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FINAL REPORT

PROOF OF CONCEPT TESTING USING "GREEN PLUS" LIQUID FUEL COMBUSTION CATALYST FOR HEAVY-DUTY ENGINES.

Accomplished for:
TEXAS CENTER FOR ENVIRONMENTAL QUALITY
Austin, Texas
Project # 422-04-4
Grant Contract # 03-R05-04G

Accomplished by:

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PREFACE

The statements, conclusions and/or recommendations in this report are, primarily those of the contractor and not necessarily those of the Texas Center for Environmental Quality (TCEQ). The mention of commercial products herein is not to be construed as actual or implied endorsement of such products.

ACKNOWLEGMENT (S)

We acknowledge the dedicated assistance of Mike Carter (CEE) and his untiring and professional support during the project. We appreciate the cooperation and guidance of Dr. Colin K. Hill and Mike Carroll of the Biofriendly Corporation.

ABSTRACT

The grant activity and results reported herein is based on operationally testing a representative heavy-duty diesel engine utilizing a proprietary liquid fuel combustion catalyst (Green Plus) to enhance combustion. A CARB (California Air Resources Board) certified Detroit Diesel engine, series 60, was used and tested for emissions output, using the AVL urban 8 mode steady state cycle, with and without the liquid catalyst. This 8 mode is designed to simulate the full United States EPA Federal test procedure (FTP). A comparative database with and without the "Green Plus" liquid fuel combustion catalyst indicates meaningful reductions in all tailpipe emissions and an improvement in fuel economy. In Brief after 150 hours of operation with "Green Plus" in the fuel, the last three 8 modes tests showed the volatile hydrocarbons (HC) were reduced by an average of 10.64%, the oxides of nitrogen (NOx) by an average of 5.09% and the Particulates (total PM) by 8.35%. For each emission, there was a clear continuing downward trend in emissions when the test was ended due to contractual constraints. During the period of the testing the fuel economy of the engine also improved. Tests looking at an engine mode simulating steady over-the-road driving under significant load showed an improvement in fuel economy that reached 5% by the end of the testing period.

PROOF OF CONCEPT TESTING USING GREEN PLUS LIQUID FUEL COMBUSTION CATALYST FOR HEAVY-DUTY ENGINES

A. INTRODUCTION

Over the past several years, there has been increased national and international interest in alternative methods to control emissions and improve fuel economy of both gasoline and diesel vehicles. This is particularly true in the United States where diesel particulates have been declared carcinogenic and gasoline vehicle emissions continue to be the largest single source of measured pollution. In the following study, a liquid fuel combustion catalyst known as 'GREEN PLUS' was used to demonstrate the effects it would have on both vehicle 'Tailpipe emissions' and 'Overall Fuel Economy'. The research study was commissioned by a grant from the Texas Center for Environmental Quality (TCEQ). The grant was awarded to the Biofriendly Corporation, the U.S. manufacturer and supplier of the catalyst.

The operational testing was accomplished at the California Environmental Engineering (CEE) Center for Environmental Research (see Appendix 1 for CEE's summary report) The CEE independent laboratory is located in Santa Ana, California and routinely provides testing support for vehicle manufacturers, agencies of the State and Federal Government and private institutions. This Premier test facility is EPA recognized and CARB-certified. CEE participates yearly in a multi-laboratory cross check program sponsored by the California Air Resources Board (CARB) and typically registers in the top ten per cent of test facilities that closely emulate the average emission readings of all participating Labs (Appendix II shows a recent example of CEE's certification papers).

A I.1 Diesel Emissions: Particulate Matter (PM) emissions from Diesel-Fueled vehicles and engines are significant. These emissions typically come from a wide variety of sources including on and off-road vehicles, stationary and portable engines. A recent emission inventory database in California indicates that 27 percent of PM-Emissions come from on-road engines and 66 percent from off-road engines. Diesel engines, in particular those in mobile applications, are significant sources of oxides of nitrogen (NOx) emissions.

A. I.2 Biofriendly Corporation Mission:

Biofriendly Corporation's mission is to develop and bring to market fuel enhancing products that address the growing need for energy while safeguarding the environment.

Biofriendly recently introduced a revolutionary new product - Green Plus fuel catalyst. Green Plus, which is a true liquid catalyst that mixes completely with various types of fuel, is one of the world's most effective and economical solutions for significantly improving fuel economy and reducing emissions.

