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# FINAL REPORT

**Exhaust Emission Equivalence Testing  
Comparing TxLed Reference Fuel  
To a No. 2 Diesel Candidate Fuel  
Treated with Viscon Polymer Additive (1 oz. to 20 gal.)  
Using a Cummins Model M-11 400 HP Diesel Engine**

For

**GTAT California  
3121 Standard Street  
Bakersfield, California 93308**

**The preparation of this report is based on work funded in part by the  
State of Texas through a Grant from the  
Texas Commission on Environmental Quality**

Revised  
July 20, 2005

By  
**Olson-EcoLogic Engine Testing Laboratory**

\_\_\_\_\_  
Approved

\_\_\_\_\_  
Date



## **Introduction**

This final report documents the emission testing project conducted for GTAT California of Bakersfield, California. This project has the objective of showing exhaust emission equivalency between a candidate fuel treated with the proprietary Viscon polymer additive (1 oz. to 20 gal.) and the TxLed reference specification fuel when tested by the official EPA transient cycle emission test protocol. This project has been done in accordance with the detailed protocol and requirements specified by the Texas Commission for Environmental Quality in Austin, Texas.

## **Test Facility and Capability**

Olson-EcoLogic as an independent emission test laboratory is an ISO 9001:2000 registered facility. It is officially recognized and listed by EPA and CARB as a capable emission test facility for the protocols conducted in this project. Dozens of transient cycle emission tests have been submitted to and accepted by CARB for other clients. Over the years literally thousands of emission tests have been conducted for CARB and in accordance with CARB and EPA requirements. All engine operation and transient cycle emission testing for this project was conducted at the Olson-EcoLogic Engine Test Laboratory in Fullerton, California on their 450 horsepower electric dynamometer in test cell no. 1. All test activity was under the direction and responsibility of Donel R. Olson. Mr. Olson is a California registered professional mechanical engineer with 40 years of experience in the measurement and analysis of engine emissions. Over twenty chassis and engine emission test laboratories in the United States and Germany have been under his past ownership and direction during the last 30 years. Mr. Olson is also the co-founder of Olson-Horiba Instruments and has been responsible for designing and providing dozens of complete emission test facilities around the world. Prior work experience included three years as an engineering project manager at Southwest Research Institute in Texas. He also started and managed Olson Laboratories, Inc. a public company that grew to be the largest independent emission measurement organization and provider of emission measurement systems in the world. This company was ultimately sold to Northrop Corporation in California.

The specific emission test cell for the project conducted here consists of the following instruments and equipment: Horiba gaseous analysis instruments for THC, CH<sub>4</sub>, CO and CO<sub>2</sub>, Rosemont chemiluminescent analyzers for NO<sub>x</sub> and NO, Sierra Model BG-2 modified and upgraded particulate sampling system; the engine dynamometer is a Baldor computer controlled 450 horsepower full electric system. Fuel consumption was measured gravimetrically with use of a precision scale and simultaneously fuel consumption can be calculated by the standard carbon balance method for comparison. Custom computer capability based on modified Wonderware software is utilized for all control and data functions. Other details of the Olson-EcoLogic emission test facility capability can be viewed and obtained on the Olson-EcoLogic website at [www.ecologiclabs.com](http://www.ecologiclabs.com). A copy of the Olson-EcoLogic ISO 9001:2000 Certificate and the CARB letter of emission testing capability is provided in the Appendix to this report.



### **Engine and Instrumentation Preparation**

The Cummins 2000 Model M-11 400E diesel test engine used in this project was provided as a recently rebuilt engine (4/25/05) by the GTAT client. Engine serial no. 34989531. The rebuilt engine specifications and engine performance test data are provided in the Appendix. This on-road engine was originally built new to California exhaust emission standards (grams per bhp-hr) of 1.3 THC, 15.5 CO, 4.0 NO<sub>x</sub> and 0.10 PM. The engine was adapted with a soft coupling and connected to the electric engine dynamometer for 25 hours of stabilizing operation under representative load conditions for subsequent EPA transient cycle emission testing. Preparation of the engine prior to testing included thermocouple and pressure transducer installations in addition to installation of a Sierra air mass sensor to measure combustion air in real time and connection of the exhaust gas to the Olson-EcoLogic heavy-duty CVS (Constant Volume Sampler) for proper exhaust gas dilution under constant mass conditions.

### **Test Fuel**

The TxLed reference fuel and the candidate fuel were provided by the client. The candidate fuel was treated with the proprietary Viscon polymer additive (1 oz. to 20 gal.). Fuel inspections are provided in the Appendix.

### **Emission Testing and Quality Control Protocols**

Dilute exhaust gases from the CVS were continuously collected and routed to the gaseous analyzers for analysis by volume and for final calculation of corrected mass concentrations using temperature, barometric pressure and humidity. All variables were automatically integrated from the second by second raw data. Simultaneously and continuously exhaust samples were routed to the Sierra BG-2 particulate sampler for capture of dilute samples over the test cycle on a pre-weighed paper filter media and weighed again to determine the mass concentration of PM.

The computer software program captures and integrates all raw data continuously over the test cycle recording and correcting the data every second over the 1200 seconds of engine operation for each hot start transient test. These measured and recorded data, after correction, become the basis for the final mass per brake horsepower-hour data that are provided in the summary reports listed here. In addition to correction of the raw data for temperature, barometric pressure and humidity the data are corrected for any hydrocarbons and carbon monoxide present in the dilution air introduced through the CVS for the dilution air only. This is done by continuously collecting the dilution air sample over the test cycle in a bag for analysis of the dilution air at the end of the engine test cycle. The measured dilution air bag concentrations of HC, NO<sub>x</sub> and CO are subtracted from the continuously integrated dilute exhaust gas samples to provide the correct exhaust gas values.

The quality control function is accomplished by automatic triplicate zero and span gas checks at the beginning and end of each test cycle. The computer automatically corrects any drift or offset that may occur during the cycle to assure that real time data are compared to the correct



instrument calibration curve. After the test is completed the quality audit function is accomplished by reviewing the real time 1200 seconds of data to be sure all control parameters are within specified and required values and that there are no obvious discrepancies in the 1200 seconds of all recorded data.

