Xtreme Fuel Optimizer Fuel Catalyst Evaluation
For
Fuel Efficiency and Emissions Reductions
With
Danco Transportation
Utilizing
The Carbon Mass Balance Test Procedure

Final Report
September 2009

Prepared by:

Green Planet

For

Xtreme Fuel Optimizer Global, Inc.

CONTENTS

Appendices

WHAT IS THE CARBON 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 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 balance” or “exhaust gas analysis” method. The studies conducted show that the carbon balance has been found to be a more precise fuel consumption test method than the alternative volumetric-gravimetric methods.

The carbon balance test is a fundamental part of the Australian Standards **AS2077-1982**. Further, the carbon 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 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 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 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 Balance Test has such a high degree of acceptance and reliability.

EXECUTIVE SUMMARY

The Xtreme Fuel Optimizer fuel catalyst manufactured and marketed by Xtreme Fuel Optimizer Global, Inc., 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.

Following discussions with (Xtreme Fuel Optimizer Representatives, and the owner Danco Transportation, it was determined that a fuel consumption analysis should be conducted utilizing at least two (2) over-the-road tractors. The designated equipment for this study includes a 2001 International with an N14+ Cummins engine and a 2000 Freightliner with a Series 60 Detroit Diesel. Engines with differing mileage accumulations were evaluated in an attempt to determine the affects of the Xtreme Fuel Optimizer fuel Catalyst on engines with varying use and horsepower.

It was determined that varying engine types be evaluated, with dissimilar engine mileage accumulations. A baseline test was conducted after which the equipment was treated by pouring the Xtreme Fuel Optimizer fuel catalyst into the rolling diesel fuel tanks for each test unit. Treatment was facilitated through the use of six-teen (16) oz. containers of Xtreme Fuel Optimizer fuel catalyst, which were used to hand treat each test unit. 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.

Danco Transportation is a long haul, contract carrier, with operations extending throughout the United States. Commodities such as tires and produce are a sampling of freight transported by Danco Transportation.

A baseline test (untreated) was conducted on August 1, 2009 using the Carbon Mass Balance Test Procedure. After which, the pre-selected test equipment was treated by adding the Xtreme Fuel Optimizer fuel catalyst to the diesel fuel contained in each individual trucks rolling tank. On August 29, 2009 and September 19, the test was then repeated (Xtreme Fuel Optimizer treated) following the same parameters. The results are contained within this report.

The data showed that the average improvement in fuel consumption, for all trucks tested, was 8.7%, during steady state testing, using the Carbon Mass Balance test procedure.

The treated engines also demonstrated a large percentage reduction in soot particulates, in the range 34%, and reductions in harmful exhaust related carbon fractions. Carbon dioxide reductions, based upon the measured reduction in fuel consumption, are also substantial.

INTRODUCTION

Baseline (untreated) fuel efficiency tests were conducted on both pieces of equipment on August 1, 2009, employing the Carbon Mass Balance (CMB) test procedure. Xtreme Fuel Optimizer Global, Inc. supplied 16 oz. bottles of Xtreme Fuel Optimizer fuel catalyst utilized to dose/treat the fuel tank on each individual test unit, by each individual driver. The sixteen-ounce containers had graduated treatment markings, which aided in the convenience of treating, each time the test units were fuelled. The test units were then operated on Xtreme Fuel Optimizer fuel catalyst treated fuel for at least 8,000 miles in order to achieve the complete conditioning period, which is documented in many laboratory and field studies. Tests conducted provide critical documentation, which proves that equipment operated with less than 2,000 to 3,000 treated miles demonstrate lower fuel consumption improvements because of the catalytic stabilization affects that take place while using Xtreme Fuel Optimizer fuel combustion catalyst.

At the end of the treated engine-conditioning period (August 29 and September 19), 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 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 loaded sufficiently 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 .800 to .910 Precision Hydrometer, columnar flask and Raytek Minitemp are utilized to determine the fuel density for each prescribed segment of the evaluation.

Next, and essential to the Carbon Balance 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 Carbon Balance test takes only 10 to 20 minutes, per unit, to perform.

Once the decision is made to test a certain piece of equipment, pertinent engine criteria needs to be evaluated as the Carbon 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.

