Fuel Factor X Catalyst Evaluation
For
Fuel Efficiency and Emissions Reductions
With
Doug Andrus Trucking
Utilizing
The Carbon Mass Balance Test Procedure

Final Report
November 2009

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For

MyDailyChoice

C O N T E N T S

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 Fuel Factor Xcatalyst manufactured and marketed by MyDailyChoice has proven in laboratory and field-testing to reduce fuel consumption in the range 3% to 10% under comparable load conditions. It has also proven to significantly reduce carbon emissions.

Following discussions with Adam Cleverly and Clay Murdock, Maintenance Manager, Doug Andrus Trucking, it was determined that a fuel consumption analysis should be conducted utilizing at least four (4) late model over-the-road tractors (1664, 1822, 1856, 2040). The designated equipment for this study includes three (3) 2007 Freightliner Columbia trucks, and one (1) 2009 Peterbilt truck. The three (3) 2007 Freightliner Columbia trucks were equipped with MBE 4000 Mercedes engines, while the 2009 Peterbilt was equipped with a C 13 Caterpillar engine with a Diesel Particulate Filter (DPF). Engines with differing mileage accumulations were evaluated in an attempt to determine the affects of the Fuel Factor X catalyst on engines with varying use and horsepower.

An integral part of this evaluation is determining the catalyst's effect on new engine technology. The new 2009 Peterbilt was specifically of interest for testing as a result of the new emissions technology, which is required for compliance by all diesel engine manufacturers to achieve the impending 2010 diesel emissions standards. Most notably, the new technology consists of a Diesel Particulate Filter (DPF) and regeneration catalyst. Of interest is the ability of the active ingredient, in the Syntek catalyst, to reduce exhaust soot levels while at the same time reducing active and passive regeneration temperatures (See Dept. of Interior, Dept. of Mines Paper no. RI 9438, SAE paper no. 900154, Southwest Research paper Diesel Engine Emissions Control Technologies, appendix B, NIOSH paper no. 9462).

Further and included in this evaluation is a detailed analysis of captured data relative to driving fuel consumption profiles for each truck. The data was extracted from the computerized engine control unit (ECU) located on each truck. The purpose for this evaluation is to determine relative fuel consumption based on actual driving time and accumulated mileage. Because each truck fuels at random fuel sites, country wide, calculations for fuel density changes were performed and are incumbent on actual specific gravity readings accumulated and recorded at the time of the baseline and treated segments of this evaluation. It should be noted that all fuel producers begin reformulating fuels, as part of a two step process, beginning in September, and finally in October of each year. Proprietary fuel changes are part of a process to improve pour point, which inherently reduces the energy of the fuel (BTU). In general, average fuel consumption increases, while engine power decreases. Since cross sectional exhaust flows, temperatures, and velocities could not be monitored, balancing calculations were utilized as a means to correct for fuel energy loss based on fuel

specific gravity, at the time of each mass emissions evaluation. The results are included in the ***Electronic Control Unit Fuel Consumption Analysis*** section of this report.

It was determined that several engines be evaluated, ranging from relatively new, to those with higher miles. A baseline test was conducted after which the equipment was treated by pouring the Fuel Factor X catalyst into the rolling diesel fuel tanks for each test unit. Treatment was facilitated through the use of sixteen (16) ounce containers of Fuel Factor X 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. Note: catalyst usage was monitored at the end of the treated segment of the evaluation to insure that a proper treatment ratio was properly maintained.

Doug Andrus Trucking is a long haul, contract carrier, with operations extending throughout the United States and into Canada. At the present time, they utilize approximately 275 trucks, from various manufacturers, equipped with a variety of engine types and packages. The existing operational paradigm includes a variety of contract work, which includes a large scale refer presence, as well as a flat bed heavy hauling division.

A baseline test (untreated) was conducted on September 19, 2009 using the Carbon Mass Balance Test Procedure, after which the pre-selected test equipment was treated by adding the Fuel Factor X catalyst to the diesel fuel contained in each individual trucks rolling tank at a treatment ratio of 1:10,000. On October 3, 2009, the test was then repeated following the same parameters. The results are contained within the body of this report.

The data showed that the average improvement in fuel consumption, for all trucks tested, was 7.025%**,** during steady state testing, using the Carbon Mass Balance test procedure. Further, data extracted from the on board computer

(ECU) for each truck evaluated documented an operational shift, which in fact increased fuel consumption during the catalyst treated segment of the evaluation. Further details will be discussed in the body of this report.

The treated engines also demonstrated a large percentage reduction in soot particulates, in the range 28%, 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 all four (4) pieces of equipment on September 19, 2009, employing the Carbon Mass Balance (CMB) test procedure. My Daily Choice supplied four (4) 16 ounce bottles of Fuel Factor X catalyst utilized to dose/treat the fuel tank on each individual test unit, by each individual driver at a treatment ratio of 1:10,000. The 16 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 Fuel Factor X catalyst treated fuel for up to 6,000 miles in order to achieve the recommended conditioning period, which is documented in many laboratories 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 Fuel Factor X combustion catalyst.

At the end of the treated engine conditioning period (October 3, 2009), 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.

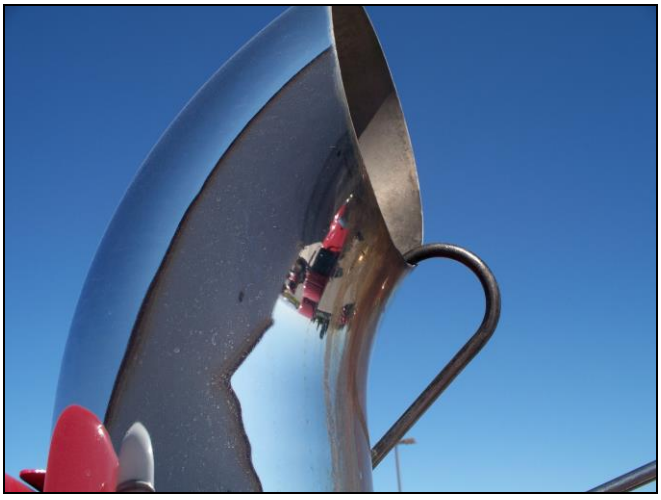
Once engine fluid levels have reached normal operating conditions the Carbon Balance study may begin. The above photograph shows that the engine RPM is locked in place at 1500 RPM. It should be noted that any deviation in RPM, temperature, either fluid or exhaust, would cause this unit to be eliminated 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 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 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.



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 accurately measured, as long as the criteria leading up to the accumulation of data is processed carefully. 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 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 compares the carbon matrix data collected during the untreated segment of the evaluation with the carbon matrix data collected during the treated segment of the CMB test. This data 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 all four (4) pieces of equipment, included in the evaluation, before and after Fuel Factor X catalyst treatment **(see graph III, Appendix I)**.

TABLE I

Test Segment	Miles	Fuel Change by %
1664 Treated	4,430	**- 7.3%**
1822 Treated	3,653	**- 6.8%**
1856 Treated	5,762	**- 7.1%**
2040 Treated	6,210	**- 6.9%**
Average (Absolute)		**- 7.025%**

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, Fuel Factor X 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	Soot Particulates
1664	
Untreated	2.96 mg/m^3
Treated	2.15 mg/m^3
	- 27%
1822	
Untreated	2.96 mg/m^3
Treated	2.25 mg/m^3
	- 24%
1856	
Untreated	4.41 mg/m^3
Treated	3.10 mg/m^3
	- 30%
2040	
Untreated	.10 mg/m^3
Treated	.07 mg/m^3
	- 30%
Average	**- 28%**

The reduction in soot particulate density (the mass of the smoke particles) was reduced by an average 28% after fuel treatment and engine conditioning with Fuel Factor X catalyst **(See Graph 1 and II, Appendix I).** Concentration levels were provided by Bacharach.