Biofriendly's patent-pending product is the only known solution that can both reduce emissions and improve fuel economy in gasoline, diesel, fuel oil and other hydrocarbon-based products. Green Plus has been under development for 16 years at a cost of over $12 million dollars. Incorporated in 1997, Biofriendly has recently begun to make Green Plus available to the commercial market. Customers on three continents are now deploying it.

A. I.3. TCEQ (Then TCET) Grant funding.

In the spring of 2003, the Texas Center for Environmental Technology (now Texas Center for Environmental Quality) issued a request for proposals from companies needing help to support and verify new technologies that can demonstrate reductions in emissions form both on-road and off-road diesel engines. TCEQ is acting on behalf of the State of Texas legislature, which is implementing a multifaceted program to reduce air pollution in major urban centers in the state. This was a competitive grant application. Biofriendly applied for funding, and, after scientific review, was selected as one of several companies that received funds in the fall of 2003. In this, the first phase of the contract, Biofriendly was asked to perform a "proof of concept" screening test to demonstrate under rigorous independent testing that Green Plus could reduce emissions in a significant manner.

B. SCOPE OF EFFORT:

B.I.1. Contract and Engine: A technical contract was developed to select and test a heavy-duty, series 60, Detroit Diesel engine. The laboratory maintained engine had recently been rebuilt and included a new DDII master control module and fuel injectors. The engine is a 1992 MY rated at 450HP and a max RPM of 2100. Due to the engine being used only in the laboratory and being recently rebuilt its baseline emissions are mostly well below EPA and CARB limits for heavy-duty engines (See table 1).

Table 1. Emissions Standards for Certification of diesel engines:

Model year 1988-2003 US federal (EPA) and 1987-2003 California (ARB) emission standards for heavy-duty diesel truck and bus engines are summarized in the following tables. Applicable to the 1994 and following year standards, sulfur content in the certification fuel has been reduced to 500 ppm wt. (Taken from the DieselNet web site).

Table 1.A
EPA Emission Standards for Heavy-Duty Diesel Engines, g/bhp hr

Heavy-Duty Diesel Truck Engines

Year	HC	CO	Nox	PM
1988	1.3	15.5	10.7	0.60
1990	1.3	15.5	6.0	0.60
1991	1.3	15.5	5.0	0.25
1994	1.3	15.5	5.0	0.10
1998	1.3	15.5	4.0	0.10

Table 1.B
California Emission Standards for Heavy-Duty Diesel Engines, g/bhp hr

Heavy-Duty Diesel Truck Engines

Year	NHMC	HC	CO	Nox	PM
1987	-	1.3	15.5	6.0	0.60
1991	1.2	1.3	15.5	5.0	0.25
1994	1.2	1.3	15.5	5.0	0.10

B.I.2. Fuel selection: Fuel (D-2 Control Diesel) for the in-depth testing was specially blended at the Haltermann products facility in Channel View, Texas. Haltermann is a subsidiary of the Dow Chemical Company. Six-55-gallon drums were prepared and shipped to the CEE Lab. This provided an assurance of obtaining all test fuel from the same batch and tank. Product information sheets for all test fuel used is provided in appendix II.

B.I.3. Test selection: An AVL 8-Mode "Urban" Heavy-duty test cycle was selected as the "test of choice". This test was developed by AVL, a company that designs and builds advanced transmissions and dynomometers, in collaboration with CARB and CEE. The test was primarily selected and used since the urban steady-state engine test cycle is designed to closely correlate with the exhaust emission results of the US FTP heavy-duty engine transient cycle. The test involves 8 (eight) pre-defined steady state modes. Each operational mode is based on the correlation of engine speed with load and is assigned a relative weight factor. A matrix showing the sequential engine operating points and relative weights of particular modes is shown as Figure 1.

Table 2. AVL 8 mode test.

The AVL 8-Mode test is a steady-state engine test procedure, designed to closely correlate with the exhaust emission results of the US FTP heavy-duty engine transient cycle. The test involves 8 steady-state modes. The composite value is calculated by applying weighting factors on the modal results.