An aftermarket throttle position lock is utilized, as one method, to secure engine RPM. This provides a steady state condition in which consistent data can be collected. 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 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 Balance study may begin. The above photograph shows that the engine RPM is locked in place at 1400 r.p.m. It should be noted that any deviation in r.p.m., 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 Balance data cannot be collected until the engine exhaust temperature has peaked. Exhaust temperature is monitored carefully for this reason (yellow probe wire).

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 Balance study.

When all temperatures are stabilized, and desired operating parameters are achieved; it is time to insert the emissions sampling probe into the exhaust tip of each piece of equipment utilized in the study group. The probe has a non-dispersive head, which allows for random exhaust sampling throughout the cross section of the exhaust (stainless steel U-shaped tube).

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 Balance procedure. This 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 Balance test is unique in that all parameters that have a dramatic affect on fuel consumption, in a volumetric test, are controlled and monitored throughout the entire 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 Balance test procedure. In this case, exhaust pressure is ascertained through the use of a Magnahelic gauge. This type of stringent regime further documents the inherent accuracy of the Carbon Balance test.

At the conclusion of the Carbon 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 all industry in a favorable position with environmental policy and the general public.

The above photograph demonstrates a typical method in which soot particulate volume is monitored during the Carbon 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 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 extremely accurate, as long as the criteria leading up to the accumulation of data meets the same stringent standards. For this reason, the Carbon Balance test is superior to any other test method utilized. It eliminates a multitude 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 Balance test. The analyzer is calibrated with known reference gases before the baseline and treated test segments begin. The data collected from this analyzer is then computed and compared to the 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 Balance test procedure. Note: **The Horiba MEXA emissions analyzer is calibrated with the same reference gas for both the baseline and treated segments of the**

evaluation. In this case, a Scott specialty Mother gas no. CYL#ALM018709 was utilized for calibration purposes.

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 Horiba Mexa Series, four gas infrared analyser.

Note: The Horiba MEXA emissions analyser is calibrated with the same reference gas for both the baseline and treated segments of the evaluation. In this case, a Scott specialty mother gas no. CYL#ALM018709 was utilized for calibration purposes.

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

Exhaust differential pressure by Dwyer Magnahelic.

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.

The Horiba infrared gas analyser was serviced and calibrated prior to each series 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 II.**

Table I: provides the final test results for both pieces of equipment, included in the evaluation, before and after Xtreme Fuel Optimizer fuel catalyst treatment **(see graph III, Appendix I)**.

TABLE I

Test Segment	Miles	Fuel Change by %
12		
Treated	9,792	**- 7.8%**
27		
Treated	11,327	**- 9.5%**
Average (Absolute)		**- 8.7%**

The computer printouts of the calculated CMB test results are located in **Appendix II.** The raw engine data sheets used to calculate the CMB are contained in **Appendix III**. The raw data sheets, and carbon balance sheets show and account for the environmental and ambient conditions during the 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 miles, Xtreme Fuel Optimizer fuel catalyst 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 .825 and .835 Diesel	**Soot Particulates**
12	
Untreated	1.26 mg/m^3
Treated	.84 mg/m^3
	- 33%
27	
Untreated	2.91 mg/m^3
Treated	1.89 mg/m^3
	- 35%

Average	**- 34%**

The reduction in soot particulate density (the mass of the smoke particles) was reduced by an average 34% after fuel treatment and engine conditioning with Xtreme Fuel Optimizer fuel catalyst **(See Graph 1 and II, Appendix I).** Concentration levels were provided by Bacharach.

Conclusion

These carefully controlled engineering standard test procedures conducted on both pieces of test equipment; provide clear evidence of reduced fuel consumption in the range of 8.7. In general, improvements utilizing the Carbon Mass Balance test, under static test conditions, generate results 2% - 3% less than those results generated with an applied load. However, engine design can and will produce data equal to or equivalent to data collected utilizing other methods of fuel evaluation.