Electronic Control Unit Fuel Consumption Analysis

In conjunction with the CMB evaluation, a parallel analysis was performed utilizing the accumulated data extracted from the Electronic Control Unit located on each truck. Pertinent data specific to documenting consistent truck operations and its relationship to fuel consumption was extracted and is included in this section **(see Appendix IV)**. Prior to data consideration it is necessary to determine the actual energy content of the fuel as it pertains to each individual truck. The following table will identify fuel density by test segment (baseline or treated) and total energy loss:

Truck Number	Fuel Density (Baseline)	Fuel Density (Treated)	Energy Loss
1664	.841 @ 29.1 c.	.819 @ 28.9 c.	2.6%
1822	.844 @ 28.8 c.	.821 @ 28.6 c.	2.7%
1856	.842 @ 27.7 c.	.819 @ 27.5 c.	2.7%
2040	.845 @ 28.4 c.	.820 @ 28.1 c.	3.0%

Fuel economy also manifested an interesting trend in that all equipment included in the evaluation demonstrated an increase in fuel consumption during the treated segment of the evaluation. See the following table:

Truck Number	MPG Baseline	MPG Treated	Percent Change
1664	6.88	6.51	+ 5.3%
1822	6.63	6.08	+ 8.3%
1856	6.39	5.96	+ 6.7%
2040	7.37	7.13	+ 3.3%

Of interest in this data is the fact that fuel consumption increased in all three of the Mercedes powered trucks beyond the potential change in energy due to the reduction in fuel density (BTU). The only truck that truly reflects any observable change in fuel density (carbon chains) is the Caterpillar powered truck (2040). The data suggests that more than just a change in fuel density occurred during the course of the evaluation. Problematic to over-the-road fuel consumption evaluations is the ability to monitor load, wind direction, speed, environmental conditions, tire pressure, fuel changes, idle time, terrain, driver habits, factory deficiencies in data accumulation in the ECU (+ or – 5%), etc. For this reason, the EPA and SAE teamed together to develop an over-the-road test specifically designed to counteract the anomalies encountered when performing an over-the-road fuel consumption test. The J1321 test procedure monitors carefully the aforementioned criteria by performing an evaluation on a closed circuit track. Of importance to the test is not only the conditions already mentioned in this section, but a more critical component known as “time”. All factions of the test are held to a minimum deviation (as little as + or - 1%) for all the variables previously mentioned, including time. The deviation for time is based on three (3) baseline circuits of the track wherein the average baseline circuit must fall within a time requirement of + or – 3%. The most important factor realized from the J1321 test procedure is environmental and physical equipment controls; something that is unachievable in typical over-the-road operations.

In solution, there is almost more water contained in the diesel fuel than the active ingredient contained in the Fuel Factor X catalyst. The fuel catalyst has been thoroughly tested by independent laboratories using ASTM test procedures documenting with certainty that the active ingredient in the catalyst acts as a cetane enhancer and does not diminish potential fuel energy (BTU). As such, it is impossible for the catalyst to diminish fuel consumption as is readily observed in the data.

To best ascertain what might be the criteria behind the sudden fuel reduction the data must be sufficiently analysed to determine the consequential or inconsequential factors behind the accumulated information. A quick review of the exhibited idle time for each individual truck provides an interesting insight. Please review the following table:

Truck Number	Idle % Baseline	Idle % Treated	Percent Difference
1664	31.95	18.15	- 43%
1822	38.27	20.10	- 47%
1856	11.14	10.32	- 7%
2040	31	22	- 29%

As observed, general idle time decreased, by percent, an average of 31.5% during the treated segment of the evaluation. Seasonal idle time is generally inconsequential, or

less than 5%, when comparing transient heat and transient cool cycles. A substantial change in idle time reflects something other than transient thermal cycles. To substantiate the aforementioned data, please review the following table:

Truck Number	Driving % Baseline	Driving % Treated	Percent Difference
1664	68.5	81.85	+ 19%
1822	61.73	79.90	+ 29%
1856	88.86	89.68	+ 1%
2040	69.5	78.5	+ 11%*

*** Calculated from "Time" and "Driving Time"**

This table documents the fact that driving time increased by an average of 15%. "Time" is predominately the single most significant indicator in fuel consumption error. Fuel consumption will always decrease as time increases to perform the same unit of work. This is substantiated by the fact that average driving speeds are inconsequential (<.0004% difference) with load varying < .005% (turbo boost). As illustrated by the aforementioned tables, idle time decreased while driving time increased during the treated segment of the evaluation. Of even more importance is the ability to report mileage. As represented by the truck manufacturer, the truck odometer and the ECU mileage indicator or not exact**. In many cases the mileage differs between the odometer and ECU as much as 3% as required by law**. Depending on the truck representative contacted, it is unclear as to which method for mileage collection is the most accurate.

Another factor that can dramatically affect fuel consumption is PTO time. This is the amount of time that the truck runs at fast idle. This form of operation actually affects fuel consumption and is totalized in the driving fuel consumption data included in the DDEC and CET data sheets **(Appendix IV)**. In general, overall data supplied by the DDEC and CET is over 30 pages of vehicle historical information. As such, the determinations of this report are based on a cover sheet and information provided by the manufacturer. In the case of the trucks included in this evaluation, PTO time increased from .305% baseline to .382% catalyst treated. Again, this data is accumulated and totalized into the driving fuel consumption data for each truck. The data documents an increase in PTO time of 25% during the treated segment of the evaluation, a dramatic increase in PTO time with an incalculable affect on overall fuel consumption.

Other factors such as time in top gear (25% overdrive), although nominal in nature, affect the data collection process and overall reliability of the data collected. As indicated in the data, top gear usage averaged 81.88% baseline when compared to 80.82% catalyst treated; a .013% decline in overdrive use during the treated segment of the evaluation; again, incalculable in nature.

The data tabulated for top gear-1, again, identifies a slight change in operational parameters. The data indicates that the average truck time in top gear-1 is 7.29% baseline and 7.76% catalyst treated. Again, the data would appear nominal in nature but actually represents a 6.4% increase in top gear-1 during the treated segment of the evaluation.

The ECU data overwhelmingly provides documentation that there was indeed a trend change in operation during the treated segment of the evaluation. As such, it would be

difficult to express the detrimental affect of each and every deviation in data in a concise fuel consumption number. However, based upon the data overview presented in this section, it would be significant. The data presented and accumulated by the ECU, in each truck, does not provide enough repeatable data to indicate any trend other than an increased trend in usage, which should have shown a reduction in fuel consumption.

Conclusion

These carefully controlled engineering standard test procedures conducted on all four pieces of test equipment; provide clear evidence of reduced fuel consumption in the range of 7.025%**.** 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.