### **Test Protocol Sequence**

The TCEQ test requirements involved the following testing sequence:

1. Operation of the test engine over a representative load cycle with the reference (baseline) fuel for 25 hours to stabilize the emissions was initially conducted.
2. Conduct of a hot start EPA 1200 second transient cycle no emission measurements) followed by an official engine MAP measurement of maximum engine power over the speed range with the reference fuel was conducted (this conditioning protocol was used and recorded prior to every fuel change and at the beginning of each test day – however, only the original reference fuel engine performance MAP was normalized and used in all subsequent emission testing).
3. Triplicate hot-start EPA transient cycle emission tests were conducted and repeated a second day using the reference fuel to obtain the baseline comparison data (a total of six baseline reference tests).
4. Upon completion of the reference fuel testing triplicate EPA transient cycle data were obtained with the candidate fuel only.
5. The Viscon polymer additive was then mixed with the candidate fuel by the client and the engine was operated for 70 hours over a representative load cycle to condition the engine with the Viscon treated candidate fuel – abbreviated measurement of emissions during this conditioning operation (not reported here) were conducted periodically to monitor the change in emissions.
6. Triplicate official hot-start EPA transient cycle emission tests operating with the Viscon treated candidate fuel were conducted each day for three separate days (nine tests total) to provide the final average data for comparison to the original six test average conducted with the baseline reference fuel.
7. Finally, immediately after completion of the testing with the Viscon treated fuel, (with no engine operation in between) triplicate hot-start EPA transient cycle emission tests were conducted with the reference fuel only to obtain some measure of residual emission effects caused by the Viscon treated candidate fuel.



## Test Results

All of the exhaust emission test data accumulated in this project are chronologically listed in the Table 1 Summary in accordance with the TCEQ requirements. Table 1A summarizes the calculated changes in emissions between the Viscon treated candidate fuel and the tolerance adjusted TxLed reference fuel. Test validation criteria regression results for each test calculated in accordance with CFR 40 Part 86 Sec. 1341-90 are provided in Table 2. Detailed individual test results and engine MAPS are provided in the Appendix.

## Discussion of Results:

The primary objective of this project was to demonstrate equivalency (or better) when comparing the Viscon treated candidate fuel to the TxLed baseline reference fuel under identical test conditions, especially for NO<sub>x</sub>, PM and fuel consumption. For these variables the Viscon treated candidate fuel was significantly better than the TxLed reference fuel thereby satisfying the TCEQ requirement of equivalency or better.

The TCEQ requirements specify equivalence calculations in a detailed format that uses a calculated tolerance level for the TxLed reference fuel emission results. Measurements of the Viscon treated candidate fuel emissions are then compared to the TxLed reference fuel results after the averages have been adjusted with the calculated tolerance adjustment. Data in Table 1A have been calculated in accordance with the TCEQ specified formulas and the results are summarized as follows:

	-----Grams/bhp-hr-----			
	<u>NO<sub>x</sub></u>	<u>THC</u>	<u>NMHC</u>	<u>PM</u>
Viscon treated candidate fuel average (1 oz. to 20 gal.)	4.811	0.1380	0.1040	0.1820
Reference fuel average after tolerance level calculation	5.017	0.1279	0.0616	0.2055
<b>Percent improvement with Viscon treated fuel</b>	<b>4.1 %</b>	<b>- 7.9 %</b>	<b>- 68.8 %</b>	<b>11.4 %</b>

In addition to the exhaust emission results the average fuel economy as measured gravimetrically was improved by 4.9% with the Viscon treated candidate fuel compared to the TxLed reference fuel.

Data variance was measured for every test using the official EPA-CFR calculations for regressions and slope intercept. These data are summarized in Table 2 and are all within EPA specified limits.





## Table 1A

### TxLED Alternative Diesel Fuel Formulation Test Data Comparison Calculations

#### GTAT California

2000 Cummins Model M-11 400 hp Test Engine

Olson-Ecologic Engine Testing Laboratory

All Emission Data are in gms/bhp-hr

**Average emissions during testing  
with the treated candidate fuel**

	Average	Untreated Candidate Fuel		HD Engine Emission	
		Average	Percent Change	Standard	Percent of Standard
NOx	4.811	5.391	11%	4.0	120%
THC	0.138	0.142	3%	1.3	11%
NMHC	0.104	0.064	-63%		
PM	0.182	0.254	28%	0.10	182%

**Average emissions during testing  
with the reference fuel**

	Average	Untreated Candidate Fuel		HD Engine Emission	
		Average	Percent Change	Standard	Percent of Standard
NOx	5.04	5.391	7%	4.0	126%
THC	0.131	0.142	8%	1.3	10%
NMHC	0.069	0.064	-8%		
PM	0.213	0.254	16%	0.10	213%

**Pooled Standard Deviation:**

NOx	0.189787274
THC	0.014906694
NMHC	0.022729674
PM	0.030508703

Number of Tests of candidate and reference fuels: 15

Comparison Results	NOx	THC	NMHC	PM
Candidate Fuel Average- as tested	<b>4.8110</b>	<b>0.1380</b>	<b>0.1040</b>	<b>0.1820</b>
Reference Fuel Average - as tested	<b>5.0400</b>	<b>0.1310</b>	<b>0.0690</b>	<b>0.2130</b>
Tolerance Level	0.0504	0.0026	0.0014	0.0043
Pooled Standard Deviation	0.1898	0.0149	0.0227	0.0305
Sqrt of 2/n	0.3651	0.3651	0.3651	0.3651
t(a,2n-2)	1.0560	1.0560	1.0560	1.0560
Reference Fuel Average - as calculated	<b>5.0172</b>	<b>0.1279</b>	<b>0.0616</b>	<b>0.2055</b>
Percent Difference from Reference Fuel	<b>4.1%</b>	<b>-7.9%</b>	<b>-68.8%</b>	<b>11.4%</b>

*\*negative value = greater emissions*





**Table 2**  
**Regression Results**  
**GTAT California**

**E.P.A. Hot Start Transient Cycle Emissions Tests**  
**From CFR 40 Part 86 Sec. 86.1341-90 Test cycle validation criteria**

	TEST 2		TEST 4		TEST 5		TEST 6		TEST 7	
	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.
HP.	0.9783	0.0894	0.9792	0.069	0.9788	-0.0563	0.9785	0.103	0.9786	0.0766
RPM.	0.9906	11.5262	0.9906	11.6004	0.9905	11.6798	0.9846	19.5754	0.9846	19.5699
TORQUE.	0.9712	2.2145	0.9723	1.3589	0.9729	1.0426	0.9714	1.4061	0.9712	1.4909