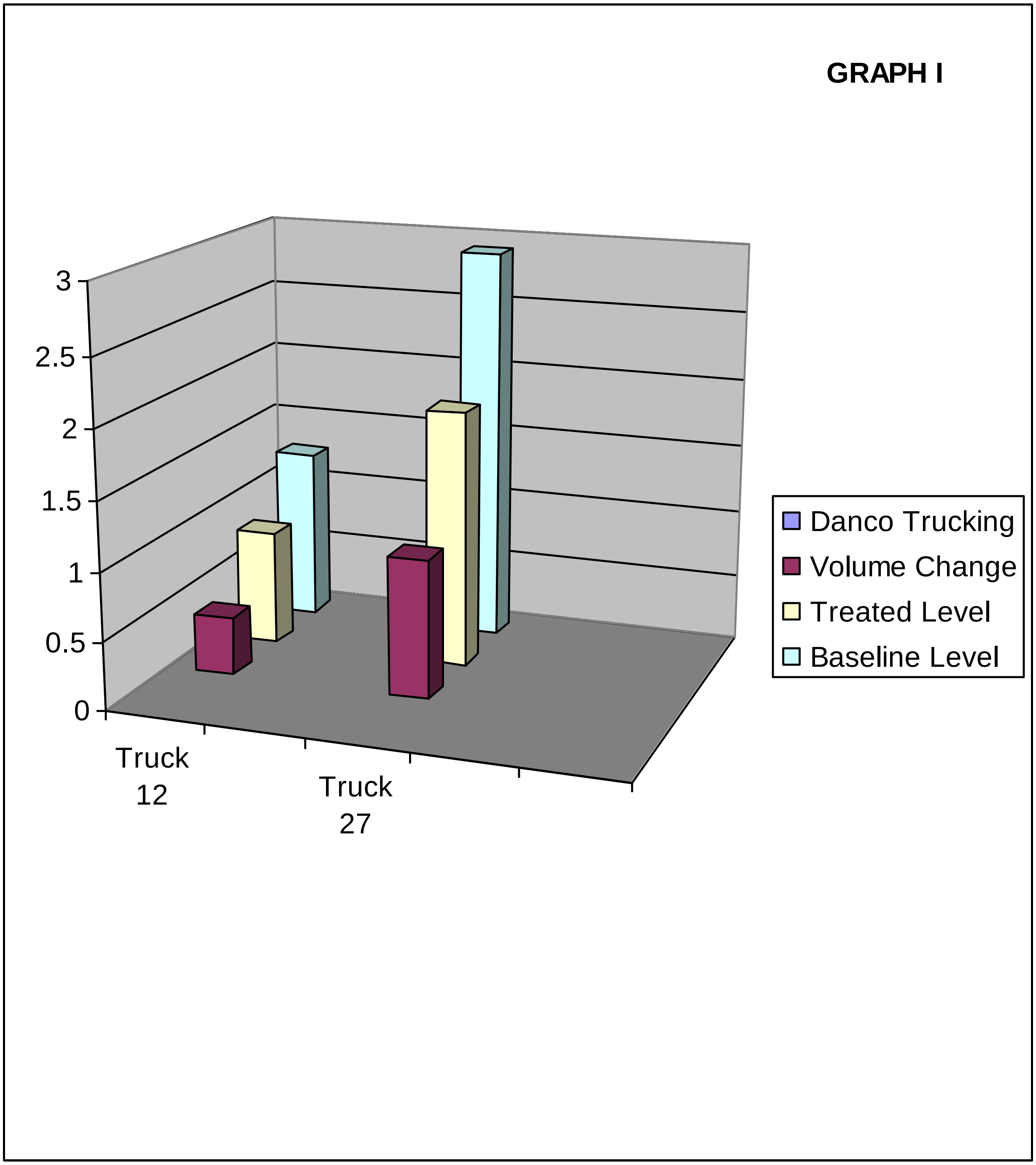
Xtreme Fuel Optimizer fuel catalyst's effect on improved combustion is also evidenced by the substantial reduction in soot particulates (smoke) in the range of 34% **(see Appendix I)**. Similar reductions in other harmful carbon emissions likewise substantiate the improved combustion created by the use of Xtreme Fuel Optimizer fuel combustion catalyst **(see raw data sheets, Appendix III)**.

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 213 metric tonnes. Reductions in Nitrogen and Methane levels were also observed.