The sequential engine operating points are as follows:

AVL 8-Mode Heavy-Duty Cycle

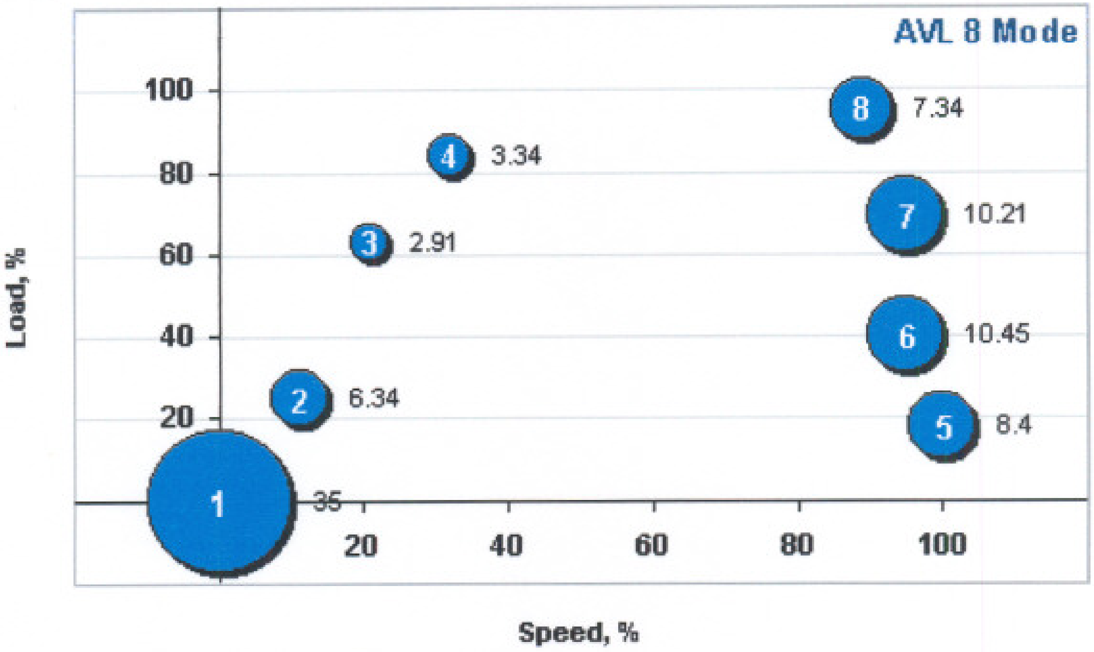
Mode	% Engine Speed*	% Load	Weight factor**
1	0	0	35.00
2	11	25	6.34
3	21	63	2.91
4	32	84	3.34
5	100	18	8.40
6	95	40	10.45
7	95	69	10.21
8	89	95	7.34

* - Normalized speed: 0% = low idle, 100% = rated speed

** - Relative weight factors, not normalized (they do not add to 100%)

The relative weights of particular modes are represented by the area of bubbles in the Figure below.

Figure 1. Relative weights of AVL 8 mode test.



Using the known engine rated speed, the percent value of engine speed for each mode is established during the initial "mapping" of the engine.

When running the 8-mode test each sequential mode speed value is obtained using the operational throttle control. Once the individual mode speed has been established, the engine is stabilized for a four-minute period followed by a two-minute sample period.

During each test mode, gas analyzers collect and measure the total weighted tailpipe emissions for HydroCarbons (HC), Carbon Monoxide (CO) and Oxides of Nitrogen (NOx). Additionally, Particulate Matter (PM) is collected on a filter set using an AVL "Smart Sampler Console". The filters are weighed before and after use to establish a weighed value of the Particulate Matter. Using pre-determined software, emission values are calculated and weighted for presentation as "grams per brake horsepower-hour"(g/bhp-h).

Fuel consumption is computed using a gravimetric system for micro weighing of the fuel. The fuel consumption is calculated and reported as "pounds per brake horsepower-hour"(lb/bhp-h).

B.I.4 Test protocol:

1). After the engine was set up in the test cell, an engine run-in of a minimum of 10 hours was performed with D2 fuel as specified. An AVL 8 mode test was performed by CEE at the beginning and end of this period to judge how well the engine had stabilized.

2). Baseline emissions: After the engine was warmed up for approximately 2 hours and engine coolant and oil temperature were within normal operating conditions a minimum of three AVL 8 mode tests were run by CEE to get reproducible and consistent base line emissions. Each test was performed in the same manner. The engine was put through each of the four modes mentioned above for 30 minutes ending with the 900-rpm 80lb torque mode, and then all the equipment checked. When all was ready, the engine speed was increased to 1596 and 443 lbs of torque and run until engine coolant and oil temperature were at "normal" operating temperatures. The engine was then turned down to idle (600 rpm) and the AVL 8 mode test begun.

3). Green Plus was added to the fuel at a specified rate. The engine was then run for about 150 hours using four of the 8 mode cycles repeated every two hours to vary load and engine speed. AVL 8 mode tests were performed about every 25 hours to determine how well the engine was performing with Green Plus present (the results of these tests are included in Appendix III).