	TEST 8		TEST 20		TEST 21		TEST 22		TEST 45	
	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.
HP.	0.98	0.0425	0.9785	-0.0439	0.9797	0.0685	0.9805	0.0766	0.9789	0.1267
RPM.	0.9848	19.3713	0.9905	11.7319	0.9904	11.8002	0.9904	11.7338	0.9847	19.4636
TORQUE.	0.9725	1.4933	0.9731	1.2334	0.9756	0.942	0.9764	0.6994	0.9755	1.1877

	TEST 46		TEST 47		TEST 49		TEST 50		TEST 51	
	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.
HP.	0.9808	0.1007	0.9802	0.0166	0.9803	0.0596	0.9812	0.0145	0.9812	0.0413
RPM.	0.9905	11.7065	0.9906	11.5914	0.9905	11.6599	0.9906	11.6141	0.9905	11.6455
TORQUE.	0.9764	1.3898	0.9762	1.0802	0.9764	1.3284	0.9763	1.3735	0.9762	1.3723

	TEST 55		TEST 56		TEST 57		TEST 59		TEST 60	
	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.	SLOPE	Y.INT.
HP.	0.9807	0.0613	0.9801	0.1436	0.9799	0.1521	0.9809	-0.089	0.9805	-0.0201
RPM.	0.9848	19.3864	0.9905	11.6086	0.9905	11.7368	0.9905	11.6825	0.9905	11.6426
TORQUE.	0.9758	1.3358	0.9752	1.3126	0.9751	1.1318	0.9753	1.2286	0.9749	1.4877

	TEST 61	
	SLOPE	Y.INT.
HP.	0.9809	-0.0237
RPM.	0.9905	11.7039
TORQUE.	0.9755	1.1318

	Speed	Torque	BHP
<b>Regression Line Tolerances</b>			
<b>Petroleum-fueled and methanol-fueled diesel engines</b>			
Standard error of estimate (SE) of Y on X .....	100 rpm .....	13 pct. of power map maximum engine torque	8 pct. of power map maximum BHP.
Slope of the regression line, m .....	0.970 to 1.030 .....	0.83-1.03 (hot), 0.77-1.03 (cold)	0.89-1.03 (hot), 0.87-1.03 (cold).
Coefficient of determination, r <sup>2</sup> .....	<sup>1</sup> 0.9700 .....	<sup>1</sup> 0.8800 (hot), <sup>1</sup> 0.8500 (cold) .....	<sup>1</sup> 0.9100.
Y intercept of the regression line, b .....	50 rpm .....	15 ft-lb .....	5.0
<b>Gasoline-fueled and methanol-fueled Otto-cycle engines</b>			
Standard error of estimate (SE) of Y on X .....	100 rpm .....	10% (hot), 11% (cold) of power map max. engine torque.	5% (hot), 6% (cold) of power map maximum BHP.
Slope of the regression line, m .....	0.980 to 1.020 .....	0.92-1.03 (hot), 0.88-1.03 (cold)	0.93-1.03 (hot), 0.89-1.03 (cold).
Coefficient of determination, r <sup>2</sup> .....	<sup>1</sup> 0.9700 .....	<sup>1</sup> 0.9300 (hot), <sup>1</sup> 0.9000 (cold)	<sup>1</sup> 0.9400 (hot), <sup>1</sup> 0.9300 (cold).
Y intercept of the regression line, b .....	25 (hot), 40 (cold) .....	4% (hot), 5 (cold) of power map max. engine torque.	2.0% (hot), 2.5% (cold) of power map BHP.

<sup>1</sup>Minimum.



## **APPENDIX**

### **Table of Contents**

1. ISO 9001:2000 Certificate
2. CARB List of Recognized Labs and CARB Letter of Approval
3. Test Engine Report and Specifications
4. Test Fuel Specifications
5. Engine MAPS
6. Individual Test Results
7. EPA email (Jim Caldwell) specifying that Viscon is not subject to the registration requirements for a fuel additive at 40 CFR 79
8. Viscon technical data for diesel applications and MSDS information



UNE DIVISION DU GROUPE CSA

QMI

90 Burnhamthorpe Ouest, Suite 300  
Mississauga, Ontario, Canada L5B 3C3  
Téléphone: (905) 272-3920  
Télécopieur: (905) 272-3942

# CERTIFICAT D'ENREGISTREMENT

QMI issues this certificate to:

## Olson-ECologic Engine Testing Laboratories, LLC

1370 South Acacia Avenue  
Fullerton, California  
92831 USA

which has demonstrated that its Quality Management System is in compliance with:

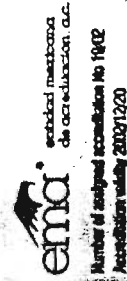
### ISO 9001:2000

The following scope of registration applies:

**Engine and Vehicle Testing.**

\* Further clarification regarding the scope of this certificate and the applicability of ISO 9001:2000 requirements may be obtained by consulting this organization

Certificate Number:	013357
SIC Number:	8734
Date of Original Registration:	July 1, 2003
Date of Current Registration:	July 1, 2003



Number of assigned accreditation No 1902  
accreditation validy 2009/12/20



*W. J. Tilford*  
Wendy J. Tilford  
President

INDEPENDENT LABORATORIES EQUIPPED TO CONDUCT EXHAUST/EVAPORATIVE EMISSIONS TESTS

While the California Air Resources Board (ARB) does not currently approve laboratories for compliance testing, certain independent commercial laboratories have become accepted, based on information submitted to the ARB, as being properly equipped to perform specialized tests, in accordance with applicable Federal and California test procedures. Their equipment is similar or equivalent to that used at the Haagen-Smit Laboratory. However, these private laboratories are neither inspected nor supervised by the ARB to determine if candidate devices for Vehicle Code (VC) Section 27156 exemption are tested in strict adherence to ARB's test letter and relevant test procedures. For this reason, ARB relies on confirmatory tests conducted at its Haagen-Smit Laboratory for a final determination of the emission performance of add-on devices. Listed below are several such commercial laboratories.