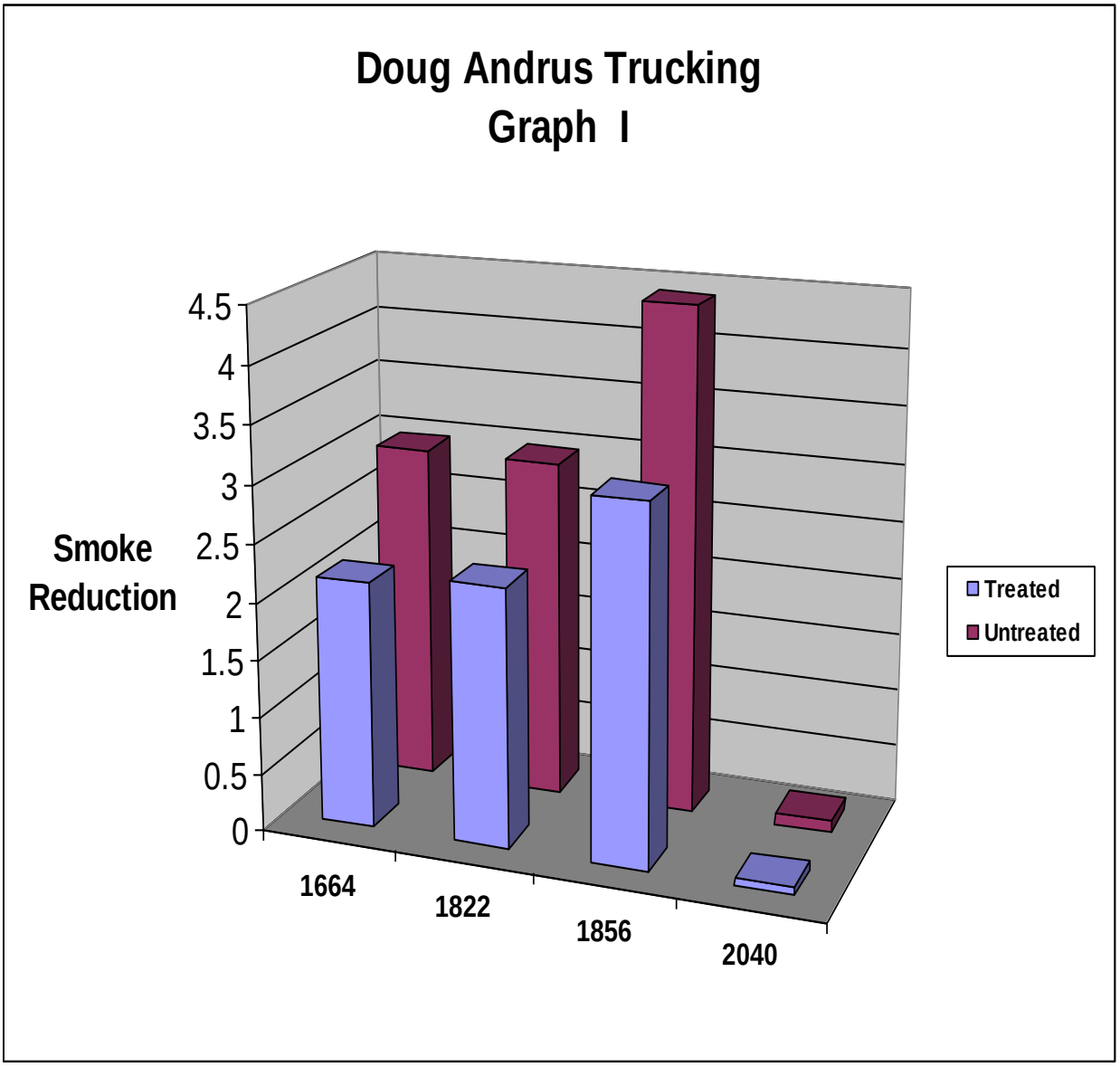
Fuel Factor X catalyst's effect on improved combustion is also evidenced by the substantial reduction in soot particulates (smoke) in the range of 28% **(see Appendix I)**. Reductions in soot and solid particulates, improves the efficiency of the diesel particulate filter (DPF) and regeneration unit. The similar reduction in other harmful carbon emissions likewise substantiates the improved combustion created by the use of Fuel Factor X 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 3,433 metric tonnes. Reductions in Nitrogen and Methane levels were also observed **(Appendix V)**.

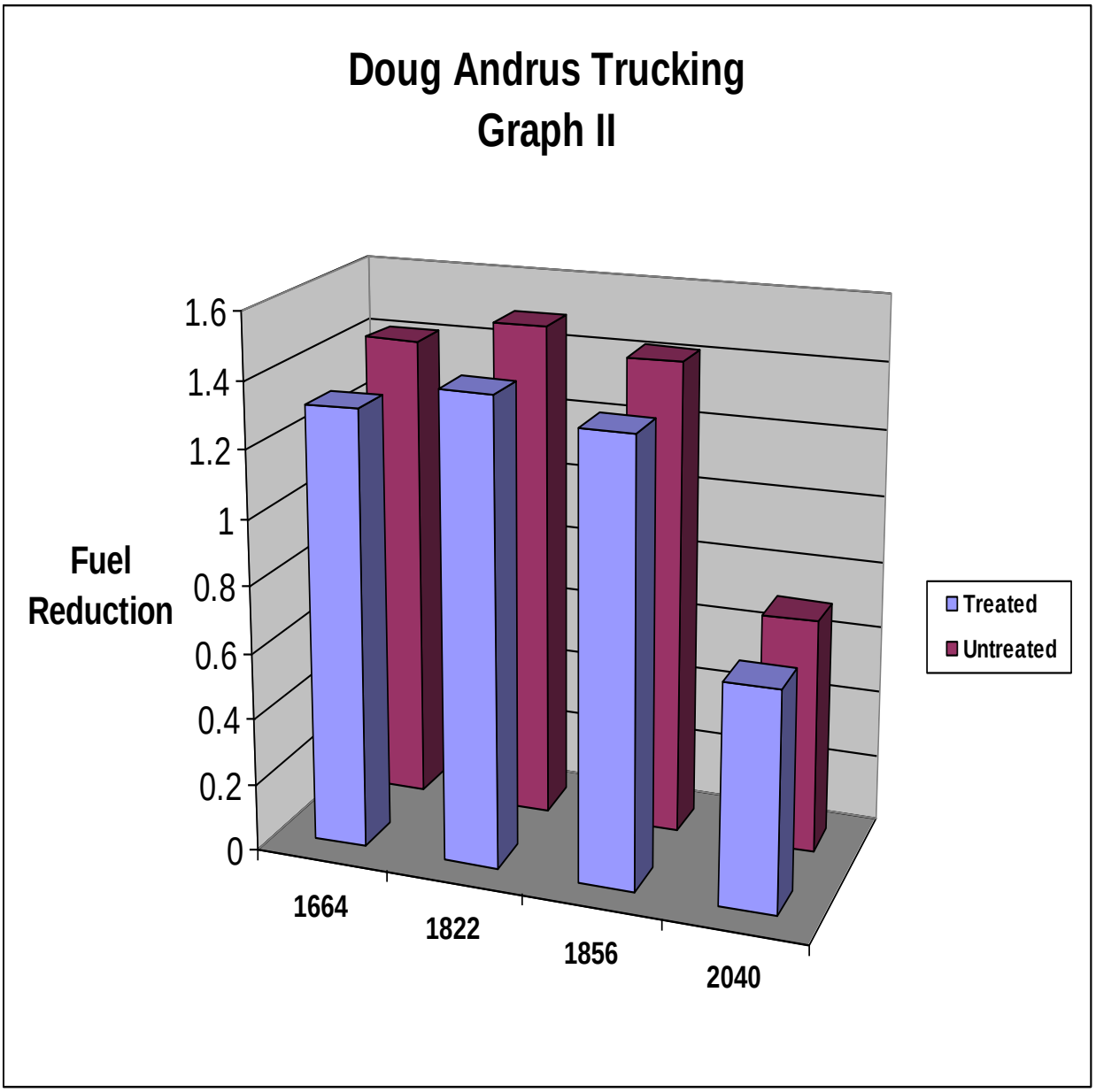
Additional to the fuel economy benefits measured and a reduction in soot particulates, a significant reduction, over time, in engine maintenance costs will be realized following treatment with My Daily Choice. These savings are achieved through lower soot levels in the engine lubricating oil, which is a result of more complete combustion of the fuel. Engine wear rates are reduced resulting in less carbon build-up in the combustion area. My Daily Choice 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



Soot Particulate Graph II

Appendix II

Carbon Mass Balance Compilation Sheets

CARBON BALANCE RESULTS

COMPANY :	Doug Andrus Trucking	LOCATION :	Idaho Falls, Idaho
EQUIPMENT :	2007 Freightliner Columbia	UNIT NR. :	1664
ENG. TYPE :	MBE 4000 Mercedes	MODEL :	Long Haul Truck
RATING :		FUEL :	Diesel

BASELINE TEST — **DATE : 09/19/09**

TRUCK MILES	405,084	ENG. RPM:	1500
AMB. TEMP (C) :	22.8	STACK(mm):	123.75
BAROMETRIC (mb)	1020	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	149	149	149	149	149	149	0.00
EXHST TEMP (C):	137.1	137.3	137.2	137.3	137.3	137	0.07
HC (ppm) :	9	10	10	11	10	10.0	7.07
CO (%) :	0.02	0.02	0.02	0.02	0.02	0.020	0.00
CO2 (%) :	2.15	2.13	2.14	2.15	2.14	2.14	0.39
O2 (%) :	10.36	10.32	10.34	10.32	10.36	10.34	0.19
CARB FLOW(g/s):	1.422	1.409	1.416	1.422	1.415	1.417	0.39

