Xtreme Fuel Optimizer Fuel Catalyst Evaluation
For
Fuel Efficiency and Emissions Reductions
With
CDS - Unistel
Utilizing
The Carbon Mass Balance Procedure

Final Report
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For:

Xtreme Fuel Optimizer.

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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 vehicle 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 , is a fuel borne catalyst wherein the primary active ingredient is a soluble organo-metallic chemistry that helps to reduce ignition delay by improving combustion chamber mixing through improved molecular dispersion.

The catalysts proprietary organo-metallic compound with the formula $Fe(C_5H_5)_2$. It is the prototypical metallocene, a type of organo-metallic chemical compound consisting of two cyclopentadienyl rings bound on opposite sides of a central soluble metal atom. Such organo-metallic compounds are also known as sandwich compounds. The rapid growth of organo-metallic chemistry is often attributed to the excitement arising from the discovery of the soluble metal crystalline structure and its many analogues.

The proprietary organo-metallic derivative has many niche uses that exploit the unusual structure (ligand scaffolds, pharmaceutical candidates), robustness (anti-knock formulations, precursors to materials), and redox (reagents and redox standards). Such organo-metallic components and its derivatives are antiknock agents used in the fuel for gasoline and diesel engines; they are safer than tetraethyl lead, previously used. The harmless Ferric Oxide deposits formed from the catalysts organo-metallic component can form a conductive coating that assists in catalytic activation of the combustion process.

It was determined that a fuel consumption analysis should be conducted using at least two (2) gasoline fuelled passenger vans utilizing the Carbon Mass Balance test procedure. As such, two (2) 2006 Ford F 450 passenger vans with 460 engines (B603 and B605) were selected for this study. Engines with different 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.

A baseline test (untreated) was conducted on April 8, 2010 using the Carbon Mass Balance Test Procedure. After which, the pre-selected test vehicles were then treated by adding the Xtreme Fuel Optimizer fuel catalyst to the mobile gasoline tanks via the use of pre-measured sixteen (16) ounce catalyst filled bottles. On June 3, 2010, 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 the test vehicle evaluated was 7.2% during steady state testing, using the Carbon Mass Balance test procedure.

The treated engine also demonstrated a large percentage reduction in soot particulates, in the range 10% 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 vehicles April 8, 2010 employing the Carbon Mass Balance (CMB) test procedure. Xtreme Fuel Optimizer supplied sufficient fuel catalyst to correctly treat the mobile fuel tank, on each vehicle, used for the purpose of this evaluation. The vehicle operations group was then instructed as to the proper method for catalyst treatment and were allotted the fuel catalyst based on fuel usage. The test vehicles were then operated on Xtreme Fuel Optimizer catalyst treated fuel for at least 4,000 miles of engine operation. At the end of the engine-conditioning period (June 3, 2010), the engine tests were repeated, reproducing all engine parameters. The final results, along with the data sheets, are contained within this report. As important, the fuel tank was filled with gasoline before each segment of the CMB evaluation to minimize heat related energy changes in fuel.

Note: Due to mechanical repairs and multiple drivers, passenger van B605 was not considered an acceptable candidate for final (treated) testing in this evaluation. As such, data was not collected on this truck for the treated segment wherein it has been eliminated from this test procedure.

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 vehicle 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.

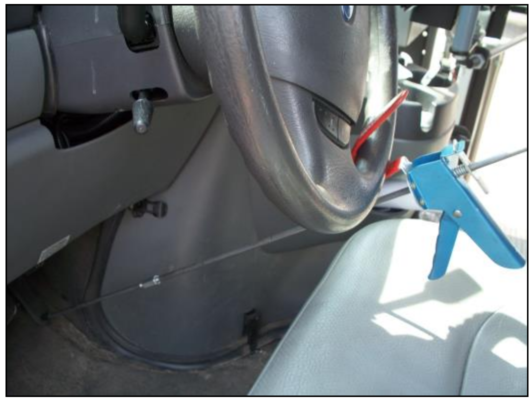
The Carbon Mass Balance test procedure follows a prescribed regimen, wherein every possible detail of engine operation is monitored to insure the accuracy of the test procedure. Cursory to performing the test, it is imperative to understand the quality of fuel utilized in the evaluation. As important, 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 .700 to .810 Precision Hydrometer, columnar flask and Raytek Minitemp were utilized to determine the fuel density for each prescribed segment of the evaluation.