Laboratory Name	Location Address	Contact Personnel	Telephone	Special Testing Capabilities	Comments
<b>Arizona</b>					
Automotive Testing Laboratory, Inc.	263 S. Mulberry Street Mesa, AZ 85202	Mr. Dennis McClement	(480) 649-7906	Enhance Evap. Emission test SFTP-US06, AC2 (alternative)	
<b>California</b>					
Automobile Club of Southern California – Automotive Research Center	1577 S. Valley Vista Dr. Diamond Bar, CA 91765	Mr. Steve Mazor	(909) 612-2560	SFTP – US06, AC2 (alternative)	
Automotive Testing & Development Services, Inc. (ATDS)	400 S. Etiwanda Avenue Ontario, CA 91761	Mr. Linwood Farmer	(909) 390-1100	SFTP-US06, Enhanced Evap. Emission test, Diesel vehicle test, Motorcycle test	
California Analytical Instrument Corp. (CAI)	1238 West Grove Ave Orange, CA 92665	Mr. Pete Furton	(714) 974-5560	Enhanced Evap. Emission test	
California Environmental Engineering (CEE)	3231 S. Birch Street Santa Ana, CA 92707	Mr. Joe Jones	(714) 545-9822	Diesel vehicles, motorcycles, & CNG/LPG vehicles, Enhanced Evap., SORE emission test	Engine Dyno 13-Mode Steady-State test is available, if required
Center for Environmental Research & Technology (CE-CERT)	University of California, Riverside 1084 Columbia Ave Riverside, CA 92507	Mr. Dave Martis	(909) 781-5737	SFTP – US06, AC2 (alternative)	
Olson-Ecologic Engine Testing Laboratories, LLC.	1370 South Acacia Ave Fullerton, CA 92831	Mr. Donel R. Olson	(714) 774-3385	Heavy-duty diesel engine transient test, SORE emission test, CVS-75 FTP on LDVs/MDVs & motorcycles (including CNG/LPG vehicles)	Engine Dyno 13-Mode Steady-State test is available, if required
Edelbrock Corporation – Emissions Laboratory	2700 California Street P.O. Box 2936 Torrance, CA 90503	Mr. Jack Mayberry	(310) 781-2222		
Mercedes-Benz Service Corporation – Los Angeles Technology Center	4035 Via Oro Avenue Long Beach, CA 90803	Mr. Kenneth Griggs	(310) 549-7600	SFTP-US06	
Northern Calif. Diagnostic Lab., Inc.	2748 Jefferson Street Napa, CA 94558	Mr. Mike Spencer-Smith	(707) 258-1753	Motorcycle test	
Quantum Technologies Emissions Laboratory	25242 Arctic Ocean Dr. Lake Forest, CA 92630	Mr. David Carson Dcarson@qtww.com	(949) 930-3476	SFTP-US06, AC2 (alternative)	
University of California Riverside Veh. Emissions Research Lab	1200 Columbia Ave Riverside, CA 92507	Mr. Dave Martis	(909) 781-5737	Diesel vehicle test	
<b>Colorado</b>					
Colorado Inst. For Fuel & High Altitude Eng. Research – Colorado School of Mines	1500 Illinois Street Golden, CO 80401-1887	Mr. Michael S. Graboski	(303) 273-3973	Heavy-duty Engine Dyno test Diesel vehicle test	
Environmental Testing Corp	1859 Jasper Street Aurora, CO 80011	Mr. Bob Begue	(303) 344-5470	Diesel vehicle test	
National Center for Veh. Emissions Control & Safety-Dept of Industrial Sciences	Colorado State University Fort Collins, CO 80523	Ms. Birgit H. Wolff	(303) 491-7240		



# Air Resources Board

9480 Telstar Avenue, Suite 4  
El Monte, California 91731 [www.arb.ca.gov](http://www.arb.ca.gov)



Alan C. Lloyd, Ph.D.  
Agency Secretary

Arnold Schwarzenegger  
Governor

Reference No. A-2005-079

April 13, 2005

Mr. Donel R. Olson, President  
Olson-Ecologic Engine Testing Laboratories, LLC  
1370 South Acacia Avenue  
Fullerton, CA 92831

Dear Mr. Olson:

This is in response to your letter dated March 29, 2005, regarding your request for the Air Resources Board (ARB) to amend its list of independent laboratories in order to update the testing capabilities of Olson-Ecologic Engine Testing Laboratories, LLC (Olson-Ecologic). Specifically, you would like the list to show that Olsen-Ecologic is now capable of performing transient heavy-duty diesel engine testing and emission testing on small off-road engines (SORE).

Based on the information you provided, we have amended the list of independent laboratories (see enclosed) to include transient heavy-duty diesel engine testing and SORE emission testing on Olson-Ecologic's testing capabilities.

Please be reminded that the list of independent laboratories is maintained solely for the purpose of providing Vehicle Code Section 27156 exemption applicants with laboratories that could perform proper emissions testing for aftermarket parts evaluation. Inclusion of a laboratory on the list is not an approval or accreditation of the laboratory by ARB, nor does it guarantee acceptance in any special test projects run by ARB. The laboratory must qualify for participation based on specific criteria set for the project.

If you have any questions regarding this letter, please contact Mr. Paul Betterman, staff engineer, Aftermarket Parts Section, at (626) 575-6778.

Sincerely,

Allen Lyons, Chief  
Mobile Source Operations Division

Enclosure



Valley Truck Parts & Equipment  
3395 E Malaga Ave  
Fresno, CA 93725

## Dynomometer Test Report

Technician: SAMMY  
Date: 4/27/05 14:43  
Customer: VTP  
Order #: S83022  
Engine: CUM.M11-400E+  
CPL: 2037  
Serial #: 34989531  
HP: 400@1800

Description	Half Load	Full Load
Engine RPM	0	1680
Torque	0	1250
Horsepower	0	400
Oil Pressure (Idle)	0	35
Oil Pressure (Full)	0	42
Water Temperature	0	180
Blow-By	0	4"

Total Miles N/A

Accessories 0

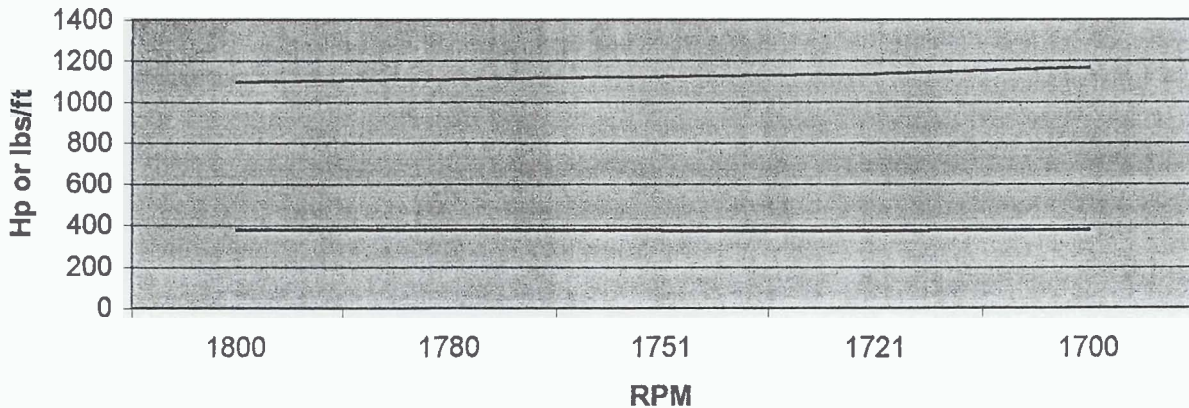
Rod Bearings: NEW STD.

