09	9:43
32.0	69.2	1008	16.1	14	3.9	1029	21	1050	38.20	102.24	0.77	30-Nov-09	9:44
32.0	69.2	1008	15.7	15	4.2	1078	24	1002	38.56	102.32	0.77	30-Nov-09	9:46
32.0	69.2	1008	16.1	15	3.9	1004	17	1021	38.14	102.22	0.77	30-Nov-09	9:47
32.0	69.4	1008	16.3	13	3.7	945	10	955	38.48	102.25	0.76	30-Nov-09	9:49
32.0	69.6	1008	15.9	15	4.0	1845	16	1061	38.39	102.21	0.75	30-Nov-09	9:51
32.0	69.2	1008	15.8	16	4.1	1061	19	1080	38.65	102.23	0.71	30-Nov-09	9:53
32.0	69.2	1008	15.7	16	4.1	1059	16	1065	38.03	102.29	0.72	30-Nov-09	9:55
32.0	69.2	1008	15.9	15	4.0	1048	13	1061	38.16	102.26	0.74	30-Nov-09	9:57
32.0	69.2	1008	15.6	14	4.2	1100	17	1117	38.22	102.40	0.72	30-Nov-09	9:59
32.0	69.8	1008	16.1	12	3.9	1013	12	1025	38.41	102.28	0.72	30-Nov-09	10:00

15-Jan-10 OPACIDAD # 7.5

Temp. Del Gas en °F.	Temp. Ambiental °F.	Presión Barometrica hPa	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
70.8	69.9	1008	16.5	13	3.5	987	26	1013	38.50	102.49	0.90	30-Nov-09	10:03
70.5	69.9	1008	16.6	14	3.5	951	19	970	38.90	102.27	0.86	30-Nov-09	10:05
70.1	70.1	1008	16.7	12	3.4	915	9	924	38.35	102.19	0.81	30-Nov-09	10:07
69.8	70.3	1008	16.3	11	3.7	1005	12	1017	38.39	102.21	0.78	30-Nov-09	10:09
69.9	70.1	1008	16.3	12	3.7	1000	0	1000	38.99	102.29	0.87	30-Nov-09	10:11
70.2	70.1	1008	16.4	12	3.6	982	0	982	38.43	102.15	0.83	30-Nov-09	10:13
70.2	70.1	1008	16.2	11	3.8	995	0	995	38.69	102.31	0.77	30-Nov-09	10:15
70.3	70.3	1008	16.5	12	3.5	946	0	946	38.62	102.35	0.81	30-Nov-09	10:16
70.1	70.3	1008	16.5	11	3.5	944	0	944	38.79	102.27	0.76	30-Nov-09	10:18
70.1	70.1	1008	16.3	10	3.6	998	2	1000	38.03	102.24	0.74	30-Nov-09	10:20
70.3	70.5	1008	16.5	11	3.5	974	2	976	38.16	102.29	0.75	30-Nov-09	10:22
70.5	70.5	1008	16.4	11	3.6	1002	3	1005	38.39	102.32	0.75	30-Nov-09	10:24
70.7	70.5	1008	16.3	11	3.7	1008	4	1012	38.27	102.24	0.74	30-Nov-09	10:26
70.8	70.7	1008	16.0	13	3.9	1051	7	1058	38.20	102.31	0.71	30-Nov-09	10:28
70.8	70.8	1008	16.1	13	3.9	1030	3	1033	38.48	102.29	0.71	30-Nov-09	10:30

Tabla para colectar data en el procedimiento de

La Limpieza de los Motores

Compañía: CFE Lugar: San Carlos B.C.S. Fecha: **15 ABRIL 2010** CAPTURO: JUAN MANUEL VAZQUEZ
Diámetro del escape: 48 in Maquina B&W MAN DIESEL UNIDAD 3
RPM: 102 Carga Max: 39.375 MW Tipo de Combustoleo: Bunker 6 **OPACIDAD # 3**