Next, and essential to the Carbon Balance procedure, are test vehicles that are mechanically sound and free from defect. Careful consideration and vehicle screening is utilized to verify the mechanical stability of each vehicle prior to testing. Preliminary data is scrutinized to disqualify any vehicle that may be mechanically suspect. When the vehicle 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 vehicle; pertinent engine criteria needs to be evaluated as the Carbon Mass Balance test proceeds.

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 after-market 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 2000 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.

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 test vehicle 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.

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 identifies 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.

As important, air inlet velocities are monitored to insure that engine inlet air restriction does not influence the data being accumulated by creating an artificial lean or enrichened operating parameter.

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 exact, as long as the criteria leading up to the accumulation of data is exact. 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 previous 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 the analyzer is then computed and a comparison is calculated for the baseline and treated segments of the test process. This data is then compared to the carbon contained within the raw fuel for each segment of the evaluation. 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.

Essential to performing the aforementioned test procedure is the method in which the task for dosing the gasoline is performed. It is critical to the success of the Carbon Mass Balance procedure to insure that the vehicles 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 provided by 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, are provided in the following tables and appendices. **See Table I, and Individual Carbon Mass Balance results, in Appendix II.**

Table I: provides the average final results for the test vehicle before and after Xtreme Fuel Optimizer fuel catalyst treatment **(see Graph II, Appendix I)**.

TABLE I

Test Segment Change	Miles	Fuel
B603		
Treated	5,085	**- 7.2%**
B603		
Treated/AC On	5,085	**- 0.3%**
Average (Absolute)		**- 3.75%**

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.

Table II

Fuel Type Gasoline **Density** .746/85 Octane	**Soot Particulates**
B603	
Untreated	.01 mg/m^3
Treated	.009 mg/m^3
	- 10%
Average	**- 10%**

The reduction in soot particulate density (the mass of the smoke particles) was reduced by an average 10% after fuel treatment and engine conditioning with Xtreme Fuel Optimizer fuel catalyst **(See Graph 1, Appendix I).** Concentration levels were provided by Bacharach.

Fuel Consumption Study

Concurrently with the CMB evaluation, a fuel consumption study was performed to further substantiate the results provided by the Carbon Mass Balance test procedure. The fuel consumption data was compiled and computed through the use of in-house fuels records collected and maintained by CDS personnel. The following data was provided by CDS and identifies the average fuel consumption for unit number B603 for a “baseline” period, just prior to testing, as well as the “treated” period which occurred as part of the process during the entirety of the evaluation.

4-5-10 to 4-9-10		B603		
		miles	Fuel gals.	
		161	28	
		160	0	
		135	31	
		136	0	
		137	34	
	total	**729**	**93**	**7.84 mpg**

Treatment started on 4-13-10
1 oz. of Syntek put in both vehicles
B603 start miles = 113,404 B605 start miles = 142,894

5-17-10 to 5-21-10		B603		
3,358 miles		miles	Fuel gals.	
		163	20	
		161	19	
		136	16	
		137	18	
		139	17	
	total	**736**	**90**	**8.18 mpg**

5-24-10 to 5-28-10		B603		
4,112 miles		miles	Fuel gals.	
		164	21	
		169	22	
		144	21	
		140	20	
		137	17	
	total	**754**	**101**	**7.47 mpg**

The data clearly identifies a “baseline” fuel consumption average of 7.84 mpg. Within 30 days, or near the fuel catalysts recommended minimum use requirement, fuel consumption improved to 8.18 mpg; a 4.34% reduction in fuel usage. CDS management identified a change during the “treated” segment of the evaluation in operational parameters beginning 5-24-2010 wherein the dual air conditioning units on the test vehicle were in use the preponderance of time. As such, fuel consumption then increased by 8.7%. This increase is documented by a load test, performed on this same unit, utilizing the Carbon Mass Balance test procedure. Likewise, the Carbon Mass Balance procedure documented a 7% increase in fuel usage with both air conditioning units in operation **(see Table I, Appendix II, sheet II and Appendix III, sheet III).**