Main Bearings: NEW STD.

Cam: NEW

Comments: Ran engine on dyno for one hour. Engine had 4" of blowby ran at 185degrees water temp. Had 400 horsepower at 1250 foot pounds of torque 1680 RPM. Engine was a V.T.P. overhaul

### Dyno Graph



— Series1 — Series2

**VALERO**  
**MARKETING AND SUPPLY COMPANY**

**Ultra Low Sulfur Diesel**

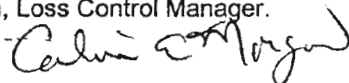
Date: June 8, 2005

Sample: Tank 304 sample from Valero Three Rivers Texas

Sample Date: May 25, 2005

Test Results per BSI Inspectorate, Los Angeles, Lab # LAC05-8736

Prepared by: Calvin Morgan, Loss Control Manager.



**Sample meets specifications for 2-D-S15 Diesel under ASTM D-975-04**

TEST	UNITS	METHOD	RESULTS	SPECS
Flash Point	°C	D-93	86.8	52 min
Water & Sediment	%vol	D-1796	<0.025	0.05 max
Distillation:	°C	D-86		
I.B.P.			207.4	
10% Rec.			230.4	
50% Rec.			262.5	
90% Rec.			307.8	282-338°C
FBP			336	
Residue			0.7	
Loss			0.4	
Viscosity @40°C	cst	D-445	3.059	1.9 - 4.1
Ash	%wt	D-482	<0.001	0.01 max
Sulfur	ppm	D-5453	<1	15 max
Copper Strip Corrosion	rating	D-130	1A	No. 3 max
Cetane Index		D-4737	49.2	40 min
Cloud Point	°C	D-2500	< -21	
Carbon Residue 10%	%wt	D-524	<0.1	0.35 max
Lubricity, HFRR @60°C	micron	D-6079	291	520 max

**Sample meets TxLED Regulations Rule §144.315(c)(3)**

TEST	UNITS	METHOD	RESULTS	SPECS
Sulfur	ppm	D-5453	<1	15 max
Total Aromatic Hydrocarbon	%vol	D-5186	8.6	10 max
Polycyclic Aromatic Hydrocarbon	%wt	D-5186	0.6	1.4 max
Nitrogen	ppm	D-4629	9	10 max
Cetane Number		D-613	52.8	48 min
API Gravity Index		D-287	36.7	33-39
Viscosity @40°C	cst	D-445	3.059	2.0 - 4.1
Flash Point	°F	D-93	188.3	130 min
Distillation:	°F	D-86		
I.B.P.			405.3	340 - 420
10% Rec.			446.7	400 - 490
50% Rec.			504.6	470 - 560
90% Rec.			586.1	550 - 610
End Point			636.8	580 - 660



CERTIFICATE OF ANALYSIS

JOB NO.	115976
LAB NO.	LAC05-8736

VESSEL	SAMPLING AND ANALYSIS	REPORT DATE	06/03/05
PRODUCT	ULTRA LOW SULFUR DIESEL		
TERMINAL/PORT	OLSSON - ECOLOGIC		
SAMPLE FROM	TANK 304	DATE SAMPLED	06/02/05
SAMPLE SUBMITTED BY	BSI INSPECTORATE		
ANALYSIS PERFORMED BY	BSI INSPECTORATE		
CLIENT(S) REF.	198501		

TEST	METHOD REFERENCED	RESULTS
GRAVITY, API	D-287	36.7
VISCOSITY AT 40 DEG C. cst	D-445-01	3.059
SULFUR, PPM	D5453	<1
FLASH DEG F PMCC	D-93-00B	188.3
CLOUD POINT DEG C	D-2500	<-21
SEDIMENT & WATER VOL. %	D-1796-97	<0.025
COPPER STRIP 3 HRS. @ 50 DEG. C	D-130	1A
AROMATICS, SFC, WT% / VOL%	D-5186	7.9 / 8.6
PNA IN DIESEL, SFC, WT%	D-5186	0.6
CETANE INDEX	D-4737	49.2
CETANE NUMBER	D-613	52.8
CARBON RESIDUE, MCRT, WT% (10% BTMS)	D-4530	<0.1
RAMSBOTTOM, BY CORRELATION, WT% (10% BTMS)	D-524	<0.1
NITROGEN CONTENT, TOTAL, PPM	D-4629	9
ASH CONTENT, WT%	D-482	<0.001
LUBRICITY, UM	D-6079	291
DISTILLATION, DEG. F.	D-96	I.B.P. 405.3
		10% REC. 446.7
		50% REC. 504.6
		90% REC. 586.1
		95% REC. 609.5
		F.B.P. 636.8
		RES. 0.7
		LOSS 0.4

JH  
Q-ANAL  
REV #3 -

BSI INSPECTORATE





**Low Sulfur Diesel**

Date: June 8, 2005

Sample: Tank 333 sample from Valero Three Rivers Texas

Sample Date: May 25, 2005

Test Results per BSI Inspectorate, Los Angeles, Lab # LAC05-8737

Prepared by: Calvin Morgan, Loss Control Manager.