4). A series of AVL 8 mode tests were run after the engine had reached the 150 hour mark to get three consistent tests that could be averaged to give an overall result for the test cycle.

5). Although fuel economy was determined during each two minute mode CEE also performed a separate fuel economy test after selected AVL 8 mode tests using three 10 minute periods with the engine running at 1591 rpm and 438 lbs of torque (mode 5) to get better precision on the fuel economy.

C. Test facility:

The CEE engine Lab utilizes a custom designed engine control bench with a Horiba Data acquisition interface. Lab quality control checks are performed routinely on a prescribed time basis (daily/weekly/monthly) on all functional systems and analytical components. All data computation is based on procedures provided in the Code of Federal Regulations (CFR 40, Part 86). The CEE Lab has been certified by the California Air Resources Board (CARB) and by Ford Motor Company (Allen Park, Michigan). A copy of the typical CARB certification is shown in appendix I.

D.I. Test Results and Conclusions:

D.I.1 Summary of three AVL 8 mode baseline data sets.

Table 3.

AVL 8 Mode test at CEE for the State of Texas on a Detroit series 60 diesel engine

CEE Total Weighted Emissions g/bhp-h

Baseline	1	2	3	
Date:	May-14-04	May-14-04	May-14-04	
Time:	10:57:53	12:25:53	2:41:32	
				Average
WBS HC:	0.0959173	0.0957804	0.0972981	**0.0963319**
WBS CO:	1.03626	1.04419	1.03891	**1.03979**
WBS NOx:	6.36023	6.47746	6.34541	**6.39437**
Partic:	0.011433	0.010505	0.010620	**0.010853**
WBSFC:	0.308	0.307	0.308	**0.308**

It is noteworthy that there is less than 1.5% variation between the three baseline tests for all endpoints except particulates. For particulates, the variation is less than 10.0%

Compared to the CARB standards for this engine series (see table 1.B) the HC, CO, and PM on this test engine are more than 90% percent below the standard, while the NOx is about 27% above the standard. The engine was not operating in a NOx reduction mode and had no other NOx reduction attachments. Thus, the engine was operating in a stable and very clean manner.

D.I.2. Conditioning Engine to Green Plus.

Biofriendly usually expects the performance of any engine to gradually improve after Green Plus is added to the fuel. Therefore, for this test it was planned to run the engine for up to 100 hours with testing periodically to see how the engine was performing. During this run despite the best effort of the CEE staff the engine encountered several transient problems that caused it to misfire for a few seconds. As far as any one could tell this was an intermittent electrical fault that was not in the computer, and happened only every 25 to 50 hours for a few seconds. However, because the engine misfired unburned fuel entered the engine, exhaust system each time, and had an adverse effect on the emissions for several hours after each problem. CEE agreed to run the engine for an extra 50 hours to allow a better idea of how Green Plus was performing.

D.I.3 AVL 8 mode testing during engine run-in with Green Plus:

During the run-in phase after Green Plus was added AVL 8 mode tests were run periodically to determine what effect the Green Plus was having on emissions and fuel economy. These were done at approximately 25-hour intervals. After the first two tests, Biofriendly adjusted the concentration of Green Plus from the original 19-ppm to 25-ppm mix based on the data seen at that time. Based on these a series of back-to-back AVL 8 mode tests were done on June 3 and 4th. The EPA and CARB standards call for three tests that have less than a 10 percent variation in each parameter measured. This was difficult to achieve in this test because the engine was continually changing and improving with time after Green Plus was added. The last three AVL 8 mode tests came the closest to satisfying the criteria and are reported here as the primary "test fuel " result in table 4.

Table 4.

AVL 8 Mode test at CEE for the state of Texas using Detroit Diesel series 60 engine.
CEE Total Weighted Emissions g/bhp-h

Treated Date: Time:	25 PPM New CPU June-4-04 16:56:42	Percent change	25 PPM New CPU June-4-04 18:26:34	Percent change	25 PPM New CPU June-4-04 19:23:34	Percent change
WBS HC:	0.0849166	**-11.85**	0.0854568	**-11.29**	0.0878719	**-8.78**
WBS CO:	1.06110	**2.05**	1.05348	**1.32**	1.02723	**-1.21**
WBS NOx:	6.07694	**-4.96**	6.03653	**-5.60**	6.09311	**-4.71**
Partic:	0.010073	**-7.18**	0.009997	**-7.88**	0.009769	**-9.99**
WBSFC:	0.304	**-1.19**	0.306	**-0.54**	0.306	**-0.54**

The average improvement from these three AVL 8 mode tests is shown below in table 4.A.