To determine the absolute affects of the dual air conditioning units on fuel consumption, a Carbon Mass Balance evaluation was performed on test unit B603 with the air conditioning off and again with both air conditioning units in operation. The results of the evaluation are included in **Table I, Appendix II, Sheet II, Carbon Mass Balance Compilation Sheets and Appendix III, Sheet III, Raw Data Sheets.** It is further discussed in the **Conclusion** section of this document.

Conclusion

These carefully controlled engineering standard test procedures conducted on this test vehicle provide clear evidence of reduced fuel consumption in the range of 7.2%. In general, improvements utilizing the Carbon Mass Balance test, under static test conditions, generate results 2% - 3% (percentage points) less than those results generated with an applied load.

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 10% **(see Appendix I, Graph I)**. The similar reduction in other harmful carbon emissions likewise substantiates the improved combustion created by the use of Xtreme Fuel Optimizer fuel combustion catalyst **(see Raw Data Sheets, Appendix III)**.

The in-house fuel consumption study included under the heading **Fuel Consumption Study**, previously discussed in this report, identifies a reduction in fuel consumption for the week of 5-17 to 5-21-2010. However, the average fuel consumption once again increased during the week of 5-24 to 5-28-2010 by 8.7%. A Carbon Mass Balance study was performed on the test vehicle to compare fuel consumption for a comparative static load and then again, with both air conditioning units in operation. The CMB study identified a 7.2% catalyst fuel reduction with the air conditioning units inoperable. The CMB study further documents a .3% reduction in fuel usage with catalyst treated fuel and the air conditioning units in operation.

In summary, the data provided for the catalyst treated fuel with the air conditioning units in operation is similar to the untreated segment of the evaluation with the air conditioning units inoperable. There is little difference between baseline mpg and catalyst treated mpg with both air conditioning units in operation. The CMB evaluation and the data collected substantiates the fact that the reduction in fuel economy as identified during the week of 5-24 to 5-28-2010 is in large part due to the affects of implementing the use of the air conditioning units.

Another point of consideration is the heat energy affect of the fuel utilized for both segments of the evaluation. The baseline segment fuel was a .750 specific gravity fuel wherein the treated segment of the evaluation identified a .754 specific gravity. Fuel temperature at the time of the specific gravity evaluation was within .2 degrees when comparing both segments of the evaluation. The specific gravity of the baseline fuel denotes a higher level of ethanol, methanol, or some other type of aromatic octane improver. The differential in the two specific gravity fuels is .05% which goes directly to fuel used. In this case, the baseline fuel was advantaged by the type of fuel consumed. Although difficult to calculate, this type of fuel differential can equate to as much as a 2% to 3% fuel consumption advantage for the baseline segment of this evaluation.