**Sample meets specifications for 2-D-S500 Diesel under ASTM D-975-04**

TEST	UNITS	METHOD	RESULTS	SPECS
Flash Point	°C	D-93	88	52 min
Water & Sediment	%vol	D-1796	<0.025	0.05 max
Distillation:	°C	D-86		
I.B.P.			194.2	
10% Rec.			229.2	
50% Rec.			269.2	
90% Rec.			314.8	282-338°C
FBP			344.2	
Residue			0.7	
Loss			1.5	
Viscosity @40°C	cst	D-445	3.178	1.9 - 4.1
Ash	%wt	D-482	<0.001	0.01 max
Sulfur	%mass	D-5453	0.0126	0.05 max
Copper Strip Corrosion	rating	D-130	1A	No. 3 max
Cetane Index		D-4737	43.4	40 min
Cloud Point	°C	D-2500	< -21	
Carbon Residue 10%	%wt	D-524	<0.1	0.35 max
Lubricity, HFRR @60°C	micron	D-6079	518	520 max

**Sample does not meet TxLED Regulations Rule §144.315(c)(3)**

TEST	UNITS	METHOD	RESULTS	SPECS
Sulfur	ppm	D-5453	126	15 max
Total Aromatic Hydrocarbon	%vol	D-5186	29.3	10 max
Polycyclic Aromatic Hydrocarbon	%wt	D-5186	11.0	1.4 max
Nitrogen	ppm	D-4629	29	10 max
Cetane Number		D-613	43.2	48 min
API Graivity Index		D-287	32.3	33-39
Viscosity @40°C	cst	D-445	3.178	2.0 - 4.1
Flash Point	°F	D-93	190.4	130 min
Distillation:	°F	D-86		
I.B.P.			381.5	340 - 420
10% Rec.			444.6	400 - 490
50% Rec.			516.5	470 - 560
90% Rec.			598.7	550 - 610
End Point			651.6	580 - 660