Table 4. A.
Average Decrease in each emission from the baseline average for the last three AVL 8 mode tests.

	Average of	**Average**
	last three	**percent**
treated	**8 modes**	**change**
Date:		
Time:		
WBS HC:	**0.086082**	**-10.64**
WBS CO:	**1.04727**	**0.72**
WBS NOx:	**6.06886**	**-5.09**
Partic:	**0.009946**	**-8.35**
WBSFC:	**0.305333**	**-0.76**

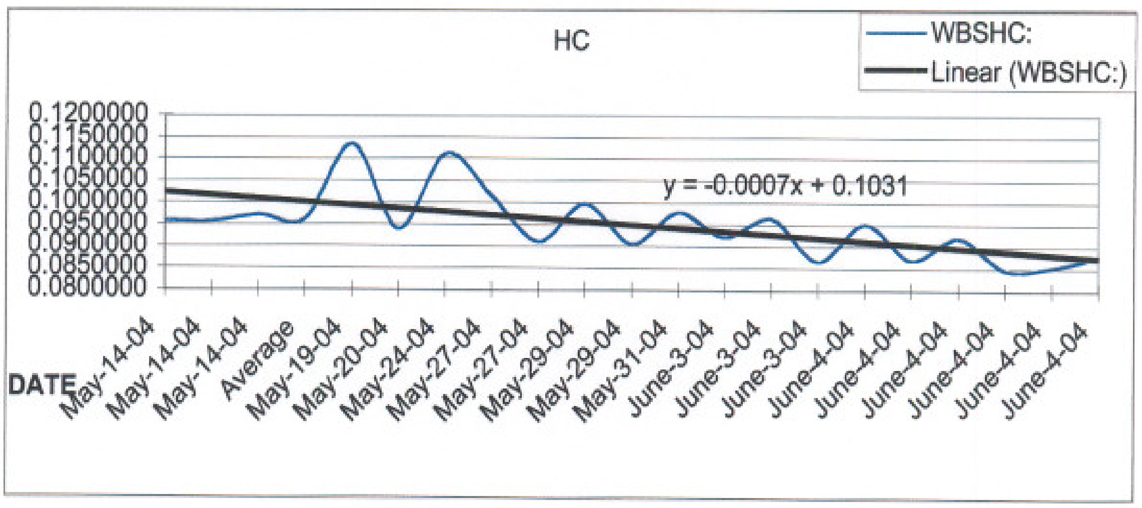
From the data shown above, it is clear there is a significant reduction in hydrocarbons (HC), Oxides of Nitrogen, and particulates.

This result is particularly pleasing as the AVL 8 mode test places a heavy weighting on the idle mode (35%). We actually found significantly larger decreases in all emissions in some of the modes that simulate on road driving under substantial loads. Selections of the full 8 mode data sheets are shown in appendix III.

D. I. 4. Downward trend in emissions after Green Plus added to the fuel.

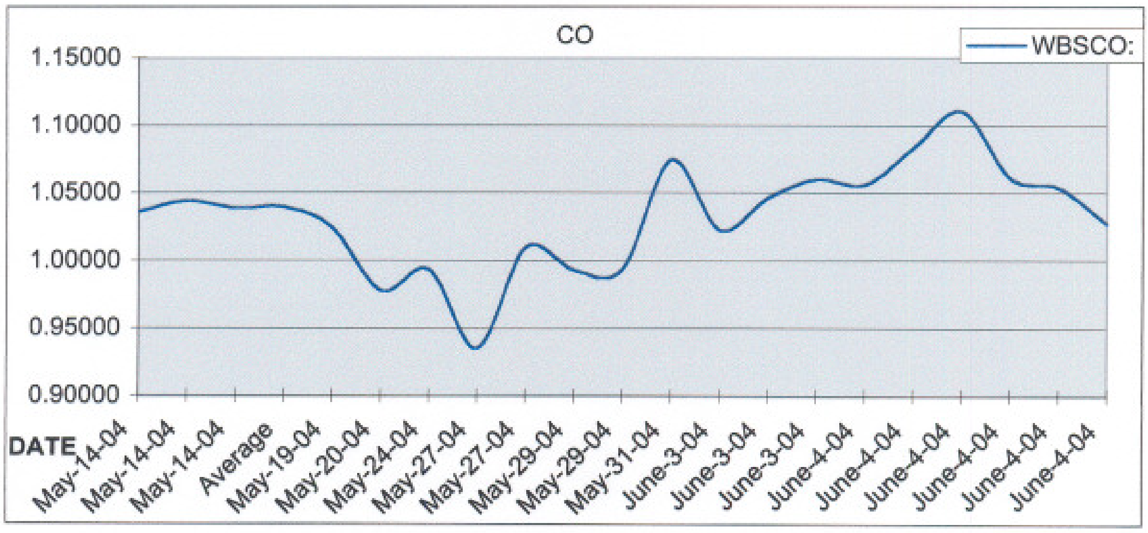
During the testing period, there were times when even larger decreases were recorded. Green Plus is thought to gradually allow the engine to clean itself and as this occurs, the combustion improves leading to more efficient power production. Most modern engines have a sophisticated computer controller monitoring many activities in the engine. We commonly find that emissions and fuel economy fluctuate after Green Plus has been added but that the overall trend is a continual improvement with gradually decreasing fluctuations. In this study we were fortunate to have collected a fairly large number of AVL 8 mode tests and can demonstrate the improvement trend by plotting the effect of Green plus with time (Figures 2-5).