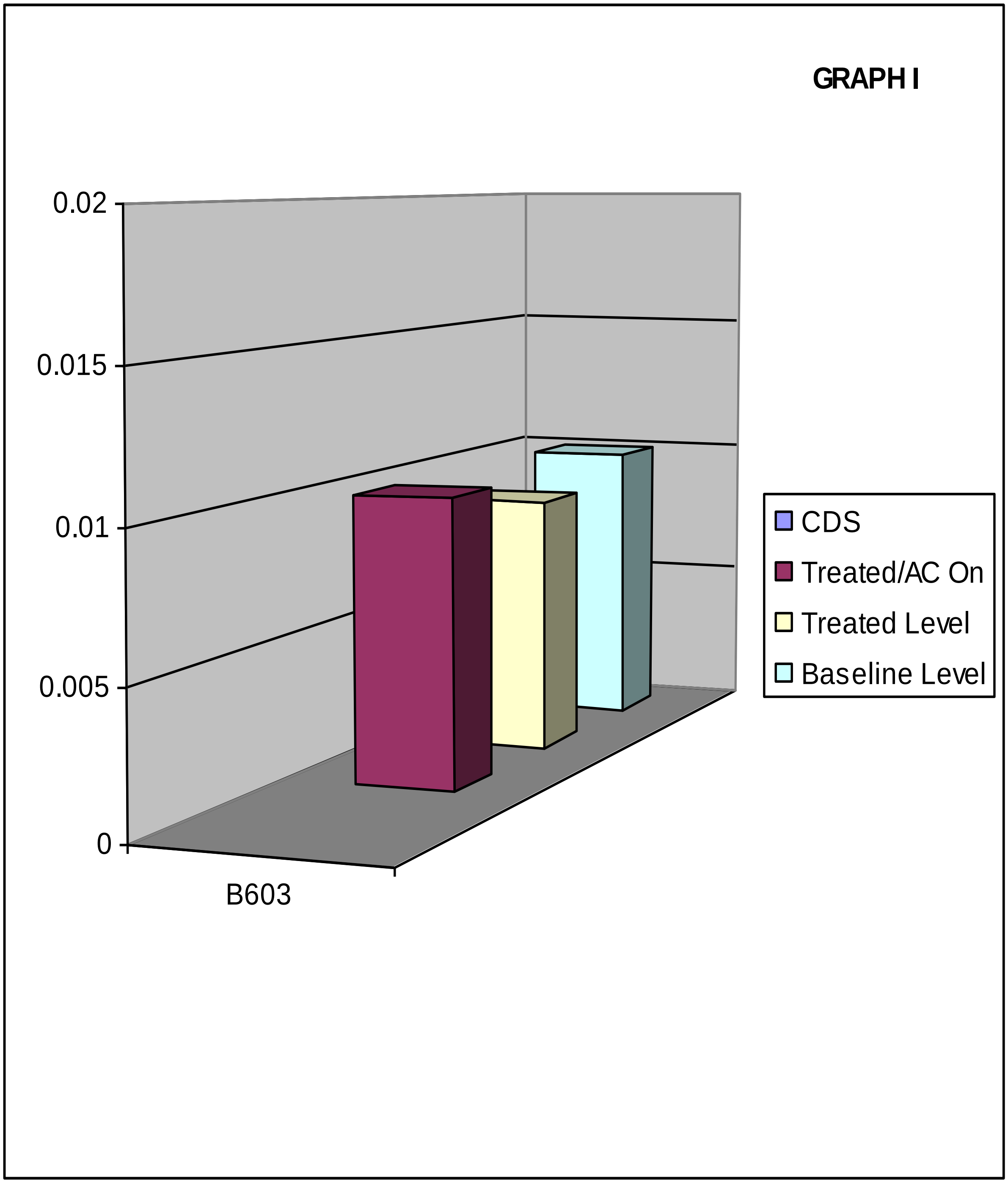
In addition to the fuel consumption analysis, a detailed compilation of carbon emissions reductions were determined. The study documented a significant

reduction in annual C02 emissions of 184 metric tonnes. Reductions in Nitrogen and Methane levels were also observed **(see Appendix IV, Carbon Footprint Data)**