Temp. Del Gas en °F.	Temp. Ambiental °F.	Presión Barometrica hPa	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
525.0	72.3	1008	15.8	36	4.1	857	25	882	38.50	102.37	1.36	6-Apr-10	3:18
529.9	73.0	1008	15.4	39	4.5	940	11	951	37.73	102.43	0.74	6-Apr-10	3:20
512.0	73.2	1008	16	38	4.0	813	0	813	38.29	102.42	0.72	6-Apr-10	3:22
509.5	73.5	1008	15.8	33	4.1	809	1	810	37.90	102.42	0.78	6-Apr-10	3:24
510.6	74.1	1007	15.6	34	4.2	833	3	836	38.01	102.4	0.8	6-Apr-10	3:26
527.9	74.3	1007	15.4	37	4.4	872	4	877	38.27	102.35	0.81	6-Apr-10	3:28
518.1	74.3	1008	15.9	33	4.1	807	0	807	38.09	102.38	0.83	6-Apr-10	3:30
516.3	74.6	1008	15.9	31	4.0	785	0	785	37.78	102.41	0.84	6-Apr-10	3:32
512.7	75.2	1008	15.8	30	4.1	796	0	796	37.88	102.46	0.87	6-Apr-10	3:34
501.0	74.8	1008	15.6	30	4.2	778	2	780	37.59	102.43	0.86	6-Apr-10	3:36
511.3	75.0	1008	15.5	34	4.2	804	2	806	37.69	102.39	0.87	6-Apr-10	3:38
501.0	75.0	1007	16.3	30	3.8	764	0	764	37.84	102.28	0.84	6-Apr-10	3:40
478.2	75.2	1007	15.8	33	4.1	784	2	791	37.99	102.3	0.84	6-Apr-10	3:42
490.8	79.8	1007	16	30	3.9	757	0	757	38.29	102.31	0.88	6-Apr-10	3:44
477.8	75.0	1007	16.9	31	3.2	642	0	642	37.92	102.36	0.86	6-Apr-10	3:46

15-Apr-10 OPACIDAD # 6

Temp. Del Gas en °F.	Temp. Ambiental °F.	Presión Barometrica hPa	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
532.5	74.1	1008	15.3	28	4.5	939	46	985	38.14	102.40	1.00	6-Apr-10	3:59
513.6	73.9	1008	15.6	40	4.2	889	22	911	37.78	102.42	0.86	6-Apr-10	4:00
526.6	74.8	1007	15.8	38	4.1	872	15	887	37.93	102.34	0.92	6-Apr-10	4:02
520.7	74.6	1008	15.9	36	4.0	869	11	880	38.16	102.40	0.77	6-Apr-10	4:04
524.3	74.4	1008	15.8	36	4.1	890	0	890	38.56	102.32	0.69	6-Apr-10	4:06
509.5	74.4	1008	16.3	36	3.8	881	11	881	38.01	102.34	0.72	6-Apr-10	4:08
517.6	74.4	1008	16.2	37	3.8	880	0	880	37.93	102.24	0.71	6-Apr-10	4:10
521.9	74.4	1008	15.9	37	4.0	876	0	876	38.14	102.27	0.74	6-Apr-10	4:12
517.1	74.6	1008	16.2	33	3.8	839	0	839	38.27	102.30	0.75	6-Apr-10	4:14
515.5	74.8	1008	15.8	36	4.1	875	0	875	38.26	102.36	0.75	6-Apr-10	4:16
515.4	74.3	1008	15.8	33	4.1	867	0	867	38.39	102.26	0.74	6-Apr-10	4:18
518.7	74.1	1008	15.6	36	4.2	861	0	861	38.14	102.37	0.75	6-Apr-10	4:20
508.2	74.3	1008	15.9	33	4.0	824	0	824	38.16	102.37	0.74	6-Apr-10	4:22
526.4	74.4	1007	15.6	33	4.2	898	0	898	38.07	102.36	0.76	6-Apr-10	4:24
493.3	75.0	1008	16.1	34	3.9	835	0	839	38.29	102.39	0.74	6-Apr-10	4:26

15-Apr-10 OPACIDAD # 3

Temp. Del Gas en °F.	Temp. Ambiental °F.	Presión Barometrica hPa	O2 %	CO ppm	CO_2 %	NO ppm	NO2 ppm	NOX ppm	Carga Mw	RPM	I Flow	Calibración S/N Fecha	Tiempo de inicio a termino
526.4	73.0	1007	15.7	28	4.2	896	46	942	38.26	102.34	0.72	6-Apr-10	4:38
516.2	73.5	1007	16.1	35	3.9	846	13	859	38.03	102.37	0.78	6-Apr-10	4:40
526.1	73.4	1008	15.7	35	4.2	908	12	920	38.35	102.41	0.80	6-Apr-10	4:42
523.7	72.6	1008	15.9	37	4.0	864	2	866	37.99	102.39	0.81	6-Apr-10	4:44
528.6	72.3	1008	15.6	37	4.2	903	4	907	38.01	1102.39	0.83	6-Apr-10	4:46
517.6	72.1	1008	15.7	37	4.2	892	3	895	38.26	102.37	0.81	6-Apr-10	4:48
524.8	71.4	1008	15.9	36	4.2	869	0	869	37.93	102.41	0.82	6-Apr-10	4:50
529.8	71.2	1008	15.6	36	4.2	908	0	908	38.20	102.42	0.84	6-Apr-10	4:52
528.9	71.4	1008	15.6	36	4.2	906	1	907	38.27	102.32	0.84	6-Apr-10	4:54
525.0	71.4	1008	15.8	38	4.1	893	0	893	38.41	102.42	0.86	6-Apr-10	4:56
523.4	71.4	1008	16.0	36	3.9	870	0	870	38.52	102.40	0.84	6-Apr-10	4:58
528.0	71.2	1008	15.7	37	4.2	912	0	912	38.35	102.43	0.86	6-Apr-10	5:00
523.9	71.2	1008	16.0	36	3.9	874	0	874	38.01	102.40	0.86	6-Apr-10	5:02
528.6	71.2	1007	15.7	37	4.2	907	0	907	38.41	102.41	0.87	6-Apr-10	5:04
527.9	71.0	1008	16.0	34	3.9	868	0	868	38.52	102.43	0.89	6-Apr-10	5:06