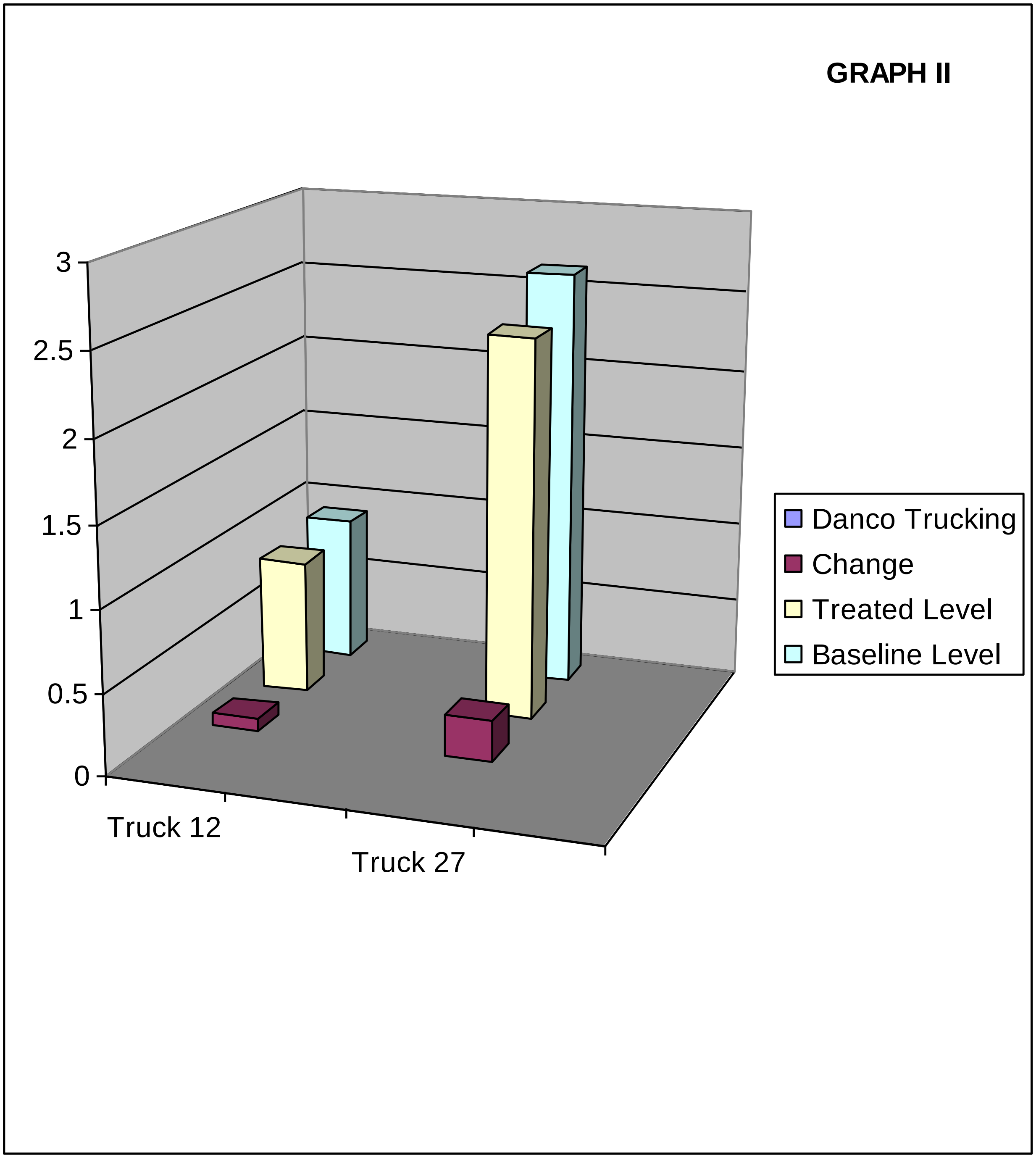
Additional to the fuel economy benefits measured and a reduction in soot particulates, a significant reduction, over time, in engine maintenance costs will be realized following treatment with Xtreme Fuel Optimizer. These savings are achieved through lower soot levels in the engine lubricating oil, which 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. Xtreme Fuel Optimizer also acts as an effective biocide should you experience water bottoms in fuel storage tanks; and, an excellent fuel system lubricant, which improves fuel system lubrication with today's low sulphur diesel fuels.