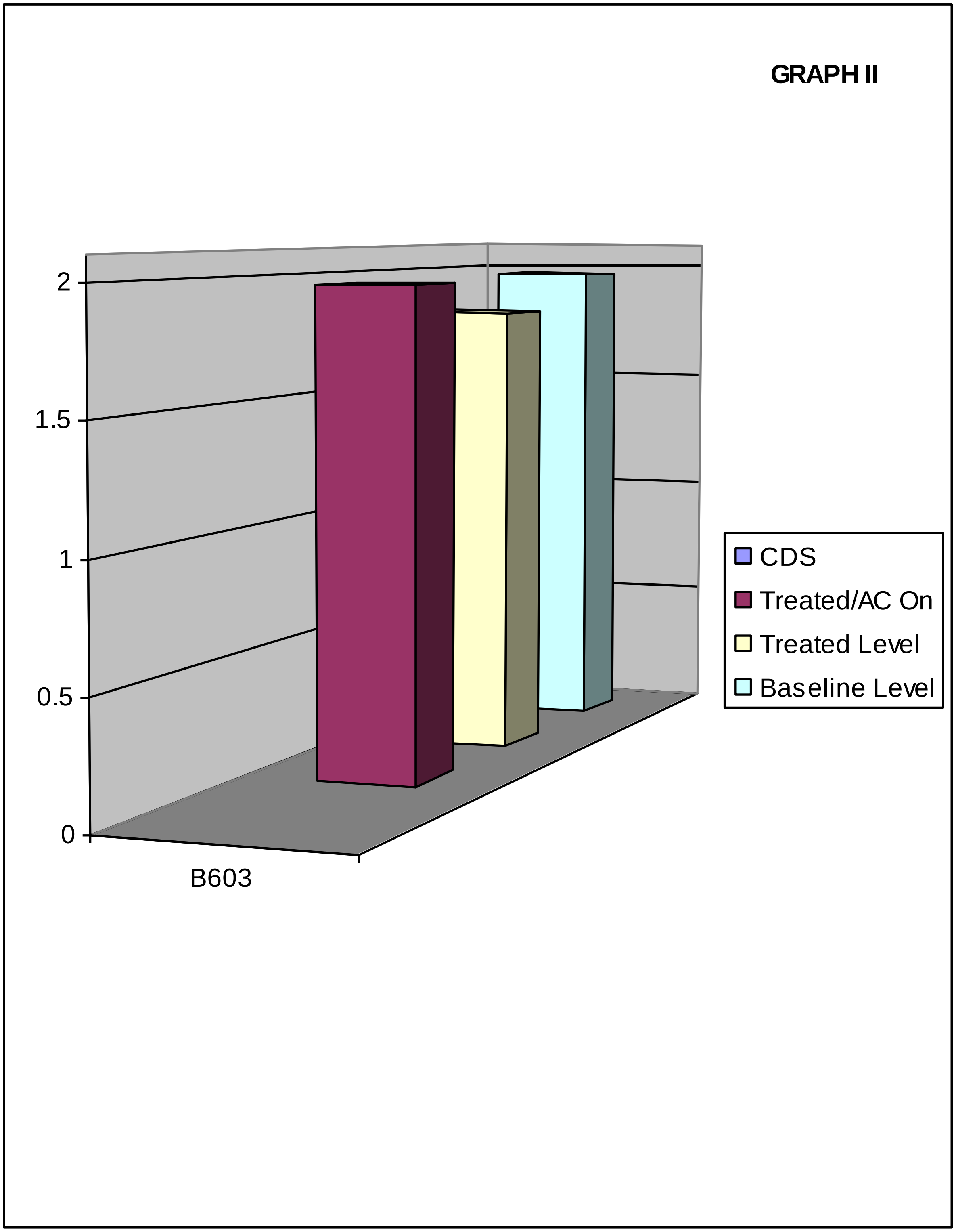
Additional to the fuel economy benefits measured and a reduction in soot particulates, product claims suggest that over time, a significant reduction in engine maintenance costs will be realized following treatment with Xtreme Fuel Optimizer. These savings are achieved through lower soot levels in the 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: mg/m^3