Appendix VI

Fuel Oil Solids Analysis

The bulk fuel storage tank was selected for catalyst treatment as a means to conduct a concurrent evaluation wherein the volume of heavy bunker fuel solids would be monitored. Samples of fuel consumed in the generator at the San Carlos site were supplied to Texas Oil Tech Laboratories, in Houston, Texas, USA, where they were tested for solids content using the ASTM D5291 test procedure. The result of findings is included in this section on letter head provided by the testing laboratory.

The GF2™ fuel borne catalyst utilizes a chemical polymerization retardant and dispersant, which will help reduce existing fuel solids and assist in preventing solids from forming, which normally exist in number 6 bunker fuel. The procedure selected to document total solids agglomeration and reduction was the ASTM D 5291, which was performed by Texas Oil Tech Laboratories, an ASTM certified oil analysis facility.

The samples were supplied in sample bottles to the laboratory utilizing samples from several areas in the fuel system. Two (2) baseline data samples were analyzed along with two (2) treated samples in an attempt to statistically validate the procedure and the solids concentration in the Bunker no. 6 fuel oil. Reducing solids helps return the bunker fuel to an aqueous state, usable for I.C.E. combustion.

The results were conclusive with regard to statistical grouping. The two (2) baseline samples identified in this section as **Baseline**, documented a carbon solids average of 85.9%, while the two (2) treated samples, identified as **Phase I treated**, documented a carbon solids average of 85.37%. The percent change of .0062% may appear to be minute, but represents a significant amount of fuel annually. At a current fuel usage of 180,675,000 litres of fuel annually, this equates to a reduction in solids, or gain in volumetric fuel, of 1,120,185 litres annually. As projected by CFE, daily solids spin off; from the centrifuge is approximately .01% (1%) of total fuel throughput. By reducing solids at a rate of .0062%, this equates to a reduction in solids spin off of 62%.

The most recently completed tests, which are identified in this section as **Phase II treated** manifested a more significant reduction in carbon solids when compared to the **Baseline** segment. Current reductions in carbon solids comparing **Baseline** to **Phase II treated** data documents a reduction in total carbon solids of 14.6%; a further significant reduction in solids and increase in soluble fuel.

Section II of this portion of this section of the report shows a sample of the fuel test data and identifies the fuel type by specific gravity, and the affects of those changes on the data collected during the course of this evaluation.

ASTM D5291 Analysis Sheets: Baseline Testing
Carbon Fuel Solids Content

Certificate of Analysis

TEXAS OIL TECH Laboratories, Inc.®
SINCE 1985
Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274
TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	**REQUESTED BY:**	Mr. Kim Lebaron
SAMPLE:	# 1 Base Line, Main Holding Tank (Antes de Centrifugadora)	**REPORT DATE:**	February 18, 2010
LABORATORY NO:	58413-01	**PURCHASE ORDER NO:**	Pending

TEST **RESULTS**

Carbon, Hydrogen, and Nitrogen by Instrumental Method, ASTM D 5291:

Carbon Content, wt%..	85.94
Hydrogen Content, wt%...	9.60
Nitrogen Content, wt%..	0.47

Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

ASTM INTERNATIONAL

Quality Management System Certified to ISO 9001:2000
MOODY INTERNATIONAL ANAB ACCREDITED
Cert. No. 5085

Certificate of Analysis

SINCE 1985
Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	**REQUESTED BY:**	Mr. Kim Lebaron
SAMPLE:	# 2 Base Line, Engine in Feed (Post Centrifuge)	**REPORT DATE:**	February 18, 2010
LABORATORY NO:	58413-02	**PURCHASE ORDER NO:**	Pending

TEST **RESULTS**

Carbon, Hydrogen, and Nitrogen by Instrumental Method, ASTM D 5291:

Carbon Content, wt%..	85.86
Hydrogen Content, wt%...	9.36
Nitrogen Content, wt%..	0.44

Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

ASTM D5291 Analysis Sheets: Phase I Treated Testing

Carbon Fuel Solids Content

Certificate of Analysis

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10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	REQUESTED BY:	Mr. Kim Lebaron
SAMPLE:	# 3 Centrifuge (Entrada), # 5 Bulk Fuel Treated	REPORT DATE:	February 18, 2010
LABORATORY NO:	58413-03	PURCHASE ORDER NO:	Pending

TEST RESULTS

Carbon, Hydrogen, and Nitrogen by Instrumental Method, ASTM D 5291:

Carbon Content, wt%..........	85.44
Hydrogen Content, wt%..........	9.68
Nitrogen Content, wt%..........	0.45

Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

Certificate of Analysis

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10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	**REQUESTED BY:**	Mr. Kim Lebaron
SAMPLE:	# 3 Centrifuge (Salida), # 6 Post Centrifuge to Engine Treated	**REPORT DATE:**	February 18, 2010
LABORATORY NO:	58413-04	**PURCHASE ORDER NO:**	Pending

TEST **RESULTS**

Carbon, Hydrogen, and Nitrogen by Instrumental Method, ASTM D 5291:

Carbon Content, wt%..	85.30
Hydrogen Content, wt%..	9.66
Nitrogen Content, wt%..	0.51

Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

ASTM D5291 Analysis Sheets: Phase II Treated Testing

Carbon Fuel Solids Content

Certificate of Analysis

TEXAS OIL TECH Laboratories, Inc.®

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10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kim Lebaron	**REQUESTED BY:**	Mr. Kim Lebaron
SAMPLE:	125 mL Black Plastic Container	**REPORT DATE:**	June 9, 2010
LABORATORY NO:	59812-02 A	**PURCHASE ORDER NO:**	Pending

TEST	RESULTS
Carbon Content, ASTM D 5291, wt%...	73.37
Solids Content by Gravimetric Analysis, wt%	0.25

Respectfully submitted,
FOR: TEXAS OILTECH LABORATORIES, L.P.

Mitchell D. Martin
Assistant Director of Laboratory Operations

ASTM INTERNATIONAL

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Quality Management System Certified to ISO 9001:2008
MOODY INTERNATIONAL ANAB ACCREDITED
Cert. No. 5085

Section II: Oil Analysis- Fuel Energy

CFE Una empresa de clase mundial

SUBDIRECCION DE GENERACION
Sistema Integral de Gestión

Gerencia Regional de Producción Noroeste
Subgerencia Regional de Generación Term. Baja California
C.C.I. "Gral. Agustín Olachea Avilés

REPORTE PARA EL ANALISIS DE COMBUSTIBLES

TIPO DE COMBUSTIBLE:	***COMBUSTOLEO***	No. ANALISIS 01
PROCEDENCIA:	***TANQUE DE ALMACENAMIENTO UNIDAD Nº3***	19 de Enero de 2010

ANALISIS FISICOQUIMICO DEL COMBUSTIBLE

DETERMINADION FISICO-QUIMICA		UNIDADES	NORMAS DE PRUEBA	EQUIPO DE PRUEBA	RESULTADOS
(1)	DENSIDAD RELATIVA 60/60ºF(15.56/15.56ºC)	Kgs./Lts	ASTM-1298 ASTM-89H JIS K-2249	BAÑO DE TEMPERATURA CONSTANTE 125 R -051	1.005
(2)	TEMPERATURA DE INFLAMACION	ºC	ASTM D-93 JIS K-2265 JIS K-2249	FLASH POINT TESTER PENSKY MARTENS	104
(3)	VISCOSIDAD A 50ºC	Cst	ASTM D-445, 446 JIS K-2249	BAÑO DE TEMP. CONSTANTE P/VISC. CINEMATICA 404072	956.44
(4)	PODER CALORIFICO SUPERIOR	Kcal/Kgr.	ASTM D-240 JIS K-2279	NENKEN CALORIMETER BOMBA PARR 1266	9,934.27
(5)	AZUFRE	%PESO	ASTM D-129 JIS K-2541	NENKEN CALORIMETER MUFLA / BBA. PARR 1266	3.63

REALIZO ANALISIS DE : (1), (2), (3), (4), (5).	NOMBRE:	*CORNELIO RAMOS HERNANDEZ*	FIRMA
REALIZO ANALISIS DE : (1), (2), (3), (4), (5).	NOMBRE:		FIRMA
REALIZO ANALISIS DE : (1), (2), (3), (4), (5).	NOMBRE:		FIRMA

OBSERVACIONES:

ANALISIS SEMANAL

REVISO

JEFE DE DEPARTAMENTO TECNICO

Vo. Bo.