Figure 2. Hydrocarbon emissions plotted against date of test. The first four are the base line tests and their average used for comparisons.



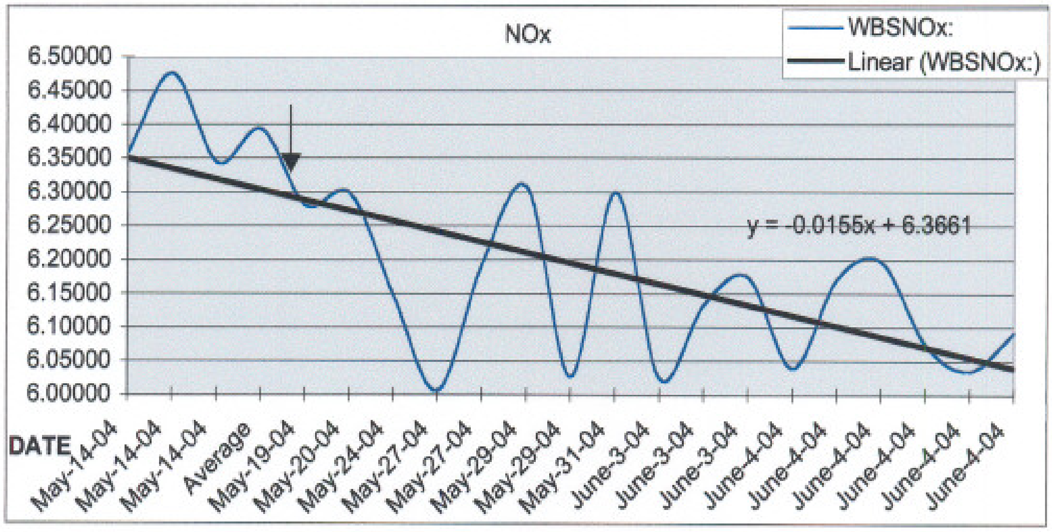
Note that the first two times the engine encountered minor control problems clearly show as major upward fluctuations in the HC emissions. However, despite these problems there is a clear downward trend in the rate of HC emissions with time after Green Plus was added. It is also clear that at the end of the testing period the downward movement in HC had not leveled out.

Figure 3. Carbon Monoxide emissions plotted against date of test. The first four are the baseline test and their average used for comparisons



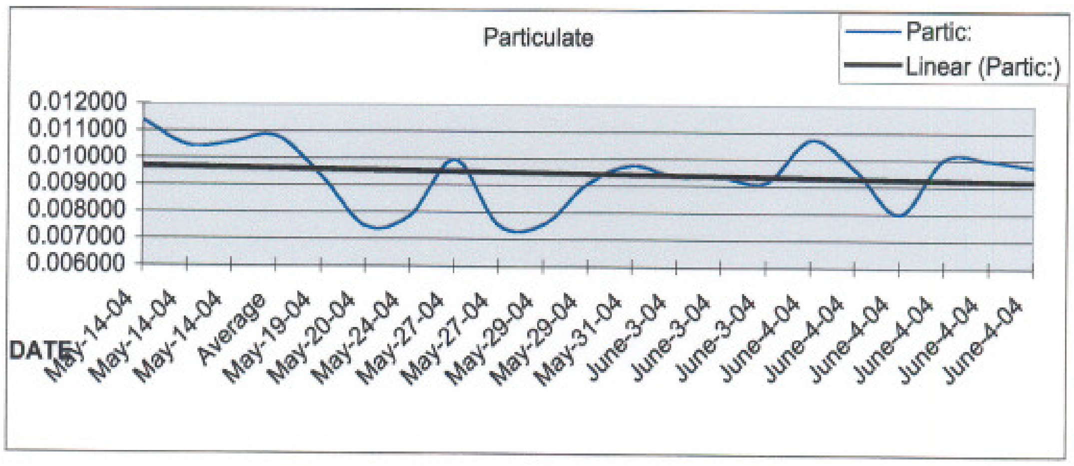
The CO emissions were already very low on this engine and as expected, it takes a long time to move CO any further downward. Towards the end of the testing period, there was the beginning of a trend downward. The very last test had an overall decrease in CO of 1.2%. In appendix III, one can also see that on many of the modes simulating on road activity with substantial loads the CO was significantly decreased.