Fuel Consumption Graph

Appendix II

Carbon Mass Balance Compilation Sheets

				CARBON BALANCE RESULTS			
COMPANY :	CDS			LOCATION :	Rochester, New York		
EQUIPMENT :	Ford Van			UNIT NR. :	B603		
ENG. TYPE :	460 c.i.			TYPE:	Passenger-multiple		
RATING :	F 450			FUEL :	Gasoline		
BASELINE TEST				**DATE :**	**4/8/2010**		
ENG. MILES	112,881			Engine Load	Static		
AMB. TEMP (C) :	24.9			STACK(mm):	74.25		
BAROMETRIC(mb):	1006			LOAD:	Idle /AC off		
AVE. LOAD:	Static						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	49.8	49.8	49.8	49.8	49.8	49.80	0.00
EXHST TEMP (C):	225.6	225.7	225.9	225.8	225.9	226	0.06
HC (ppm) :	6	6	6	6	6	6.0	0.00
CO (%) :	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.00000
CO2 (%) :	16.22	16.20	16.20	16.22	16.24	16.22	0.10
O2 (%) :	8.80	8.72	8.80	8.76	8.80	8.78	0.41
CARB FLOW(g/s):	1.970	1.968	1.967	1.970	1.972	1.970	0.10
REYNOLDS NR. :	2.84E+04						
TREATED TEST				**DATE :**	**6/3/2010**		
ENG. MILES	117,966			Engine Load	Static		
AMB. TEMP (C) :	26.4			STACK(mm):	74.25		
BAROMETRIC(mb):	1009			LOAD:	Idle/AC off		
AVE. LOAD:	Static						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	49.3	49.3	49.3	49.3	49.3	0.01	551078.95
EXHST TEMP (C):	224.6	224.7	224.7	224.8	224.6	225	0.04
HC (ppm) :	4	4	5	4	4	4.2	10.65
CO (%) :	0.01000	0.01000	0.00000	0.01000	0.00000	0.00600	91.287
CO2 (%) :	15.09	15.10	15.08	15.09	15.07	15.09	0.08
O2 (%) :	8.91	8.83	8.92	8.91	8.94	8.90	0.47
CARB FLOW(g/s):	1.830	1.831	1.827	1.829	1.826	1.829	0.11
REYNOLDS NR. :	4.03E+02		TOTAL HOURS ON TREATED FUEL :			5085	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-7.2**	**%**

				CARBON BALANCE RESULTS			
COMPANY :	CDS			LOCATION :	Rochester, New York		
EQUIPMENT :	Ford Van			UNIT NR. :	B603		
ENG. TYPE :	460 c.i.			TYPE:	Passenger-multiple		
RATING :	F 450			FUEL :	Gasoline		
BASELINE TEST				**DATE :**	**4/8/2010**		
ENG. MILES	112,881			Engine Load	Static		
AMB. TEMP (C) :	24.9			STACK(mm):	74.25		
BAROMETRIC(mb):	1006			LOAD:	Idle /AC off		
AVE. LOAD:	Static						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	49.8	49.8	49.8	49.8	49.8	49.80	0.00
EXHST TEMP (C):	225.1	225.2	225.4	225.6	225.7	225	0.11
HC (ppm) :	6	6	6	6	6	6.0	0.00
CO (%) :	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.00000
CO2 (%) :	16.22	16.20	16.20	16.22	16.24	16.22	0.10
O2 (%) :	8.80	8.72	8.80	8.76	8.80	8.78	0.41
CARB FLOW(g/s):	1.971	1.969	1.968	1.970	1.973	1.970	0.09
REYNOLDS NR. :	2.84E+04						
TREATED TEST				**DATE :**	**6/3/2010**		
ENG. MILES	117,966			Engine Load	Static		
AMB. TEMP (C) :	26.6			STACK(mm):	74.25		
BAROMETRIC(mb):	1008			LOAD:	Idle/AC On		
AVE. LOAD:	Static						
	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	49.7	49.7	49.7	49.7	49.7	49.70	0.00
EXHST TEMP (C):	226.8	226.9	227	227	227.2	227	0.07
HC (ppm) :	6	6	7	6	7	6.4	8.56
CO (%) :	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.000
CO2 (%) :	16.19	16.20	16.18	16.17	16.19	16.19	0.07
O2 (%) :	8.76	8.78	8.77	8.76	8.79	8.77	0.15
CARB FLOW(g/s):	1.964	1.965	1.963	1.962	1.964	1.964	0.07
REYNOLDS NR. :	2.83E+04		TOTAL HOURS ON TREATED FUEL :			5085	
PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) :						**-0.3**	%

Appendix III

Raw Data Sheets

Carbon Mass Balance Field Data Form

Company: CDS **Location:** Rochester, NY **Date:** 4-8-10

Water Temp: Ø **Oil Pres:** Ø **Fan Clutch:** ON **Smoke No:** .01 mg/m3 **Exhaust Diameter:** 74.25 ~~Inches~~ mm

Test Portion: Baseline: X **Treated:** ____ **Engine Make/Model:** 2006 Ford 460 **Air Inlet Velocity:** .20