SUPERINTENDENTE DE CENTRAL

O-2041-Q12-R-03

CFE Una empresa de clase mundial

SUBDIRECCION DE GENERACION
Sistema Integral de Gestión

Gerencia Regional de Producción Noroeste
Subgerencia Regional de Generación Term. Baja California
C.C.I. "Gral. Agustín Olachea Avilés

REPORTE PARA EL ANALISIS DE COMBUSTIBLES

TIPO DE COMBUSTIBLE:	*COMBUSTOLEO*	No. ANALISIS 04
PROCEDENCIA:	*TANQUE DE ALMACENAMIENTO UNIDAD Nº3*	FECHA: 20 DE ABRIL 10

ANALISIS FISICOQUIMICO DEL COMBUSTIBLE

	DETERMINADION FISICO-QUIMICA	UNIDADES	NORMAS DE PRUEBA	EQUIPO DE PRUEBA	RESULTADOS
(1)	DENSIDAD RELATIVA 60/60ºF(15.56/15.56ºC)	Kgs./Lts.	ASTM-1298 ASTM-89H JIS K-2249	BAÑO DE TEMPERATURA CONSTANTE 125 R -051	1.015
(2)	TEMPERATURA DE INFLAMACION	ºC	ASTM D-93 JIS K-2265 JIS K-2249	FLASH POINT TESTER PENSKY MARTENS	99
(3)	VISCOSIDAD A 50ºC	Cst	ASTM D-445, 446 JIS K-2249	BAÑO DE TEMP. CONSTANTE P/VISC. CINEMATICA 404072	1,134.39
(4)	PODER CALORIFICO SUPERIOR	Kcal/Kgr.	ASTM D-240 JIS K-2279	NENKEN CALORIMETER BOMBA PARR 1266	9,871.07
(5)	AZUFRE	%PESO	ASTM D-129 JIS K-2541	NENKEN CALORIMETER MUFLA / BBA. PARR 1266	3.93

REALIZO ANALISIS DE : ~~(1), (2), (3), (4), (5),~~	NOMBRE: *CORNELIO RAMOS HERNANDEZ*	FIRMA
REALIZO ANALISIS DE : (1), (2), (3), (4), (5),	NOMBRE:	FIRMA
REALIZO ANALISIS DE : (1), (2), (3), (4), (5),	NOMBRE:	FIRMA

OBSERVACIONES:

RESIDUOS CARBONOSOS	N.D. %PESO	N.D.= NO DETERMINADO A CAUSA DE APARATO
CENIZAS SULFATADAS	N.D. %PESO	DAÑADO.
AGUA POR DESTILACION	0.1 %VOL.	
AGUA Y SEDIMENTOS	0.25 %VOL.	

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O-2041-Q12-R-03

Data documenting the specific gravity of the number 6 bunker fuel consumed during the course of the evaluation was evaluated and weighted for energy content and value. Although the CFE onsite oil analysis documents identify changes in fuel density ranging from 1.005 to 1.016 this equates to only a .011% change in fuel density. Bulk fuel storage tank fuel mixing would further diminish the change in fuel density due to the introduction of multiple fuel viscosities. Data was collected and monitored through May, 2010. The above documents identify the means and process through which fuel density was collected and derived.

Fuel energy changes at this minimal level would have little or not effect on the outcome of the evaluation. It appears that fuel consistency, as a standard norm, was maintained throughout the entirety of the testing process. However, fuel energy is not singular to the process of combustion. Many governmental and laboratory studies have been conducted and written documenting the inherent relationship between the organo-metallic chemistry, crucial to the chemical makeup of the GF2™ fuel catalyst, and its relationship to the combustion process. Organo-metallic components reduce ignition delay very much similar to that of a higher cetane fuel. Specialty chemistries such as an organo-metallic component enhances combustion as affectively as 2,2,4- trimetheylpentane directly enhances octane or cetane in aqueous fuels. According to laboratory tests, engine efficiency will improve with catalyst treated fuel over that of the non-catalyst treated fuel in light of consistent or relatively minute changes in fuel density. With the catalyst, combustion dynamics change much like that of running a less viscous, more responsive fuel.

Appendix VII

Load and RPM Comparison

Data was further extracted to determine generator efficiency gains, based on megawatts per RPM. Calculating power gain per RPM identifies gains in performance based solely upon actual applied data; not theoretical calculations that do not define the process and are not pertinent to the current application. Applied data indicates a change in RPM of less than .0006%, which would be considered well within the standards of deviation. Although RPM change is negligible, the data documents a significant improvement in megawatts per RPM; an average of 3.15% during the catalyst treated segment of the evaluation. Since RPM is held constant and load is subject to changes in fuel flow, the increase in available load is a function of combustion related energy release, with the catalyst, rather than an increase in fuel flow.