Appendix I

Exhaust Particulate and Fuel Graphs



Soot Particulate Graph I



Fuel Consumption Graph II

Appendix II

Carbon Mass Balance Compilation Sheets

CARBON BALANCE RESULTS

COMPANY :	Danco Trucking	LOCATION :	Idaho Falls, Idaho
EQUIPMENT :	2000 Freightliner	UNIT NR. :	12
ENG. TYPE :	60 Series Detroit Diesel	MODEL :	Long Haul Truck
RATING :		FUEL :	Diesel

BASELINE TEST — **DATE : 08/01/09**

TRUCK MILES	343,129	ENG. RPM:	1400
AMB. TEMP (C) :	22.6	STACK(mm):	123.75
BAROMETRIC (mb)	1017	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	62.25	62.25	62.25	62.25	62.25	62	0.00
EXHST TEMP (C):	121.5	121.4	121.6	121.7	121.6	122	0.09
HC (ppm) :	11	13	13	12	13	12.4	7.21
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	2.10	2.08	2.09	2.08	2.07	2.08	0.55
O2 (%) :	10.24	10.20	10.23	10.22	10.24	10.23	0.16
CARB FLOW(g/s):	0.919	0.911	0.915	0.911	0.907	0.913	0.52
REYNOLDS NR. :	3.59E+04						

TREATED TEST — **DATE : 09/19/09**

TRUCK MILES	352,921	ENG. RPM:	1400
AMB. TEMP (C) :	22.1	STACK(mm):	123.75
BAROMETRIC(mb):	1015	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	62.25	62.25	62.25	62.25	62.25	62	0.00
EXHST TEMP (C):	121.7	121.8	121.6	121.7	121.8	122	0.27
HC (ppm) :	10	9	9	10	9	9.4	5.83
CO (%) :	0.02	0.03	0.03	0.02	0.02	0.024	22.82
CO2 (%) :	1.93	1.94	1.92	1.93	1.92	1.93	0.45
O2 (%) :	10.16	10.14	10.12	10.14	10.13	10.14	0.15
CARB FLOW(g/s):	0.841	0.849	0.840	0.841	0.836	0.841	0.55
REYNOLDS NR. :	3.58E+04		TOTAL HOURS ON TREATED FUEL :			9792	

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : **-7.8 %**

REMARKS:

CARBON BALANCE RESULTS

COMPANY :	Danco Trucking	LOCATION :	Idaho Falls, Idaho
EQUIPMENT :	2001 Internatiional	UNIT NR. :	27
ENG. TYPE :	N14+ Cummins	MODEL :	Long Haul Truck
RATING :		FUEL :	Diesel

BASELINE TEST — **DATE : 08/01/09**

TRUCK MILES	1,037,335	ENG. RPM:	1600
AMB. TEMP (C) :	24.2	STACK(mm):	148.5
BAROMETRIC (mb)	1017	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	224	224	224	224	224	224	0.00
EXHST TEMP (C):	149.6	149.8	150	150	149.9	150	0.11
HC (ppm) :	14	14	15	14	14	14.2	3.15
CO (%) :	0.02	0.02	0.02	0.02	0.02	0.020	0.00
CO2 (%) :	2.28	2.30	2.30	2.29	2.30	2.29	0.39
O2 (%) :	10.14	10.12	10.15	10.14	10.16	10.14	0.15
CARB FLOW(g/s):	2.621	2.643	2.643	2.631	2.642	2.636	0.38
REYNOLDS NR. :	6.57E+04						

TREATED TEST — **DATE : 08/29/09**

TRUCK MILES	1,048,662	ENG. RPM:	1600
AMB. TEMP (C) :	23.8	STACK(mm):	148.5
BAROMETRIC(mb):	1016	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	224	224	224	224	224	224	0.00
EXHST TEMP (C):	149.5	149.6	149.7	149.6	149.7	150	0.29
HC (ppm) :	8	10	8	9	8	8.6	10.40
CO (%) :	0.01	0.01	0.01	0.01	0.01	0.010	0.00
CO2 (%) :	2.09	2.08	2.08	2.09	2.09	2.09	0.34
O2 (%) :	10.02	10.04	10.04	10.03	10.05	10.04	0.11
CARB FLOW(g/s):	2.389	2.379	2.377	2.390	2.389	2.385	0.25
REYNOLDS NR. :	6.57E+04	TOTAL HOURS ON TREATED FUEL :				11327	

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : **-9.5 %**

REMARKS:

Appendix III

Raw Data Sheets

Carbon Mass Balance Field Data Form

Company: Damco Transportation **Location:** Idaho Falls, Id. **Date:** 8-1-09

Water Temp: ø **Oil Pres:** ø **Fan Clutch:** off **Smoke No:** 1.26 mg/m³ **Exhaust Diameter:** 123.75 ~~Inches~~ mm