Figure 4. Oxides of Nitrogen emissions plotted against date of test. The first four are the base lines and their average.



This figure shows very clearly that Green Plus reduces NOx and that there is a definite downward trend in the NOx emissions. This downward movement was still continuing at the end of the testing period.

Figure 5. Total particulates collected during each AVL 8 Mode test plotted against date of the test.



In figure 5, the first four data points are again the base lines and their average. It is clear there was an initial drop in particulates, typical of the effect of Green Plus. After that, there were some quite large fluctuations in the emissions, at least partly due to the minor engine problems that were encountered. Overall, there is a continuing downward trend in particulate emissions. Again, in Appendix III, there is some individual mode data for modes where there is substantial load that showed very significant decreases in particulates.

D.I.5. Simulation of EPA non-road 8 mode test.

The AVL 8 mode urban heavy duty cycle test puts a heavy weighting on the idle mode (35% of the 80% percent total). CARB and AVL explain this is due to the test design being to simulate heavy duty, truck activity in highly urbanized areas of the country such as the Los Angeles City basin. In such areas trucks may sit for significant amounts of time in traffic jams and slow downs with the engine at or near idle.

For over the road trucks that spend much of their time on the open road and non-road engines that are stationary or mobile there is a much less idle time. Although the budget did not allow us to repeat the test with a second engine, we took the EPA non road 8 mode test (see table 5 below) and applied it to the data from the AVL 8 mode test.

Table 5. Code of Federal regulations Title 40 EPA non-road 8 mode test schedule.

PART 89—CONTROL OF EMISSIONS FROM NEW AND IN-USE NONROAD COMPRESSION-IGNITION ENGINES

Appendix B to Subpart E of Part 89—Tables

Table 1_8-Mode Test Cycle for Variable-Speed Engines

Test segment	Mode number	Engine speed \1\	Observed torque \2\ (percent of max. observed)	Minimum time in mode (minutes)	Weighting factors
1	1	Rated	100	5.0	0.15
1	2	Rated	75	5.0	0.15
1	3	Rated	50	5.0	0.15
1	4	Rated	10	5.0	0.10
2	5	Int	100	5.0	0.10
2	6	Int	75	5.0	0.10
2	7	Int	50	5.0	0.10
2	8	Idle	0	5.0	0.15

\1\ Engine speed (non-idle): ± 2 percent of point. Engine speed (idle): Within manufacturer's specifications. Idle speed is specified by the manufacturer.

\2\ Torque (non-idle): Throttle fully open for 100 percent points. Other non-idle points: ± 2 percent of engine maximum value. Torque (idle): Throttle fully closed. Load less than 5 percent of peak torque.

In Table 6, we show the results of these calculations for the three base line and the last three AVL 8 mode data sets.

Table 6. Emissions calculations for simulated 8 mode non road test.

CEE Total Weighted Emissions g/bhp-h

	Baseline 1	Baseline 2	Baseline 3	Baseline average
WBS HC	0.0733298	0.0709347	0.0721565	0.072140
WBS CO	1.08827	1.09405	1.1115	1.09794
WBS NOx	5.97297	6.05947	5.95838	5.99694
WBS FC	0.299	0.296	0.299	0.298

Treated 1	Treated 2	Treated 3	Treated average	% change compared to baseline average
0.059122	0.0613976	0.062426	0.0619118	-14.18%
1.11208	1.08888	1.05021	1.069545	-2.59%
5.65766	5.61108	5.65969	5.635385	-6.03%
0.295	0.297	0.297	0.297	-0.34%

There is a clear and significant reduction in all the tail pipe emissions. **NOx and HC reductions of 6% and 14% are particularly noteworthy**. This simulation could not be done for the particulates as they are measured as from one filter that collects particles from all 8 modes.