REYNOLDS NR. : 5.45E+04

TREATED TEST — **DATE : 10/03/09**

TRUCK MILES	409,514	ENG. RPM:	1500
AMB. TEMP (C) :	20.3	STACK(mm):	123.75
BAROMETRIC(mb):	1019	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	142.5	142.5	142.5	142.5	142.5	143	0.00
EXHST TEMP (C):	134.2	134.3	134.5	134.6	134.5	134	0.37
HC (ppm) :	5	6	5	5	6	5.4	10.14
CO (%) :	0.01	0.02	0.02	0.01	0.01	0.014	39.12
CO2 (%) :	2.03	2.04	2.02	2.04	2.03	2.03	0.43
O2 (%) :	10.28	10.26	10.25	10.28	10.26	10.27	0.13
CARB FLOW(g/s):	1.310	1.323	1.310	1.316	1.310	1.314	0.45

REYNOLDS NR. : 5.35E+04 TOTAL HOURS ON TREATED FUEL : 4430

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : **-7.3 %**

REMARKS:

CARBON BALANCE RESULTS

COMPANY :	Doug Andrus Trucking	LOCATION :	Idaho Falls, Idaho
EQUIPMENT :	2007 Freightliner Columbia	UNIT NR. :	1822
ENG. TYPE :	MBE 4000 Mercedes	MODEL :	Long Haul Truck
RATING :		FUEL :	Diesel

BASELINE TEST — **DATE : 09/19/09**

TRUCK MILES	341,827	ENG. RPM:	1500
AMB. TEMP (C) :	22.1	STACK(mm):	123.75
BAROMETRIC (mb)	1019	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	149	149	149	149	149	149	0.00
EXHST TEMP (C):	134.7	134.6	134.8	134.6	134.7	135	0.06
HC (ppm) :	12	11	12	13	12	12.0	5.89
CO (%) :	0.02	0.02	0.02	0.02	0.02	0.020	0.00
CO2 (%) :	2.25	2.26	2.23	2.26	2.25	2.25	0.54
O2 (%) :	10.38	10.35	10.36	10.36	10.37	10.36	0.11
CARB FLOW(g/s):	1.492	1.498	1.479	1.499	1.492	1.492	0.55

REYNOLDS NR. : 5.46E+04

TREATED TEST — **DATE : 10/03/09**

TRUCK MILES	345,480	ENG. RPM:	1500
AMB. TEMP (C) :	20.4	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):	147	147	147	147	147	147	0.00
EXHST TEMP (C):	132	131.9	131.7	131.6	131.7	132	0.22
HC (ppm) :	6	7	7	6	7	6.6	8.30
CO (%) :	0.01	0.01	0.01	0.01	0.01	0.010	0.00
CO2 (%) :	2.10	2.13	2.12	2.11	2.13	2.12	0.62
O2 (%) :	10.27	10.29	10.26	10.28	10.30	10.28	0.15
CARB FLOW(g/s):	1.379	1.399	1.393	1.386	1.399	1.391	0.63

REYNOLDS NR. : 5.44E+04 TOTAL HOURS ON TREATED FUEL : 3653

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : **-6.8 %**

REMARKS:

CARBON BALANCE RESULTS

COMPANY :	Doug Andrus Trucking	LOCATION :	Idaho Falls, Idaho
EQUIPMENT :	2007 Freightliner Columbia	UNIT NR. :	1856
ENG. TYPE :	MBE 4000 Mercedes	MODEL :	Long Haul Truck
RATING :		FUEL :	Diesel

BASELINE TEST — **DATE : 09/19/09**

TRUCK MILES	311,183	ENG. RPM:	1500
AMB. TEMP (C) :	22.6	STACK(mm):	123.75
BAROMETRIC (mb)	1020	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	149	149	149	149	149	149	0.00
EXHST TEMP (C):	135.6	135.8	135.7	135.8	135.9	136	0.08
HC (ppm) :	9	8	8	9	8	8.4	6.52
CO (%) :	0.02	0.02	0.02	0.02	0.02	0.020	0.00
CO2 (%) :	2.14	2.16	2.13	2.16	2.15	2.15	0.61
O2 (%) :	10.29	10.26	10.27	10.25	10.28	10.27	0.15
CARB FLOW(g/s):	1.418	1.430	1.411	1.431	1.424	1.423	0.59

REYNOLDS NR. : 5.46E+04

TREATED TEST — **DATE : 10/03/09**

TRUCK MILES	316,945	ENG. RPM:	1500
AMB. TEMP (C) :	20.2	STACK(mm):	123.75
BAROMETRIC(mb):	1018	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	146	146	146	146	146	146	0.00
EXHST TEMP (C):	132.4	132.5	132.6	132.5	132.6	133	0.41
HC (ppm) :	4	5	5	4	4	4.4	12.45
CO (%) :	0.01	0.01	0.01	0.01	0.01	0.010	0.00
CO2 (%) :	2.03	2.02	2.01	2.03	2.01	2.02	0.50
O2 (%) :	10.18	10.19	10.15	10.16	10.18	10.17	0.16
CARB FLOW(g/s):	1.328	1.322	1.315	1.328	1.315	1.322	0.49

REYNOLDS NR. : 5.42E+04 — TOTAL HOURS ON TREATED FUEL : 5762

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

REMARKS:

CARBON BALANCE RESULTS

COMPANY :	Doug Andrus Trucking	LOCATION :	Idaho Falls, Idaho
EQUIPMENT :	2009 Peterbilt	UNIT NR. :	2040
ENG. TYPE :	C-13 Caterpillar DPF	MODEL :	Long Haul Truck
RATING :		FUEL :	Diesel

BASELINE TEST — **DATE : 09/19/09**

TRUCK MILES	98,019	ENG. RPM:	1500
AMB. TEMP (C) :	22.1	STACK(mm):	123.75
BAROMETRIC (mb)	1018	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	63	63	63	63	63	63	0.00
EXHST TEMP (C):	132.7	132.6	132.4	132.5	132.6	133	0.09
HC (ppm) :	7	8	7	7	8	7.4	7.40
CO (%) :	0.01	0.01	0.01	0.01	0.01	0.010	0.00
CO2 (%) :	1.60	1.64	1.62	1.64	1.64	1.63	1.10
O2 (%) :	10.10	10.14	10.12	10.14	10.16	10.13	0.23
CARB FLOW(g/s):	0.690	0.707	0.698	0.707	0.707	0.702	1.10

REYNOLDS NR. : 3.56E+04

TREATED TEST — **DATE : 10/03/09**

TRUCK MILES	104,229	ENG. RPM:	1500
AMB. TEMP (C) :	19.6	STACK(mm):	123.75
BAROMETRIC(mb):	1016	LOAD:	High Idle

	TEST 1	*TEST 2*	*TEST 3*	*TEST 4*	*TEST 5*	AVERAGE	% ST.DEV
PRES DIFF (Pa):	62	62	62	62	62	62	0.00
EXHST TEMP (C):	128.7	128.6	128.6	128.7	128.7	128	0.58
HC (ppm) :	4	4	5	4	4	4.2	10.65
CO (%) :	0.01	0.01	0.01	0.01	0.01	0.010	0.00
CO2 (%) :	1.51	1.52	1.53	1.53	1.52	1.52	0.57
O2 (%) :	10.00	10.05	9.99	10.05	10.01	10.02	0.28
CARB FLOW(g/s):	0.648	0.652	0.657	0.656	0.652	0.653	0.56

REYNOLDS NR. : 3.55E+04 TOTAL HOURS ON TREATED FUEL : 6210

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : **-6.9 %**

REMARKS:

Appendix III

Raw Data Sheets

Carbon Mass Balance Field Data Form

Company: Doug Andeus **Location:** Idaho Falls, Id. **Date:** 9-19-09

Water Temp: ~~X~~ **Oil Pres:** ~~X~~ **Fan Clutch:** off **Smoke No:** 2.96 mg/m³ **Exhaust Diameter:** 123.75 ~~Inches~~ mm