Test Portion: Baseline: X **Treated:** **Engine Make/Model:** 2000 60 Series Detroit **Air Inlet Velocity:** .20

Exhaust Manifold Temp: ø **Miles/Hours:** 343,129 **ID#:** 12 **Fuel Specific Gravity:** .825 @ 30.1°C

Type of Equipment: Freightliner Truck **Exhaust Side:** LeFT **Barometric Pressure:** 1017

RPM: 1400 **Load:** static - AC off - Lights off **Oil Pressure Temp.** ø

Fuel Type	Exhaust Temp °C	P Inches Of H_2O	CO	HC PPM	CO_2	02	Ambient Temp. C.	Instrument Calibration	Observer	Time Begin To Time End
Diesel	121.5	62.25	.03	11	2.10	10.24	22.6	Yes		10:55 A-m
	121.4	62.25	.03	13	2.08	10.20				
	121.6	62.25	.03	13	2.09	10.23				
	121.7	62.25	.03	12	2.08	10.22				
	121.6	62.25	.03	13	2.07	10.24	22.6			11:05 A.m.

Carbon Mass Balance Field Data Form

Company: Denco Transportation **Location:** Idaho Falls, Id. **Date:** 9-19-09

Water Temp: Ø **Oil Pres:** Ø **Fan Clutch:** off **Smoke No:** .84 mg/m^3 **Exhaust Diameter:** 123.75 ~~Inches~~ mm

Test Portion: Baseline: ____ **Treated:** X **Engine Make/Model:** 2000 60 Series Detroit **Air Inlet Velocity:** .70

Exhaust Manifold Temp: Ø **Miles/Hours:** 352,921 **ID#:** 12 **Fuel Specific Gravity:** .826 @ 30.2c

Type of Equipment: Freightliner Truck **Exhaust Side:** Left **Barometric Pressure:** 1015

RPM: 1400 **Load:** static - AC off - Lights off **Oil Pressure Temp.** Ø

Fuel Type	Exhaust Temp °C	P Inches Of H_2O	CO	HC PPM	CO_2	02	Ambient Temp. C.	Instrument Calibration	Observer	Time Begin To Time End
Diesel	121.7	62.25	.02	10	1.93	10.16	22.1	Yes		9:20 A.m.
	121.8	62.25	.03	9	1.94	10.14				
	121.6	62.25	.03	9	1.92	10.12				
	121.7	62.25	.02	10	1.93	10.14				
	121.8	62.25	.02	9	1.92	10.13	22.1			9:30 A.m

Carbon Mass Balance Field Data Form

Company: Danco Transportation **Location:** Idaho Falls, Id. **Date:** 8-01-09

Water Temp: ø **Oil Pres:** ø **Fan Clutch:** off **Smoke No:** 2.91 mg/m³ **Exhaust Diameter:** 148.5 ~~Inches~~ mm

Test Portion: Baseline: X **Treated:** ___ **Engine Make/Model:** 2001 Cummins N14+ **Air Inlet Velocity:** .50

Exhaust Manifold Temp: ø **Miles/Hours:** 1,037,335 **ID#:** 27 **Fuel Specific Gravity:** .835 @ 28.2°c

Type of Equipment: International Truck **Exhaust Side:** Right **Barometric Pressure:** 1017

RPM: 1600 **Load:** static - Lights off - AC off **Oil Pressure Temp.** ø

Fuel Type	Exhaust Temp °C	P Inches Of H_2O	CO	HC PPM	CO_2	02	Ambient Temp. C.	Instrument Calibration	Observer	Time Begin To Time End
Diesel	149.6	224	.02	14	2.28	10.14	24.2	Yes		11:30 A-m.
	149.8	224	.02	14	2.30	10.12				
	150	224	.02	15	2.30	10.15				
	150	224	.02	14	2.29	10.14				
	149.9	224	.02	14	2.30	10.16	24.2			11:40 A-m.