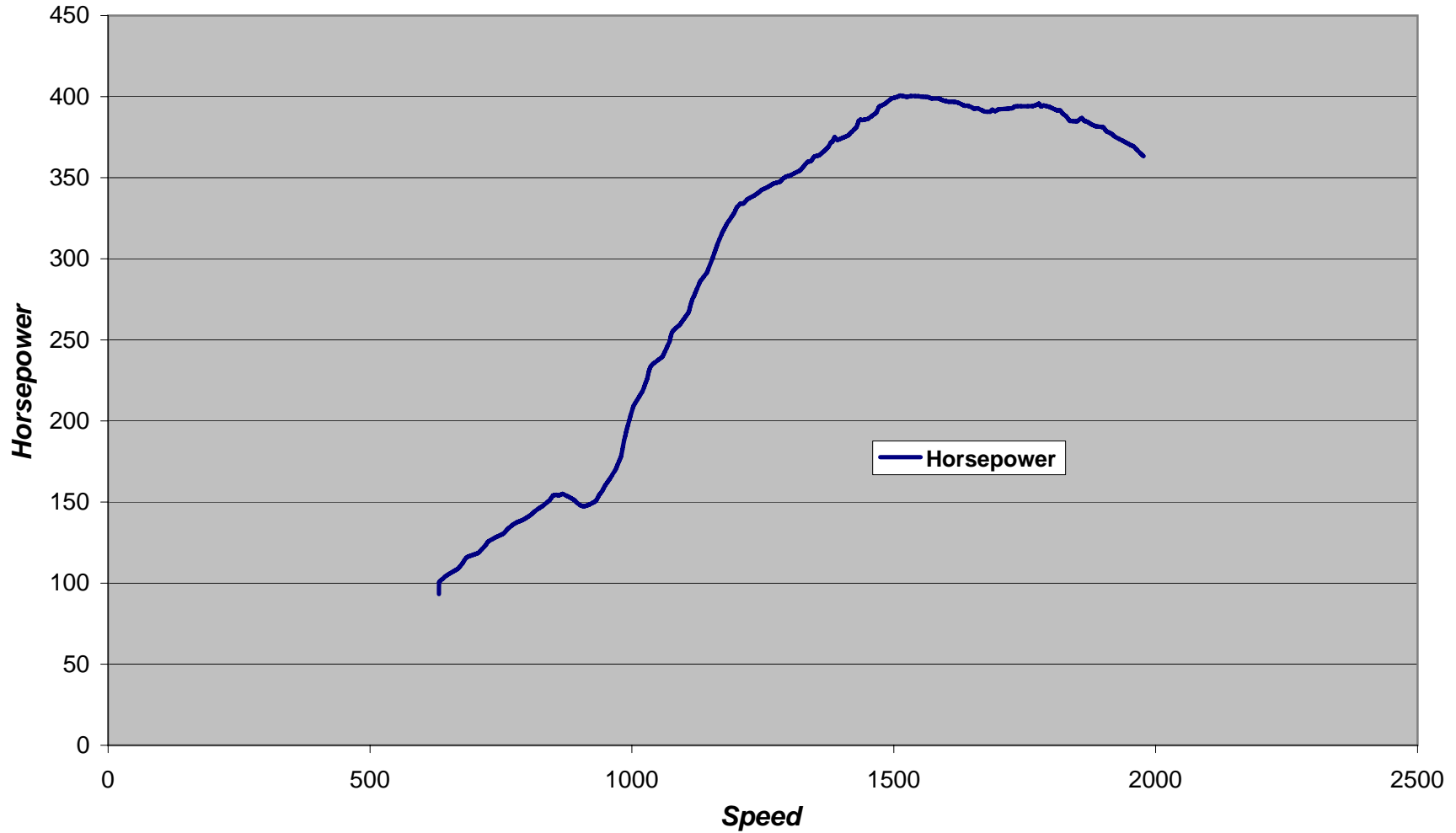
CERTIFICATE OF ANALYSIS

JOB NO.	115976
LAB NO.	LAC05-8737

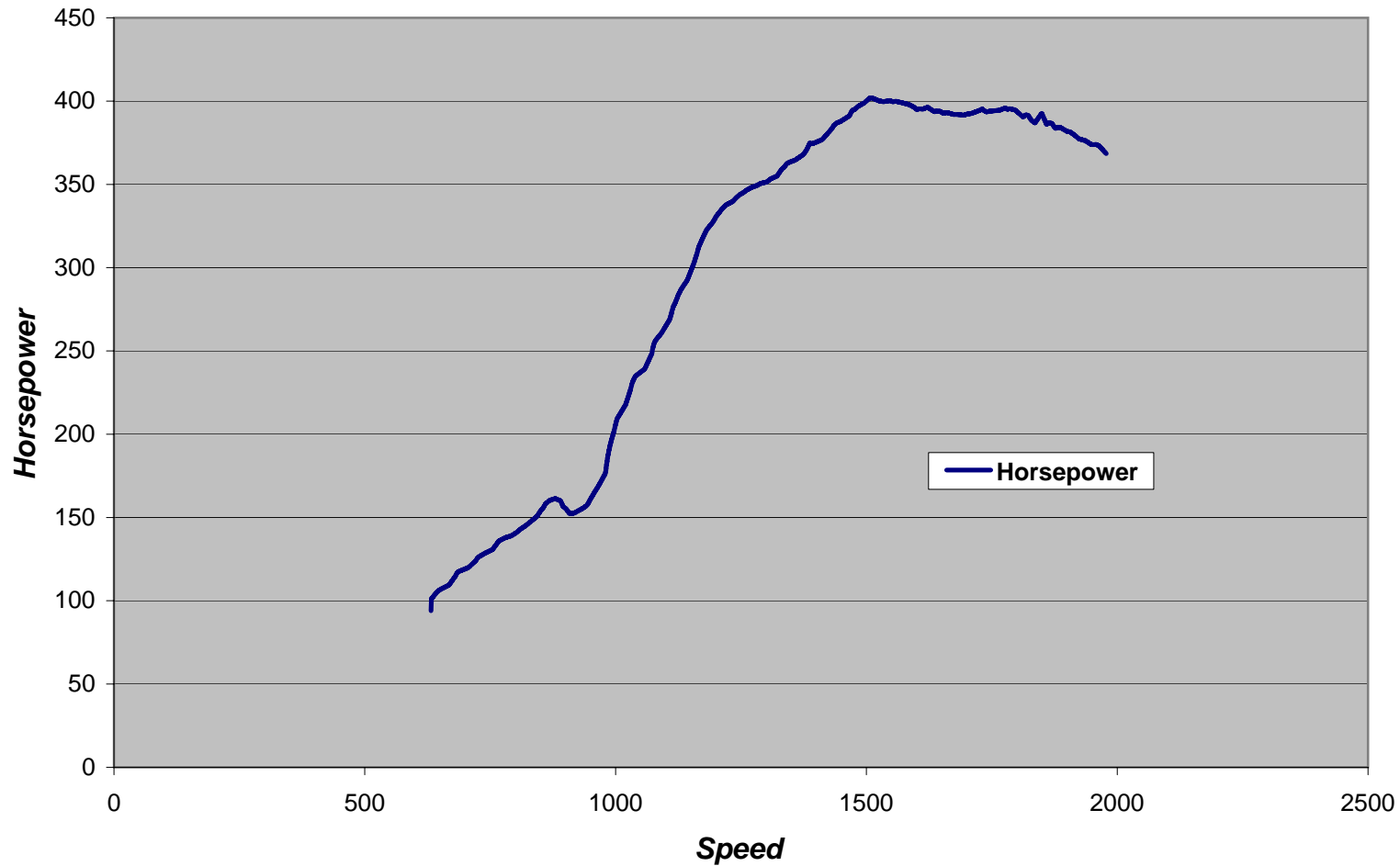
VESSEL	SAMPLING AND ANALYSIS	REPORT DATE	06/03/05
PRODUCT	LOW SULFUR DIESEL		
TERMINAL/PORT	OLSSON - ECOLOGIC		
SAMPLE FROM	TANK 333	DATE SAMPLED	06/02/05
SAMPLE SUBMITTED BY	BSI INSPECTORATE		
ANALYSIS PERFORMED BY	BSI INSPECTORATE		
CLIENT(S) REF.	198501		

TEST	METHOD REFERENCED	RESULTS
GRAVITY, API	D-287	32.3
VISCOSITY AT 40 DEG C. cst	D-445-01	3.178
SULFUR, PPM	D-5453	126
FLASH DEG F PMCC	D-93-00B	190.4
CLOUD POINT DEG C	D-2500	<-21
SEDIMENT & WATER VOL. %	D-1796	<0.025
COPPER STRIP 3 HRS. @ 50 DEG. C	D-130	1A
AROMATICS , SFC , WT% / VOL%	D-5186	30.5 / 29.3
PNA IN DIESEL, SFC , WT%	D-5186	11.0
CETANE INDEX	D-4737	43.4
CETANE NUMBER	D-613	43.2
CARBON RESIDUE , MCRT , WT% (10 % BTMS)	D-4530	<0.1
RAMSBOTTOM , BY CORRELATION, WT% (10% BTMS)	D-524	<0.1
NITROGEN CONTENT, TOTAL ,PPM	D-4629	29
ASH CONTENT , WT%	D-482	<0.001
LUBRICITY, UM	D-6079	518
DISTILLATION , DEG. F.	D-86	I.B.P. 381.5
		10% REC. 444.6
		50% REC. 516.5
		90% REC. 598.7
		95% REC. 630.2
		F.B.P. 651.6
		RES. 0.7
		LOSS 1.5