Exhaust Manifold Temp: Ø **Miles/Hours:** 112,881 **ID#:** B603 **Fuel Specific Gravity:** .746@17.2°C

Type of Equipment: F450 Passenger Van **Exhaust Side:** only **Barometric Pressure:** 1006

RPM: 2000 **Load:** static - AC/Heater 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
Gasoline	225.6	49.8	.01	6	16.22	8.80	24.9	Yes		12:42 p.m.
	225.7	49.8	.01	6	16.20	8.72				
	225.9	49.8	.01	6	16.20	8.80				
	225.8	49.8	.01	6	16.22	8.76				
	225.9	49.8	.01	6	16.24	8.80	24.9			12:52 p.m.

Carbon Mass Balance Field Data Form

Company: CDS Location: Rochester, NY Date: 6-3-10

Water Temp: Ø Oil Pres: Ø Fan Clutch: on Smoke No: .009 mg/m3 Exhaust Diameter: 74.25 ~~Inches~~ mm

Test Portion: Baseline: ____ Treated: X Engine Make/Model: 2006 Ford 460 Air Inlet Velocity: .20

Exhaust Manifold Temp: Ø Miles/Hours: 117,966 ID#: 3603 Fuel Specific Gravity: .750 @ 17.0 C

Type of Equipment: F450 Passenger Van Exhaust Side: only Barometric Pressure: 1009

RPM: 2000 Load: static - AC/Heater 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
Gasoline	224.6	49.3	.01	4	15.09	8.91	26.4	Yes		4:42 p.m.
	224.7	49.3	.01	4	15.10	8.83				
	224.7	49.3	.00	5	15.08	8.92				
	224.8	49.3	.01	4	15.09	8.91				
	224.6	49.3	.00	4	15.07	8.94	26.4			4:52 p.m.

Carbon Mass Balance Field Data Form

Company: CDS Location: Rochester, NY Date: 6-3-10

Water Temp: ø Oil Pres: ø Fan Clutch: on Smoke No: .01mg/m³ Exhaust Diameter: 74-25 ~~Inches~~ mm

Test Portion: Baseline: ___ Treated: X Engine Make/Model: 2006 Ford 4.6D Air Inlet Velocity: .20

Exhaust Manifold Temp: ø (Miles)/Hours: 117,966 ID#: B603 Fuel Specific Gravity: .752@17.°C

Type of Equipment: F450 Passenger Van Exhaust Side: Only Barometric Pressure: 1008

RPM: 2000 Load: Stock AC on - Heater off - Lights on 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
Gasoline	226.8	49.7	.01	6	16.19	8.76	26.6	Yes		5:05 p.m.
	226.9	49.7	.01	6	16.20	8.78				
	227	49.7	.01	7	16.18	8.77				
	227	49.7	.01	6	16.17	8.76				
	227.2	49.7	.01	7	16.19	8.79	26.6			5:15 p.m.

Raw Data Sheet; CMB Evaluation with Both Air Conditioning Units in Operation

Appendix IV

Carbon Footprint Data

All calculations are estimates only and are not based on actual fuel consumption:

Calculation of Greenhouse Gas Reductions

Assumptions: **Fleet Average (Estimate)**

* Fuel Type =
Gasoline
*Annual Fuel Usage = 250,000 gallons, or 950,000 litres.
*Average 7.2% 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"	950,000	2.716	0.99	2,554,398	2,554
"Treated"	881,600	2.716	0.99	2,370,481	2,370
C02 reductions with Xtreme Fuel Optimizer fuel catalyst				**183,917**	**184**

The reduction of C02 greenhouse emissions in the amount of 184 tonnes (203 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 [950,000] x [1kg/1000g] = 171 kg

"Treated" [18.0g/100 litres] x [881,600] x [1kg/1000g] = 159 kg

CH_4 Reduction = 12 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 [950,000] x [1kg/1000g] = 25.65 kg

"Treated" [2.7g/100 litres] x [881,600] x [1kg/1000g] = 23.80 kg

N_2O Reduction = 1.85 kg