The data is tabulated as a result of documenting hundreds and hundreds of field data points over many days of testing. Table IV profiles the data, along with the findings of that data: All calculations and data are identified relative to the baseline number:

Table V

Average Load per Test Segment:

	Baseline **Dec. 5,**	**Treated I** **Jan. 15, 2010**	**Treated II** **April 15,**
Phase I:	35.55	38.57	37.98
Phase 2:	38.79	38.31	38.15
Phase	37.51	38.48	38.23
3:	**37.28 mw**	**38.45 mw**	**38.12**

Average RPM per Test Segment:

	Baseline **Dec. 5,**	**Treated I** **Jan. 15,**	**Treated II** **April 15,**
Phase I:	102.34	102.24	102.38
Phase 2:	102.29	102.27	102.34
Phase 3:	102.29	102.28	102.39
Average:	**102.31**	**102.26 RPM**	**102.37**
RPM RPM Change:		**.00049%**	**RPM**
Mw/RPM:	.364	.376	.372
Pct. Change:		**+3.3%**	**+3%**

Appendix VIII

Particulate Levels (Smoke) Analysis

The following data included in Table V tabulates the smoke samples extracted from the exhaust stack of the test generator utilizing a Bacharach Smoke Spot tester. The data was then analyzed and compared with similar data points to validate the reading and smoke content level. The following information identifies the smoke spot number, along with the average improvement and reduction in smoke. All calculations and data are identified relative to the baseline number:

Table VI

Average Particulate Smoke Patch Number per Test Segment:

	Baseline **Dec. 5, 2009**	**Treated I** **Jan. 15, 2010**	**Treated II** **April 15, 2010**
Phase I:	7	7	3
Phase 2:	7.5	7.5	6
Phase 3:	7.5	6.5	3
Average:	**7.33**	**7.0**	**4.0**
Mg/m^3	12.67 mg/m^3	10.98 mg/m^3	8.92 mg/m^3
Pct. Change:		**- 13.34%**	**- 29.6%**

Appendix IX

Carbon Footprint Data

Calculation of Greenhouse Gas Reductions

Assumptions: **San Carlos** **Plant Average (Estimate)**

* Fuel Type = Diesel
*Annual Fuel Usage = 47,546,053 gallons, or 180,675,000 litres
*Average 7.6% reduction in fuel usage with GF2™ fuel catalyst.

Discussion:

When fuel containing carbon is burned in an engine, there are emissions of carbon dioxide (CO_2, methane (CH_4), nitrous oxide (N_20), oxides of nitrogen (NO_x), carbon monoxide (CO), non methane volatile organic compounds (NMVOC's) and sulfur dioxide (SO_2). The amount of each gas emitted depends on the type and quantity of fuel used (the "activity"), the type of combustion equipment, the emissions control technology, and the operating conditions.

The International Greenhouse Partnerships Office section of the Federal Government Department of Science Industry and Technology has produced a workbook outlining how to calculate the quantities of greenhouse gas emissions and is accepted internationally as the accepted approach. The workbook illustrates an example of how to calculate the mass of CO_2 for example on page 21, Table 3.1 and Example 3.1:

The CO_2 produced from burning 100 litres of diesel oil is calculated as follows:

* the CO_2 emitted if the fuel is completely burned is 2.716 kg CO2/litre (see Appendix A, Table A1)

* the oxidation factor for oil-derived fuels is 99% (see Table 3.1)

Therefore, the CO_2 produced from burning 100 litres of fuel is:

100 litres x 2.716 kg CO_2/litre x .99 = 268.88 kg

Based on the above calculations, the Greenhouse gas reductions for C02 are as follows:

Test Data	Fuel Usage	kg CO_2 per litre fuel	Oxidation	System CO_2	System CO_2
"Baseline"	180,675,000	2.716	0.99	485,806,167	485,806
"Treated"	166,943,700	2.716	0.99	448,884,898	448,885
C02 reductions with GF2™ fuel catalyst				**36,921,269**	**36,921**

The reduction of C02 greenhouse emissions in the amount of 36,921tonnes (40,687 tons) is significant! Carbon Dioxide accounts for approximately 99.6% of the total greenhouse gas emissions produced. In other words, when diesel oil is burned in an internal combustion engine, the CH4 and N20 emissions contribute less than 0.4% of the greenhouse emissions. This low level is typical of most fossil fuel combustion systems and often is not calculated.