D.I.5. Fuel Economy after Green Plus treatment.

Many fuel treatments reduce emissions at the cost of loss in fuel economy. In general, Biofriendly has found that Green Plus improves fuel economy. During the 8 mode tests fuel economy by CEE staff was estimated both from the 8 mode values and from an extra test at the end of each 8 mode where the fuel economy was measured for three 10 minute periods with the engine running in one particular mode deemed representative of over the road travel. The average fuel economy was than calculated from the average of these three ten minute runs.

Table 7 shows fuel economy for a set of runs before Green Plus was added and again several runs soon after it was added.

Table 7.

10 min Baseline test			RPM:	1591	Torque:	438	Oil Temp:	195		
grams fuel /10mins										
	May-11-04	May-11-04	May-11-04		May-27-04	May-27-04	May-27-04	May-27-04	May-27-04	May-27-04
Start:	19000	22020	25030		21410	24430	27432	1500	4497	7515
End:	22020	25030	28045		24430	27432	30433	4497	7515	10534
Total (g):	3020	3010	3015		3020	3002	3001	2997	3018	3019
Average		3015				3008			3011	
% Change						-0.24			-0.12	
		May-29-04	May-29-04	May-29-04	May-31-04	May-31-04	May-31-04	June-4-04	June-4-04	June-4-04
		3000	5986	8966	17100	20081	23050	16300	19297	22250
		5986	8966	11955	20081	23050	26035	19297	22250	25208
		2986	2980	2989	2981	2969	2985	2997	2953	2958
			2985			2978			2969	
			-1.00			-1.22			-1.51	

The values in red in table 7 are the average improvement in fuel economy. Even though there were some fluctuations, it is clear there is a gradual improvement in fuel economy in the Series 60 engine as the time with Green Plus present increased. Due to lack of time on the last day of the test, fuel economy runs were not done for the last three runs of the day that have been shown else where as the definitive emissions test. Therefore, a final set of fuel economy runs was done on June 9, 2004. These are shown below in table 8.

Table 8.

10 min baseline test		RPM:1680:	Torque:200		Oil Temp:	195						
	May-11-04	May-11-04	May-11-04	June-9-04	June-9-04	June-9-04	June-9-04	June-9-04	June-9-04	June-9-04	June-9-04	June-9-04
Start	**19000**	**22020**	**25030**	2000	3881	5756	7629	9492	11350	13214	15048	16871
End	**22020**	**25030**	**28045**	3881	5756	7629	9492	11350	13214	15048	16871	18684
Total (g)	**1915**	**1920**	**1925**	**1881**	**1875**	**1873**	**1863**	**1858**	**1864**	**1823**	**1834**	**1813**
		1920			**1876**			**1862**			**1823**	
% Change					**-2.29**			**-3.03**			**-5.03**	

The values in red are the percent improvement in fuel economy compared to the baseline from May 11, 2004. **Overall, the fuel economy improved by 5% after 155 hours of engine running time after Green Plus was added.**

D.I.6 Concluding summary:

The data developed for Biofriendly by CEE and presented in this report in summary form are conclusive evidence that Green Plus added to diesel fuel reduces emissions and improves fuel economy. Even though Green Plus was tested in a clean CARB certified engine using a relatively clean fuel it achieved remarkable results. After only 155 hours of engine running time, there were significant reductions in HCs, NOx, and particulates in the AVL urban 8 mode test. When the weightings of the 8 mode were adjusted to be more consistent with over the road long distance driving or off road engine use (Similar to EPA 8 mode) the results were even more significant and CO also showed a significant drop. Green Plus also produced a meaningful improvement in fuel economy. The overall results as demonstrated in the graphs suggest strongly that the engine was still improving when the test was completed.

It is clear that Green Plus produces significant reductions in emissions in modern heavy-duty diesel engines. Unlike many Technologies Green Plus reduces all the major emissions. The results indicate that prolonged use of Green Plus will be even more effective than shown in this report.
Respectfully submitted this 21st day of June 2004.

APPENDIX I. SUMMARY FINAL REPORT FROM CEE.

APPENDIX II. SAMPLE CERTIFICATION PAPERS FROM CEE.

APPENDIX III. FINAL WEIGHTED DATA SHEETS FROM EACH 8 MODE TEST PERFORMED DURING THE BIOFRIENDLY "GREEN PLUS" EMISSIONS TESTING ON A DETROIT DIESEL, SERIES 60 ENGINE.