Test Portion: Baseline: X **Treated:** _____ **Engine Make/Model:** 2007 MBE 4000 Mercedes **Air Inlet Velocity:** .25

Exhaust Manifold Temp: ~~X~~ **(Miles)/Hours:** 405,084 **ID#:** 1664 **Fuel Specific Gravity:** .841 @ 29.1C ~~.841 @ 29.1C~~

Type of Equipment: Freightliner Columbia **Exhaust Side:** Right **Barometric Pressure:** 1020

RPM: 1500 **Load:** static - AC off - Lights off **Oil Pressure Temp.** ~~X~~

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	137.1	149	.02	9	2.15	10.36	22.8	Yes		12:25 p-m
	137.3	149	.02	10	2.13	10.32				
	137.2	149	.02	10	2.14	10.34				
	137.3	149	.02	11	2.15	10.32				
	137.3	149	.02	10	2.14	10.36	22.8			12:35 p-m

Carbon Mass Balance Field Data Form

Company: Doug Andens Location: Idaho Falls, Id. Date: 10-3-09

Water Temp: ~~0~~ Oil Pres: ~~0~~ Fan Clutch: off Smoke No: 2.15 mg/m^3 Exhaust Diameter: 123.75 ~~Inches~~ mm

Test Portion: Baseline: ____ Treated: X Engine Make/Model: 2007 MBE4000 Mercedes Air Inlet Velocity: .25

Exhaust Manifold Temp: ~~0~~ Miles/Hours: 409,514 ID#: 1664 Fuel Specific Gravity: .819 @ 28.9C

Type of Equipment: Freightliner Columbia Exhaust Side: Right Barometric Pressure: 1019

RPM: 1500 Load: static - AC off - Lights off Oil Pressure Temp. ~~0~~

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	134.2	142.5	.01	5	2.03	10.28	20.3	Yes		12:25 p.m
	134.3	142.5	.02	6	2.04	10.26				
	134.5	142.5	.02	5	2.02	10.25				
	134.6	142.5	.01	5	2.04	10.28				
	134.5	142.5	.01	6	2.03	10.26	20.3			12:35 p.m

Carbon Mass Balance Field Data Form

Company: Doug Anders **Location:** Idaho Falls, Id. **Date:** 9-19-09

Water Temp: ~~X~~ **Oil Pres:** ~~X~~ **Fan Clutch:** off **Smoke No:** 2.9 bmg/m³ **Exhaust Diameter:** 123.75 ~~Inches~~ mm

Test Portion: Baseline: X **Treated:** _____ **Engine Make/Model:** 2007 MBE Mercedes **Air Inlet Velocity:** .25

Exhaust Manifold Temp: ~~X~~ **(Miles)/Hours:** 341,827 **ID#:** 1822 **Fuel Specific Gravity:** .844 @ 28.8C

Type of Equipment: Freightliner Columbia **Exhaust Side:** Right **Barometric Pressure:** 1019

RPM: 1500 **Load:** static - AC off - Lights off **Oil Pressure Temp.** ~~X~~

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	134.7	149	.02	12	2.25	10.38	22.1	Yes		12:10 p.m
	134.6	149	.02	11	2.26	10.35				
	134.8	149	.02	12	2.23	10.36				
	134.6	149	.02	13	2.26	10.36				
	134.7	149	.02	12	2.25	10.37	22.1			12:20 p.m

Carbon Mass Balance Field Data Form

Company: Doug Andrus Location: Idaho Falls, Id. Date: 10-3-09

Water Temp: 0 Oil Pres: 0 Fan Clutch: off Smoke No: 2.25 mg/m³ Exhaust Diameter: 123.75 ~~Inches~~ mm

Test Portion: Baseline: ____ Treated: X Engine Make/Model: 2-2007 MBE 4000 Mercedes Air Inlet Velocity: .20

Exhaust Manifold Temp: 0 Miles/Hours: 345,480 ID#: 1822 Fuel Specific Gravity: .821 @ 28.6 C

Type of Equipment: Freightliner Columbia Exhaust Side: Right Barometric Pressure: 1017

RPM: 1500 Load: static - AC off - Lights off Oil Pressure Temp. 0

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	132	147	.01	6	2.10	10.27	20.4	Yes		1:18 p.m
	131.9	147	.01	7	2.13	10.29				
	131.7	147	.01	7	2.12	10.26				
	131.6	147	.01	6	2.11	10.28				
	131.7	147	.01	7	2.13	10.30				1:28 p.m

Carbon Mass Balance Field Data Form

Company: Doug Andens Location: Idaho Falls, Id. Date: 9-19-19

Water Temp: ~~X~~ Oil Pres: ~~X~~ Fan Clutch: ~~OFF~~ Smoke No: 4.41 mg/m³ Exhaust Diameter: 123.75 ~~Inches~~ mm

Test Portion: Baseline: X Treated: ____ Engine Make/Model: 2002 MBE 4000 Mercedes Air Inlet Velocity: .25

Exhaust Manifold Temp: ~~X~~ Miles/Hours: 311,183 ID#: 1856 Fuel Specific Gravity: .842 @ 27.7C

Type of Equipment: Freightliner Columbia Exhaust Side: Right Barometric Pressure: 1020

RPM: 1500 Load: static - AC off - Lights off Oil Pressure Temp. ~~X~~

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	135.6	149	.02	9	2.14	10.29	22.6	Yes		11:42 A.M.
	135.8	149	.02	8	2.16	10.26				
	135.7	149	.02	8	2.13	10.27				
	135.8	149	.02	9	2.16	10.25				
	135.9	149	.02	8	2.15	10.28	22.6			11:52 A.M.

Carbon Mass Balance Field Data Form

Company: Anders Trucking Location: Idaho Falls, Id. Date: 10-3-09

Water Temp: ~~6~~ Oil Pres: ~~0~~ Fan Clutch: off Smoke No: 3.10 mg/m^3 Exhaust Diameter: 123.75 ~~Inches~~ mm

Test Portion: Baseline: ____ Treated: X Engine Make/Model: 2007 MBE 4000 Mercedes Air Inlet Velocity: .20

Exhaust Manifold Temp: ~~0~~ (Miles)/Hours: 316,945 ID#: 1856 Fuel Specific Gravity: .819 @ 27.5C

Type of Equipment: Freightliner Columbia Exhaust Side: Right Barometric Pressure: 10.18

RPM: 1500 Load: static - AC off - Lights off Oil Pressure Temp. ~~0~~

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	132.4	146	.01	4	2.03	10.18	20.2	Yes		12:55 p.m.
	132.5	146	.01	5	2.02	10.19				
	132.6	146	.01	5	2.01	10.15				
	132.5	146	.01	4	2.03	10.16				
	132.6	146	.01	4	2.01	10.18	20.2			1:05 p.m.

Carbon Mass Balance Field Data Form

Company: Doug Andrus Location: Idaho Falls, Id. Date: 9-19-09

Water Temp: R Oil Pres: R Fan Clutch: off Smoke No: .1D mg/m3 Exhaust Diameter: 123.75 ~~Inches~~ mm

Test Portion: Baseline: X Treated: ____ Engine Make/Model: 2009 C13 Caterpillar Air Inlet Velocity: .2D

Exhaust Manifold Temp: R (Miles) Hours: 98,019 ID#: 204D Fuel Specific Gravity: .8458@28.4C

Type of Equipment: Peterbilt DPF Exhaust Side: Right Barometric Pressure: 1018

RPM: 1500 Load: Static - AC off - Lights off Oil Pressure Temp. R

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	132.7	63	.01	7	1.60	10.10	22.1	Yes		11:11 A.M.
	132.6	63	.01	8	1.64	10.14				
	132.4	63	.01	7	1.62	10.12				
	132.5	63	.01	7	1.64	10.14				
	132.6	63	.01	8	1.64	10.16	22.1			11:21 A.M.