However, by way of additional information, the reduction in CH_4 and N_20 are calculated as follows:

CH_4 Emissions Reduction

* the specific energy content of the fuel is 36.7 MJ/litre (see Table A1), so the total energy in 100 litres is 3,670 MJ, or 3.67 GJ

* the CH_4 emissions factor for diesel oil used in an internal combustion engine is 4.0 g/GJ (see Table A2) so the total CH_4 emitted is 3.67 x 4 = 18.0g

"Baseline" [18.0g/100 litres] x [180,675,000] x [1kg/1000g] = 32,522 kg "Treated"

[18.0g/100 litres] x [166,943,700] x [1kg/1000g] = 30,050 kg

CH_4 Reduction = 2,472 kg

N_2O Emissions Reduction

* the N_2O emissions factor for diesel oil used in an internal combustion engine is 1,322 g/GJ so the total N2O emitted is 3.67 x 0.6 = 2.7 g

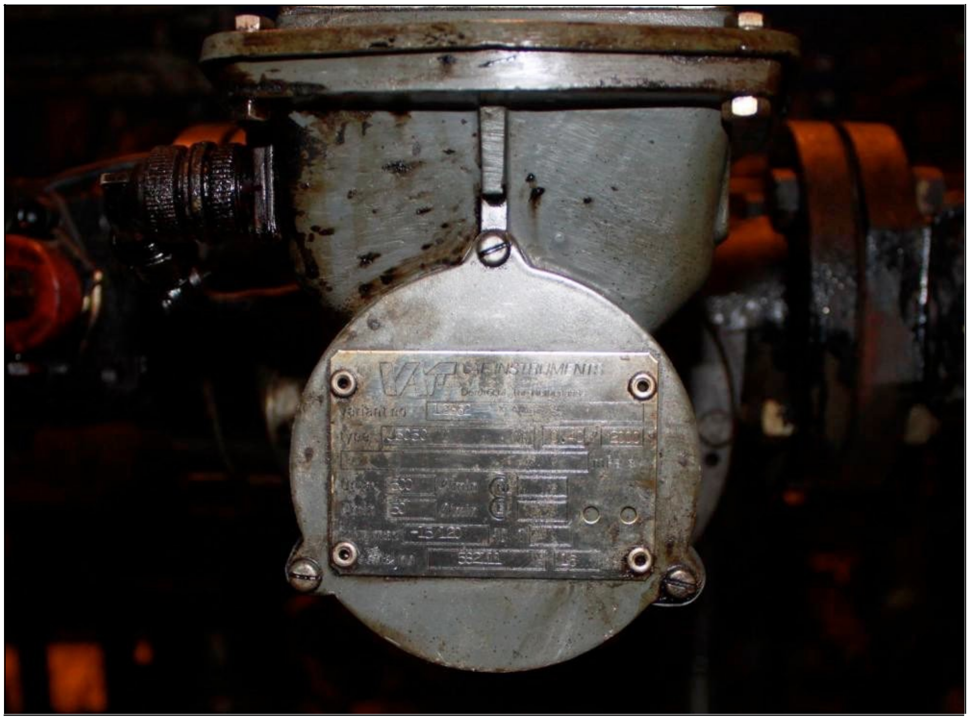
"Baseline" [2.7g/100 litres] x [180,675,000] x [1kg/1000g] = 4,878 kg

"Treated" [2.7g/100 litres] x [166,943,700] x [1kg/1000g] = 4,507 kg

N_2O Reduction = 371 kg

Appendix X

Variant J5050 Flow Meter Analysis



The flowmeter incorporated into daily operations by CFE is a Variant J5050 flow meter. This flowmeter was manufactured in 2000 and is not designed to compensate for temperature (volume) changes as it is a mechanical counter only. Although not in place, this flowmeter can be fitted with a flow computer which will measure net fuel consumption to reference temperature. The flowmeter accuracy is + or -2% factory calibration; + or -3% field calibration; with designed data repeatability of + or -5% (see specification sheet in this section).

There are several cursory engineering conditions that must be in place as a determinant for timely flowmeter calibration. The calibration interval will depend on the nature of the process liquid and the operating conditions during which that process liquid is utilized. Two important factors are as follows:

- The process liquid must be clean and non-abrasive.
- A liquid filter/screen with the correct mesh width must be installed at the flowmeter inlet (at least a .05 mm filter/screen (280 mesh)).

Compliance with the aforementioned criteria reduces calibration frequency and damage to the flowmeter. The in-process calibration interval for this flowmeter, with all cursory requirements met, is identified in Table VII and is as follows:

Table VII

Meter Type	Connection Size	Calibration Interval (litres)
JN050	2”	110×10^6

*** All general specifications provided via the Variant Flowmeter Maintenance Manual TB 129.**

Several requests were extended to obtain the flowmeter calibration frequency from CFE, along with the certification of calibration for the flowmeter discussed in this section. The requested calibration data has not yet been provided and exacerbates the credibility of ongoing flowmeter performance, calibration and flowmeter supplied data for credible performance calculations. Flowmeter performance, unmanaged, can create indisputable variances in accuracy of + or – 10%. As provided in the aforementioned data, calibrated under the best of circumstances, flowmeter accuracy will vary as much as 6% with the repeatability of data varying as much as 10%. Un-calibrated, data repeatability could vary as much as 20%. Data variability of this magnitude can hardly represent reliable information when utilized to compute and compile important plant performance reports.