Carbon Mass Balance Field Data Form

Company: Danco Transportation **Location:** Idaho Falls, Id. **Date:** 8-29-07

Water Temp: ∅ **Oil Pres:** ∅ **Fan Clutch:** off **Smoke No:** 1.89 mg/m³ **Exhaust Diameter:** 148.5 ~~Inches~~ mm

Test Portion: Baseline: ___ **Treated:** X **Engine Make/Model:** 2001 Cummins N14+ **Air Inlet Velocity:** .50

Exhaust Manifold Temp: ∅ **Miles/Hours:** 1,048,662 **ID#:** 27 **Fuel Specific Gravity:** .836@28°C

Type of Equipment: International Truck **Exhaust Side:** Right **Barometric Pressure:** 1016

RPM: 1600 **Load:** static - AC off - Lights off **Oil Pressure Temp.** ∅

Fuel Type	Exhaust Temp °C	P Inches Of H_2O	CO	HC PPM	CO_2	02	Ambient Temp. C.	Instrument Calibration	Observer	Time Begin To Time End
Diesel	149.5	224	.01	8	2.09	10.02	23.8	Yes		10:15 A.m.
	149.6	224	.01	10	2.08	10.04				
	149.7	224	.01	8	2.08	10.04				
	149.6	224	.01	9	2.09	10.03				
	149.7	224	.01	8	2.09	10.05	23.8			10:25 A.m.

Appendix IV

Carbon Footprint Data

Calculation of Greenhouse Gas Reductions

Assumptions: **Fleet Average (all locations)**

* Fuel Type = Diesel
*Annual Fuel Usage = 240,000 gallons, or 912,000 litres.
*Average 8.06% reduction in fuel usage with Xtreme Fuel Optimizer 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 (see Workbook attached) 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 Basis	**Fuel Usage litres**	**kg CO_2 per litre fuel**	**Oxidation Factor**	**System CO_2 kg**	**System CO_2 tonnes**
"Baseline"	912,000	2.716	0.99	2,452,222	2,452
"Treated"	832,656	2.716	0.99	2,238,879	2,239
C02 reductions with Xtreme Fuel Optimizer fuel catalyst				**213,343**	**213**

The reduction of C02 greenhouse emissions in the amount of 213 tonnes (235 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 [912,000] x [1kg/1000g] = 164 kg

"Treated" [18.0g/100 litres] x [832,656] x [1kg/1000g] = 150 kg

CH_4 Reduction = 14 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 [912,000] x [1kg/1000g] = 25 kg

"Treated" [2.7g/100 litres] x [832,656] x [1kg/1000g] = 22 kg

N_2O Reduction = 3 kg

Appendix V

Estimated Fuel Savings

Estimated Monthly and Annual Fuel Savings With Catalyst Use

The attached information is included as an estimate only and is utilized to establish the magnitude of cost savings derived through the use of the Xtreme Fuel Optimizer Fuel Catalyst. All numbers are estimates and should not be considered absolute values.

Estimated: CMB

	Carbon Balance Estimate Only!
Monthly Fuel Consumption:	20,000.00 gals. .
Monthly Fuel Costs ($2.35/gal.):	$47,000.00
Improvement in Fuel Efficiency:	.087%
Monthly Gross Fuel Savings:	$4,089.00

Estimated Gross Annual Savings Based On
240,000 Gallons of Diesel Fuel Consumed: **$49,068.00**

Using the fuel savings data produced from the Carbon Balance test procedure, the results show that Danco Transportation could potentially reduce annual fuel consumption costs by a minimum of $49,068.00. Other cost reducing factors that will enhance the use of the Xtreme Fuel Optimizer fuel catalyst include reduced repairs due to carbon related failures; extended oil change intervals as experienced by other Xtreme Fuel Optimizer fuel catalyst customers; reduced fuel system repairs with the additional fuel system lubricant contained in the catalyst; and, increased engine life. These factors and many more are the reason that so many companies are opting to implement Xtreme Fuel Optimizer fuel catalyst as part of their preventive maintenance program.

Other benefits in using Xtreme Fuel Optimizer fuel catalyst are as follows:

Demulsifier: Removes water from fuel.
Biocide: Helps control bacterial growth in fuel.
Polymerization Retardant: Helps prevent the formation of solids in fuel.
Dispersant: Helps to eliminate existing solids in fuel.
Lubricant: Lubricates the fuel system (fuel pump and injectors).
Detergent: Cleans the fuel pump and injectors.
Corrosion Inhibitor: Protects against fuel tank corrosion.
Metal Deactivator: Prevents catalytic oxidation.