Carbon Mass Balance Field Data Form

Company: Doug Andams Location: Idaho Falls, Id. Date: 10-3-09

Water Temp: 0 Oil Pres: 0 Fan Clutch: off Smoke No: .07 mg/m³ Exhaust Diameter: 123.75 ~~Inches~~ mm

Test Portion: Baseline: ____ Treated: X Engine Make/Model: 2009 C-13 Caterpillar Air Inlet Velocity: .20

Exhaust Manifold Temp: 0 Miles/Hours: 104,229 ID#: 2040 Fuel Specific Gravity: .820 @ 28.1C

Type of Equipment: Peterbilt D8F Exhaust Side: Right Barometric Pressure: 1016

RPM: 1500 Load: static - AC off - Lights off Oil Pressure Temp. 0

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	128.7	62	.01	4	1.51	10.00	19.6	Yes		1:40 p.m.
	128.6	62	.01	4	1.52	10.05				
	128.6	62	.01	5	1.53	9.99				
	128.7	62	.01	4	1.53	10.05				
	128.7	62	.01	4	1.52	10.01	19.6			1:50 p.m.

Appendix IV

ECU Data Sheets

DDEC® Reports - Trip Activity

Print Date: Sep 19, 2009 07:12 AM (MDT)

Doug Andrus Dist.
6300 S 45W
Idaho Falls, ID 83402-
(208) 523-1034

Trip: 07/28/09 08:05 AM (MST) to 09/19/200
Vehicle ID: 1664
Driver ID:
Odometer: 405084.1 mi

Trip Distance	17418.5 mi
Trip Fuel	2633.63 gal
Fuel Economy	6.61 mpg
Avg Drive Load	62 %
Avg Vehicle Speed	55.7 mph
Driving Time	312:38:29
Driving Percent	68.05 %
Driving Fuel	2530.00 gal
Driving Economy	6.88 mpg
Vehicle Speed Limiting	
Time	39:49:59
Percent	12.74 %
Distance	2516.6 mi
Fuel	109.13 gal
Top Gear	
Time	242:50:13
Percent	77.67 %
Distance	14963.1 mi
Fuel	1889.50 gal
Time	27:48:05
Top Gear - 1	
Percent	8.89 %
Distance	1494.6 mi
Fuel	401.38 gal
Cruise	
Time	226:31:29
Percent	72.46 %
Distance	13934.4 mi
Fuel	1988.75 gal
Top Gear Cruise	
Time	210:37:40
Percent	67.37 %
Distance	13051.9 mi
Fuel	1688.38 gal
Speeding A(>=66 mph and <71 mph)	
Count	1021
Time	4:58:19
Percent	1.59 %
Speeding B(>=71 mph)	
Count	64
Time	0:11:47
Percent	0.06 %
Highest Speed	76.0 mph
Occurred	08/15/09 14:43:18 (MST)
Coasting Time	0:00:00
Coasting Percent	0.00 %
DPF Regeneration	
Parked Regen Count	0
Driving Regen Count	0

Trip Time	459:24:49
Fuel Consumption	5.73 gal/h
Idle Time	146:46:20
Idle Percent	31.95 %
Idle Fuel	103.63 gal
VSG(PTO) Total Time	3:51:40
VSG(PTO) Percent	0.84 %
VSG(PTO) Total Fuel	4.88 gal
Stop Idle Time	130:07:38
Stop Idle Percent	28.32 %
Stop Idle Fuel	90.75 gal
Over Rev Limit	1800 rpm
Count	102
Time	0:26:31
Percent	0.10 %
Highest RPM	2521 rpm
Occurred	09/15/09 12:45:14 (MST)
Diag. Records	0
Hard Brake Count	2
Brake Count	3396
Eng. Brake Time	14:33:15
Optimized Idle Time	
Active	0:00:00
Run	0:00:00
Battery	0:00:00
Engine Temp.	0:00:00
Thermostat	0:00:00
Extended Idle	0:00:00
Continuous	0:00:00
Optimized Idle Battery Charging Starts	
Normal Count	0
Alternate Count	0
Continuous Run	0
Fan On Time	
Total Time	4:33:23
Engine System	0:00:00
Manual	4:33:23
A/C	0:00:00
Pump On Time	
Time	0:00:00
Distance	0.0 mi
Fuel	0.00 gal
Engine Utilization	36.17 %
Vehicle Utilization	24.61 %

DDEC® Reports - Trip Activity

Print Date: Oct 09, 2009 04:41 PM (MDT)

Doug Andrus Distributing
6300 S 45 W
Idaho Falls, ID 83402
2085231034

Trip: 09/19/2009 to 10/09/2009 (MST)
Vehicle ID: 1664
Driver ID:
Odometer: 412643.9 mi

Trip Distance	7559.8 mi	Trip Time	162:55:06
Trip Fuel	1163.63 gal	Fuel Consumption	7.14 gal/h
Fuel Economy	6.50 mpg	Idle Time	29:34:18
Avg Drive Load	63 %	Idle Percent	18.15 %
Avg Vehicle Speed	56.7 mph	Idle Fuel	20.38 gal
Driving Time	133:20:48	VSG(PTO) Time	0:49:35
Driving Percent	81.85 %	VSG(PTO) Percent	0.51 %
Driving Fuel	1143.25 gal	VSG(PTO) Fuel	1.00 gal
Driving Economy	6.61 mpg		
		Stop Idle Time	23:48:44
Vehicle Speed Limiting		Stop Idle Percent	14.62 %
Time	14:01:04	Stop Idle Fuel	16.38 gal
Percent	10.51 %		
Distance	886.0 mi	Over Rev Limit	1800 rpm
Fuel	35.63 gal	Count	9
		Time	0:02:06
Top Gear		Percent	0.02 %
Time	106:56:28		
Percent	80.20 %	Highest RPM	2275 rpm
Distance	6598.3 mi	Occurred	10/05/09 13:38:43 (MST)
Fuel	889.38 gal		
		Diag. Records	0
Top Gear - 1		Hard Brake Count	1
Time	11:23:44	Brake Count	1184
Percent	8.55 %	Eng. Brake Time	4:33:42
Distance	611.3 mi		
Fuel	167.50 gal	Optimized Idle Time	
		Active	0:00:00
Cruise		Run	0:00:00
Time	102:53:13	Battery	0:00:00
Percent	77.16 %	Engine Temp.	0:00:00
Distance	6331.4 mi	Thermostat	0:00:00
Fuel	950.88 gal	Extended Idle	0:00:00
		Continuous	0:00:00
Top Gear Cruise			
Time	95:46:54	Optimized Idle Battery Charging Starts	
Percent	71.83 %	Normal Count	0
Distance	5939.2 mi	Alternate Count	0
Fuel	814.25 gal	Continuous Run	0
Speeding A(>=66 mph and <71 mph)		Fan On Time	
Count	339	Total Time	0:00:00
Time	1:38:30	Engine System	0:00:00
Percent	1.23 %	Manual	0:00:00
Speeding B(>=71 mph)		A/C	0:00:00
Count	19		
Time	0:03:53	Pump On Time	
Percent	0.05 %	Time	0:00:00
		Distance	0.0 mi
Highest Speed	74.0 mph	Fuel	0.00 gal
Occurred	09/22/09 09:28:27 (MST)		
		Engine Utilization	33.29 %
Coasting Time	0:00:00	Vehicle Utilization	27.25 %
Coasting Percent	0.00 %		
DPF Regeneration			
Parked Regen Count	0		
Driving Regen Count	0		

09-18-09

DDEC® Reports - Trip Activity

Print Date: Sep 18, 2009 10:53 AM (MDT)

Doug Andrus Dist.
6300 S 45W
Idaho Falls, ID 83402-
(208) 523-1034

Trip: 06/30/09 09:44 AM (MST) to 09/18/200
Vehicle ID: 1822
Driver ID:
Odometer: 341825.6 mi