Note: During the course of this evaluation, the flow meters for unit number three (3) were observed in an inoperable condition. Fuel usage was neither tabulating nor accumulating.

Technical specifications Midflow®

Basic model number	J5025	J5040	J5050	J5080	J5100	J1025	J1040	J1050	J1080	J1100	J3025	J3040	J3050	J3080	J3100
Connection size, DN [mm]	25	40	50	80	100	25	40	50	80	100	25	40	50	80	100
Capacity	See graphs on page 6														
Displaced volume per revolution [litre]	0.167	0.167	0.40	2.95	5.30	0.167	0.167	0.40	2.95	5.30	0.167	0.167	0.40	2.95	5.30
Measuring accuracy Range 1 : 10 [1] Range 1 : 20 [2]	+/- 0.2% +/- 0.3%			+/- 0.1% +/- 0.3%		+/- 0.2% +/- 0.3%			+/- 0.1% +/- 0.3%		+/- 0.2% +/- 0.3%			+/- 0.1% +/- 0.3%	
Repeatability	Better than +/- 0.05%														
Required starting pressure [kPa (bar)]	3 (0.03)														
Materials															
Body	Ductile iron					AISI 316									
Rotor	Ductile iron			Cast iron		Ductile iron			Cast iron		AISI 316				
Covers	Ductile iron Steel on application					Steel					AISI 316				
Vanes	Carbon														
O-rings	Viton A PFA covered Viton A or Kalrez on application										PFA covered Viton A Kalrez on application				
Bearings	Steel ball bearings Stainless Steel ball bearings on application										AISI 316 needle bearings				
Body pressure rating [kPa (bar)]	2,000 (20)			1,050 (10,5)		2,500 (25)			2,000 (20)		2,500 (25)			2,000 (20)	

Appendix XII

Emissions Averages for Carbon Mass Balance Evaluation

The averages for all emissions monitored during the Carbon Mass Balance test procedure are tabulated and are included in Table VIIII. The ECOM analyzer used to monitor stack emissions was not designed to monitor unburned hydrocarbons due to low environmental impact. As such, HC levels likewise have little or no impact on the CMB equation because of their minute levels. For the purpose of the CMB equation, HC levels were held as a constant for all calculations. The data is as follows:

Table VIII

Phase I; January 15, 2010:

	HC	**C02**	**O2**
Baseline:	.00003%	4.52%	15.35%
Treated:	.00002%	4.16%	15.68%
Pct. Change:	- 33%	- 8%	+ 2.15%

Phase II; April 15, 2010:

	HC	**C02**	**O2**
Baseline:	.00003%	4.52%	15.35%
Treated:	.000037%	4.21%	15.82%
Pct. Change:	+ 23%	- 6.9%	+ 3.1%

Overall Average Dec. 3, 2009 (baseline) thru April 15, 2010 (treated):

	HC	**C02**	**O2**
Baseline:	.00003%	4.52%	15.35%
Treated:	.000029%	4.19%	15.75%
Pct. Change:	- 3.3%	- 7.3%	+ 2.6%

The data for the entirety of the evaluation clearly shows reductions in carbon emissions with an increase in oxygen levels.

Appendix XII

Carbon Mass Balance Base Equation

Assumptions: C_8H_{15} and SG = 0.78
Time is Constant
Load is Constant

Data:

Mwt	= Molecular Weight
pf_1	= Calculated Performance Factor (baseline)$_{(1)}$
pf_2	= Calculated Performance Factor (treated)$_{(2)}$
PF_1	= Performance Factor (adjusted for baseline exhaust mass)$_{(1)}$
PF_2	= Performance Factor (adjusted for treated exhaust mass)$_{(2)}$
T	= Temperature (°F)
F	= Flow (exhaust CFM)
SG	= Specific Gravity
F	= Volume Fraction

$VFC0_2$ = "reading" ÷ 100
$VF0_2$ = "reading" ÷ 100
VFHC = "reading" ÷ 1,000,000
VFCO = "reading" ÷ 100

Equations:

$$Mwt = (VFHC)(86)+(VFCO)(28)+(VFCO_2)(44)+(VFO_2)(32)+[(1-VFHC-VFCO-VFO_2-VFCO_2)(28)]$$

$$pf_1 \text{ or } PF_1 = \frac{2952.3 \times Mwt}{89(VFHC)+13.89(VFCO)+13.89(VFCO_2)}$$

$$PF_1 \text{ or } PF_2 = \frac{pf \times (T+460)}{F}$$

Fuel Economy:
Percent Increase (or Decrease) $= \frac{(PF_2 - PF_1) \times 100}{PF_1}$