Trip Distance	27396.0 mi
Trip Fuel	4335.50 gal
Fuel Economy	6.32 mpg
Avg Drive Load	66 %
Avg Vehicle Speed	58.7 mph
Driving Time	467:00:56
Driving Percent	61.73 %
Driving Fuel	4132.75 gal
Driving Economy	6.63 mpg
Vehicle Speed Limiting	
Time	217:05:29
Percent	46.48 %
Distance	13931.5 mi
Fuel	1646.75 gal
Top Gear	
Time	400:59:43
Percent	85.86 %
Distance	25226.5 mi
Fuel	3535.25 gal
Time	23:48:29
Top Gear - 1	
Percent	5.10 %
Distance	1226.8 mi
Fuel	341.38 gal
Cruise	
Time	305:40:52
Percent	65.45 %
Distance	19287.2 mi
Fuel	2874.88 gal
Top Gear Cruise	
Time	295:36:04
Percent	63.30 %
Distance	18764.7 mi
Fuel	2681.13 gal
Speeding A(>=66 mph and <71 mph)	
Count	3017
Time	15:07:19
Percent	3.24 %
Speeding B(>=71 mph)	
Count	100
Time	0:29:35
Percent	0.11 %
Highest Speed	79.0 mph
Occurred	09/01/09 13:22:54 (MST)
Coasting Time	0:00:00
Coasting Percent	0.00 %
DPF Regeneration	
Parked Regen Count	0
Driving Regen Count	0

Trip Time	756:35:47
Fuel Consumption	5.73 gal/h
Idle Time	289:34:51
Idle Percent	38.27 %
Idle Fuel	202.75 gal
VSG(PTO) Total Time	2:54:46
VSG(PTO) Percent	0.38 %
VSG(PTO) Total Fuel	3.38 gal
Stop Idle Time	274:00:59
Stop Idle Percent	36.22 %
Stop Idle Fuel	190.75 gal
Over Rev Limit	1800 rpm
Count	20
Time	0:09:16
Percent	0.02 %
Highest RPM	2347 rpm
Occurred	09/17/09 10:14:01 (MST)
Diag. Records	0
Hard Brake Count	2
Brake Count	3840
Eng. Brake Time	24:56:11
Optimized Idle Time	
Active	0:00:00
Run	0:00:00
Battery	0:00:00
Engine Temp.	0:00:00
Thermostat	0:00:00
Extended Idle	0:00:00
Continuous	0:00:00
Optimized Idle Battery Charging Starts	
Normal Count	0
Alternate Count	0
Continuous Run	0
Fan On Time	
Total Time	0:00:02
Engine System	0:00:00
Manual	0:00:02
A/C	0:00:00
Pump On Time	0:00:00
Time	0.0 mi
Distance	0.00 gal
Fuel	
Engine Utilization	39.40 %
Vehicle Utilization	24.32 %

DDEC® Reports - Trip Activity

Print Date: Oct 12, 2009 10:02 AM (MDT)

Doug Andrus Distributing
6300 S 45 W
Idaho Falls, ID 83402
2085231034

Trip: 09/19/2009 to 10/12/2009 (MST)
Vehicle ID: 1822
Driver ID:
Odometer: 348586.3 mi

Trip Distance	6758.9 mi	Trip Time	145:46:23
Trip Fuel	1132.13 gal	Fuel Consumption	7.77 gal/h
Fuel Economy	5.97 mpg	Idle Time	29:18:02
Avg Drive Load	65 %	Idle Percent	20.10 %
Avg Vehicle Speed	58.0 mph	Idle Fuel	20.88 gal
Driving Time	116:28:21	VSG(PTO) Time	1:01:50
Driving Percent	79.90 %	VSG(PTO) Percent	0.71 %
Driving Fuel	1111.25 gal	VSG(PTO) Fuel	1.13 gal
Driving Economy	6.08 mpg	Stop Idle Time	25:36:35
		Stop Idle Percent	17.57 %
Vehicle Speed Limiting		Stop Idle Fuel	18.00 gal
Time	42:44:42		
Percent	36.70 %	Over Rev Limit	1800 rpm
Distance	2747.4 mi	Count	14
Fuel	326.88 gal	Time	0:04:31
		Percent	0.05 %
Top Gear			
Time	96:10:27	Highest RPM	2267 rpm
Percent	82.57 %	Occurred	10/06/09 11:59:30 (MST)
Distance	6052.5 mi		
Fuel	912.63 gal	Diag. Records	0
		Hard Brake Count	0
Top Gear - 1		Brake Count	1160
Time	7:28:26	Eng. Brake Time	6:05:04
Percent	6.42 %		
Distance	387.4 mi	Optimized Idle Time	
Fuel	110.75 gal	Active	0:00:00
		Run	0:00:00
Cruise		Battery	0:00:00
Time	80:04:42	Engine Temp.	0:00:00
Percent	68.75 %	Thermostat	0:00:00
Distance	5029.1 mi	Extended Idle	0:00:00
Fuel	824.75 gal	Continuous	0:00:00
Top Gear Cruise		Optimized Idle Battery Charging Starts	
Time	76:03:06	Normal Count	0
Percent	65.30 %	Alternate Count	0
Distance	4824.0 mi	Continuous Run	0
Fuel	746.25 gal		
Speeding A(>=66 mph and <71 mph)		Fan On Time	
Count	750	Total Time	0:00:00
Time	3:33:17	Engine System	0:00:00
Percent	3.05 %	Manual	0:00:00
Speeding B(>=71 mph)		A/C	0:00:00
Count	15		
Time	0:04:07		
Percent	0.06 %	Pump On Time	
		Time	0:00:00
Highest Speed	76.0 mph	Distance	0.0 mi
Occurred	09/27/09 04:33:37 (MST)	Fuel	0.00 gal
Coasting Time	0:00:00	Engine Utilization	26.27 %
Coasting Percent	0.00 %	Vehicle Utilization	20.99 %
DPF Regeneration			
Parked Regen Count	0		
Driving Regen Count	0		

DDEC® Reports - Trip Activity

Print Date: Sep 19, 2009 06:47 AM (MDT)

Doug Andrus Dist.
6300 S 45W
Idaho Falls, ID 83402-
(208) 523-1034

Trip: 09/08/09 01:32 PM (MST) to 09/19/200
Vehicle ID: 1856
Driver ID:
Odometer: 311183.8 mi

Trip Distance	3498.7 mi
Trip Fuel	553.38 gal
Fuel Economy	6.32 mpg
Avg Drive Load	68 %
Avg Vehicle Speed	56.6 mph
Driving Time	61:47:05
Driving Percent	88.86 %
Driving Fuel	547.88 gal
Driving Economy	6.39 mpg
Vehicle Speed Limiting	
Time	6:01:14
Percent	9.74 %
Distance	384.8 mi
Fuel	6.50 gal
Top Gear	
Time	50:43:57
Percent	82.11 %
Distance	3110.4 mi
Fuel	441.38 gal
Time	4:51:49
Top Gear - 1	
Percent	7.87 %
Distance	253.4 mi
Fuel	69.88 gal
Cruise	
Time	47:24:52
Percent	76.74 %
Distance	2918.7 mi
Fuel	453.75 gal
Top Gear Cruise	
Time	44:44:49
Percent	72.42 %
Distance	2769.9 mi
Fuel	402.00 gal
Speeding A(>=66 mph and <71 mph)	
Count	140
Time	0:42:21
Percent	1.14 %
Speeding B(>=71 mph)	
Count	5
Time	0:01:49
Percent	0.05 %
Highest Speed	74.5 mph
Occurred	09/16/09 13:46:12 (MST)
Coasting Time	0:00:00
Coasting Percent	0.00 %
DPF Regeneration	
Parked Regen Count	0
Driving Regen Count	0

Trip Time	69:32:01
Fuel Consumption	7.96 gal/h
Idle Time	7:44:56
Idle Percent	11.14 %
Idle Fuel	5.50 gal
VSG(PTO) Total Time	0:00:00
VSG(PTO) Percent	0.00 %
VSG(PTO) Total Fuel	0.00 gal
Stop Idle Time	5:32:34
Stop Idle Percent	7.97 %
Stop Idle Fuel	3.75 gal
Over Rev Limit	1800 rpm
Count	1
Time	0:00:27
Percent	0.01 %
Highest RPM	2248 rpm
Occurred	09/14/09 20:23:51 (MST)
Diag. Records	0
Hard Brake Count	0
Brake Count	338
Eng. Brake Time	3:14:53
Optimized Idle Time	
Active	0:00:00
Run	0:00:00
Battery	0:00:00
Engine Temp.	0:00:00
Thermostat	0:00:00
Extended Idle	0:00:00
Continuous	0:00:00
Optimized Idle Battery Charging Starts	
Normal Count	0
Alternate Count	0
Continuous Run	0
Fan On Time	
Total Time	0:00:00
Engine System	0:00:00
Manual	0:00:00
A/C	0:00:00
Pump On Time	
Time	0:00:00
Distance	0.0 mi
Fuel	0.00 gal
Engine Utilization	27.14 %
Vehicle Utilization	24.11 %

FOR JON ANDRUS

DDEC® Reports - Trip Activity

Print Date: Oct 16, 2009 05:57 PM (MDT)

Doug Andrus Distributing
6300 S 45 W
Idaho Falls, ID 83402
2085231034

Trip: 09/19/2009 to 10/16/2009 (MST)
Vehicle ID: 1856
Driver ID:
Odometer: 321433.5 mi

Trip Distance	10249.7 mi
Trip Fuel	1733.88 gal
Fuel Economy	5.91 mpg
Avg Drive Load	66 %
Avg Vehicle Speed	56.3 mph

Trip Time	203:07:46
Fuel Consumption	8.54 gal/h
Idle Time	20:57:16
Idle Percent	10.32 %
Idle Fuel	14.63 gal

Driving Time	182:10:30
Driving Percent	89.68 %
Driving Fuel	1719.25 gal
Driving Economy	5.96 mpg

VSG(PTO) Time	0:37:29
VSG(PTO) Percent	0.31 %
VSG(PTO) Fuel	0.75 gal

Stop Idle Time	14:01:57
Stop Idle Percent	6.91 %
Stop Idle Fuel	9.50 gal

Vehicle Speed Limiting

Time	21:07:03
Percent	11.59 %
Distance	1329.4 mi
Fuel	82.75 gal

Over Rev Limit	1800 rpm
Count	13
Time	0:04:46
Percent	0.04 %

Top Gear

Time	145:11:11
Percent	79.70 %
Distance	8926.3 mi
Fuel	1363.50 gal

Highest RPM	2318 rpm
Occurred	09/19/09 10:58:39 (MST)

Diag. Records	1
Hard Brake Count	0
Brake Count	1209
Eng. Brake Time	8:40:17

Top Gear - 1

Time	15:08:37
Percent	8.31 %
Distance	786.9 mi
Fuel	218.00 gal

Optimized Idle Time

Active	0:00:00
Run	0:00:00
Battery	0:00:00
Engine Temp.	0:00:00
Thermostat	0:00:00
Extended Idle	0:00:00
Continuous	0:00:00

Cruise

Time	127:00:54
Percent	69.72 %
Distance	7830.0 mi
Fuel	1300.38 gal

Optimized Idle Battery Charging Starts

Normal Count	0
Alternate Count	0
Continuous Run	0

Top Gear Cruise

Time	119:37:18
Percent	65.66 %
Distance	7422.9 mi
Fuel	1156.25 gal

Fan On Time

Total Time	0:00:00
Engine System	0:00:00
Manual	0:00:00
A/C	0:00:00

Speeding A(>=66 mph and <71 mph)

Count	317
Time	1:35:40
Percent	0.88 %

Speeding B(>=71 mph)

Count	17
Time	0:03:25
Percent	0.03 %

Pump On Time

Time	0:00:00
Distance	0.0 mi
Fuel	0.00 gal

Highest Speed	74.0 mph
Occurred	09/23/09 17:41:46 (MST)

Coasting Time	0:00:00
Coasting Percent	0.00 %

Engine Utilization	30.82 %
Vehicle Utilization	27.64 %

DPF Regeneration

Parked Regen Count	0
Driving Regen Count	0

Caterpillar Electronic Technician 2009A v1.0
Trip Segment - Driver

9/18/2009 8:12 AM

C13 Truck (LEE20610)

Parameter	Value
Vehicle ID	2040
Engine Serial Number	LEE20610
ECM Serial Number	17586152RA
Personality Module Part Number	3435735-00
Personality Module Release Date	FEB09
Personality Module Code	160
ECM Date/Time	9/18/2009 9:14:51 AM

Description	Value	Unit
Time	102:45	hours
Driving Time	71:12	hours
Distance	~~3973.0~~ 26,190	Miles
Fuel	557.0	Gal
Overall Fuel Economy	7.13	MPG
Driving Fuel Economy	7.37	MPG
Idle Time	31:32	hours
Idle Fuel	18.0	Gal
% Idle Time	31	%
PTO Time	0:00	hours
PTO Fuel	0.0	Gal
% PTO Time	0	%
Avg Load Factor	37	%
Avg Vehicle Speed	38.7	MPH
Avg Driving Speed	55.8	MPH
Max Vehicle Speed	78	MPH
Max Engine Speed	2351	RPM
Start Time	2513:15	hours
End Time	2616:00	hours
Start Odometer	94410.9	Miles
End Odometer	98383.9	Miles

Caterpillar Electronic Technician 2009A v1.0
Trip Segment - Driver

10/3/2009 12:02 PM

C13 Truck (LEE20610)

Parameter	Value
Vehicle ID	2040
Engine Serial Number	LEE20610
ECM Serial Number	17586152RA
Personality Module Part Number	3435735-00
Personality Module Release Date	FEB09
Personality Module Code	160
ECM Date/Time	10/3/2009 1:06:52 PM

Description	Value	Unit
Time	125:03	hours
Driving Time	98:06	hours
Distance	5458.0	Miles
Fuel	780.5	Gal
Overall Fuel Economy	6.99	MPG
Driving Fuel Economy	7.13	MPG
Idle Time	26:57	hours
Idle Fuel	14.9	Gal
% Idle Time	22	%
PTO Time	0:00	hours
PTO Fuel	0.0	Gal
% PTO Time	0	%
Avg Load Factor	40	%
Avg Vehicle Speed	43.6	MPH
Avg Driving Speed	55.6	MPH
Max Vehicle Speed	74	MPH
Max Engine Speed	2166	RPM
Start Time	2633:42	hours
End Time	2758:45	hours

Appendix V

Carbon Footprint Data

Calculation of Greenhouse Gas Reductions

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

* Fuel Type = Diesel
*Annual Fuel Usage = 4,800,000 gallons, or 18,240,000 litres.
*Average 7.025% reduction in fuel usage with Fuel Factor Xcatalyst.

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"	18,240,000	2.716	0.99	49,044,441	49,044
"Treated"	16,963,200	2.716	0.99	45,611,330	45,611
C02 reductions with Fuel Factor X catalyst				**3,433,111**	**3,433**

The reduction of C02 greenhouse emissions in the amount of 3,433 tonnes (3,785 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 [18,240,000] x [1kg/1000g] = 3283 kg

"Treated" [18.0g/100 litres] x [16,963,200] x [1kg/1000g] = 3053 kg

CH_4 Reduction = 230 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 [18,240,000] x [1kg/1000g] = 492kg

"Treated" [2.7g/100 litres] x [16,963,200] x [1kg/1000g] = 458kg

N_2O Reduction = 34kg

Appendix VI

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 Fuel Factor X catalyst. All numbers are estimates and should not be considered absolute values.

Estimated: CMB

	Carbon Balance Estimate Only!
Monthly Fuel Consumption:	400,000.00 gals. .
Monthly Fuel Costs ($2.35/gal.):	$940,000.00
Improvement in Fuel Efficiency:	.07%
Monthly Gross Fuel Savings:	$65,800.00

Estimated Gross Annual Savings Based On
4,800,000 Gallons of Diesel Fuel Consumed: **$789,600.00**

Using the fuel savings data produced from the Carbon Balance test procedure, the results show that Doug Andrus trucking could potentially reduce annual fuel consumption costs by a minimum of $789,600.00. Other cost reducing factors that will enhance the use of the Fuel Factor X catalyst include reduced repairs due to carbon related failures; extended oil change intervals as experienced by other Fuel Factor X 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 Fuel Factor X catalyst as part of their preventive maintenance program.

Other benefits in using Fuel Factor X 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.