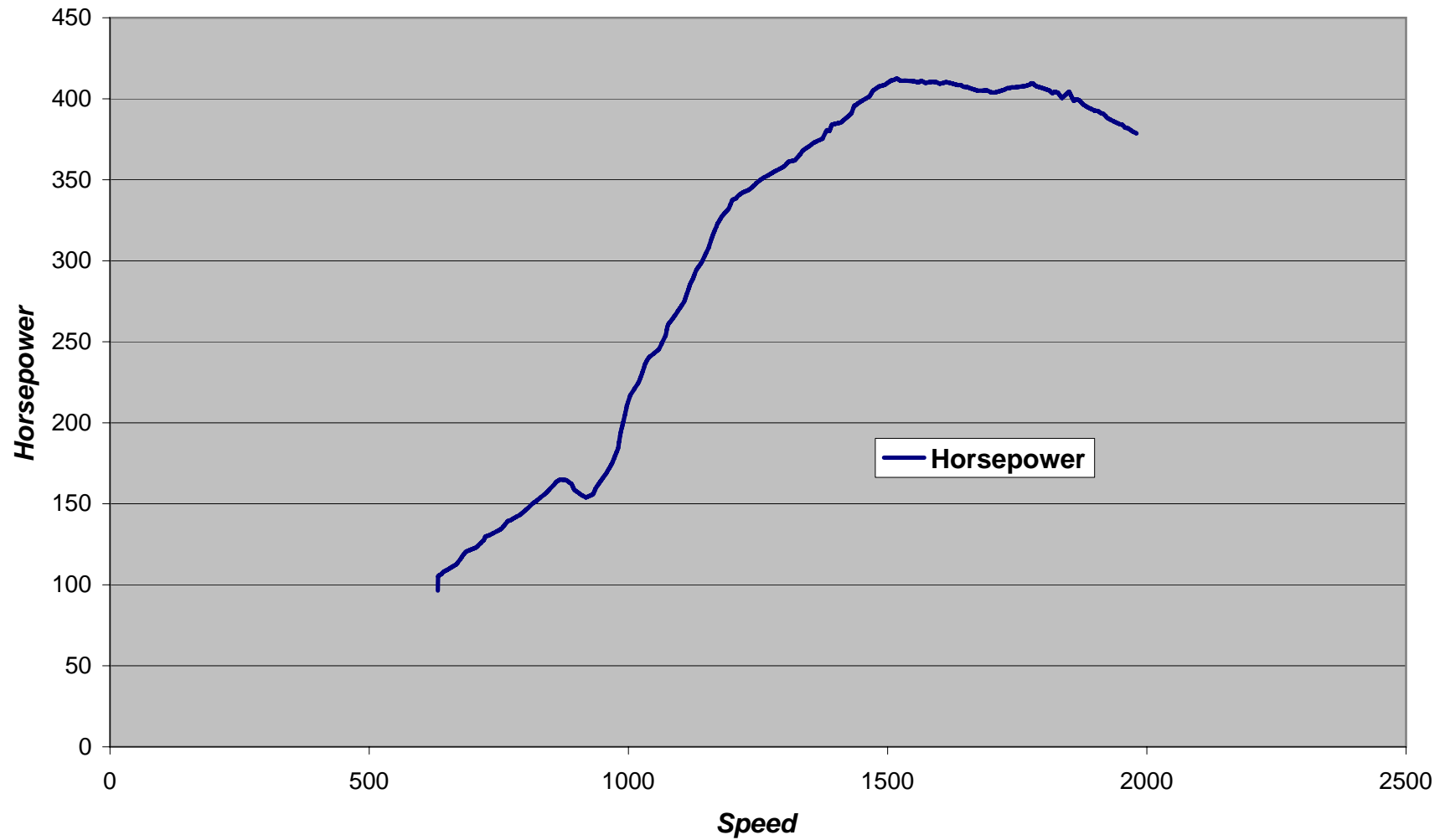
M-11 Reference Fuel "Test" 6-03-05  
Horsepower Mapping (Prior to Test 02)  
Standard for All Tests



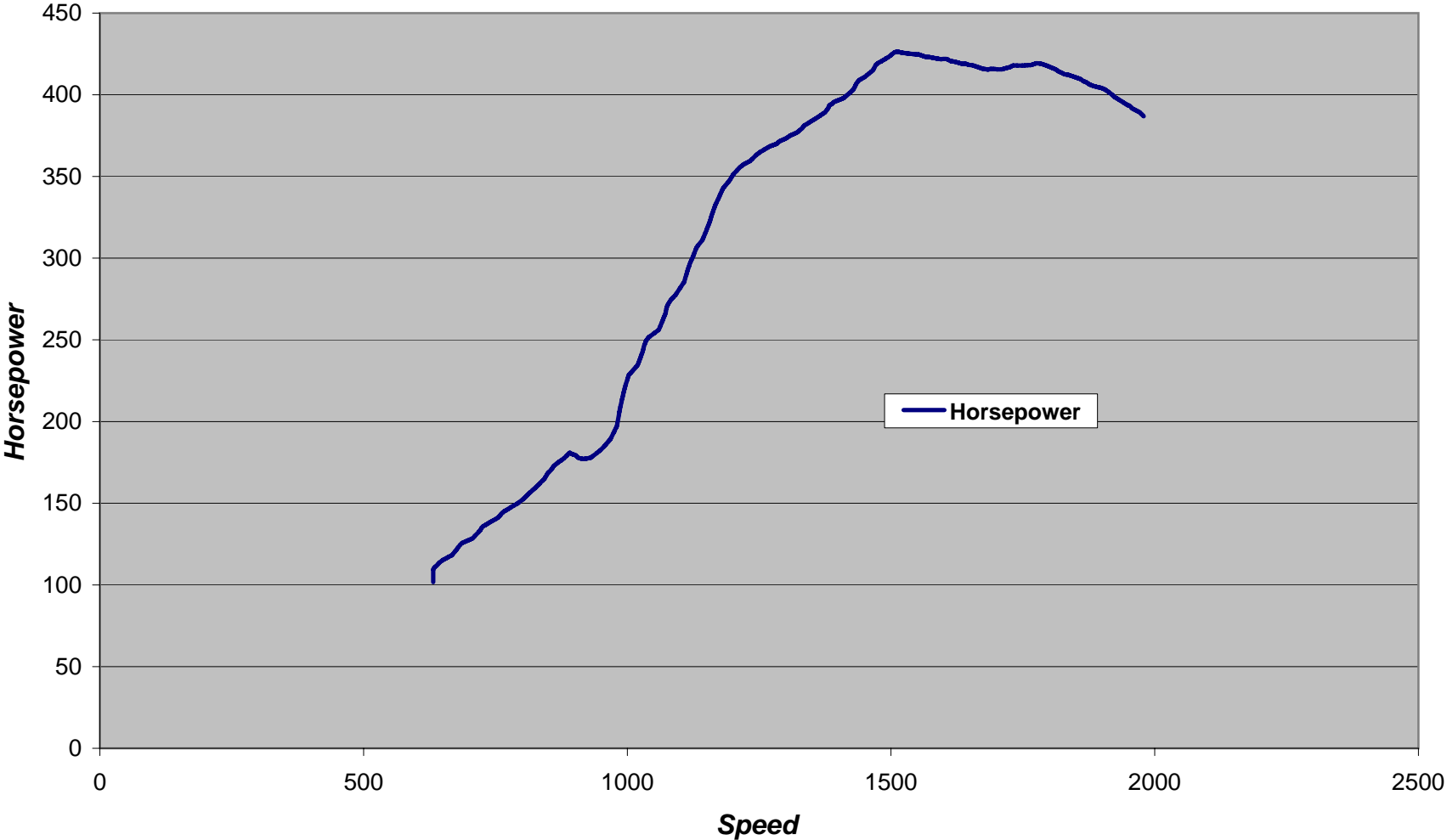
M-11 Reference Fuel 6-04-05  
Horsepower Mapping (Prior to Test 06)



M-11 Candidate Fuel with Viscon 6-09-05  
Horsepower Curve (Prior to Test 20)

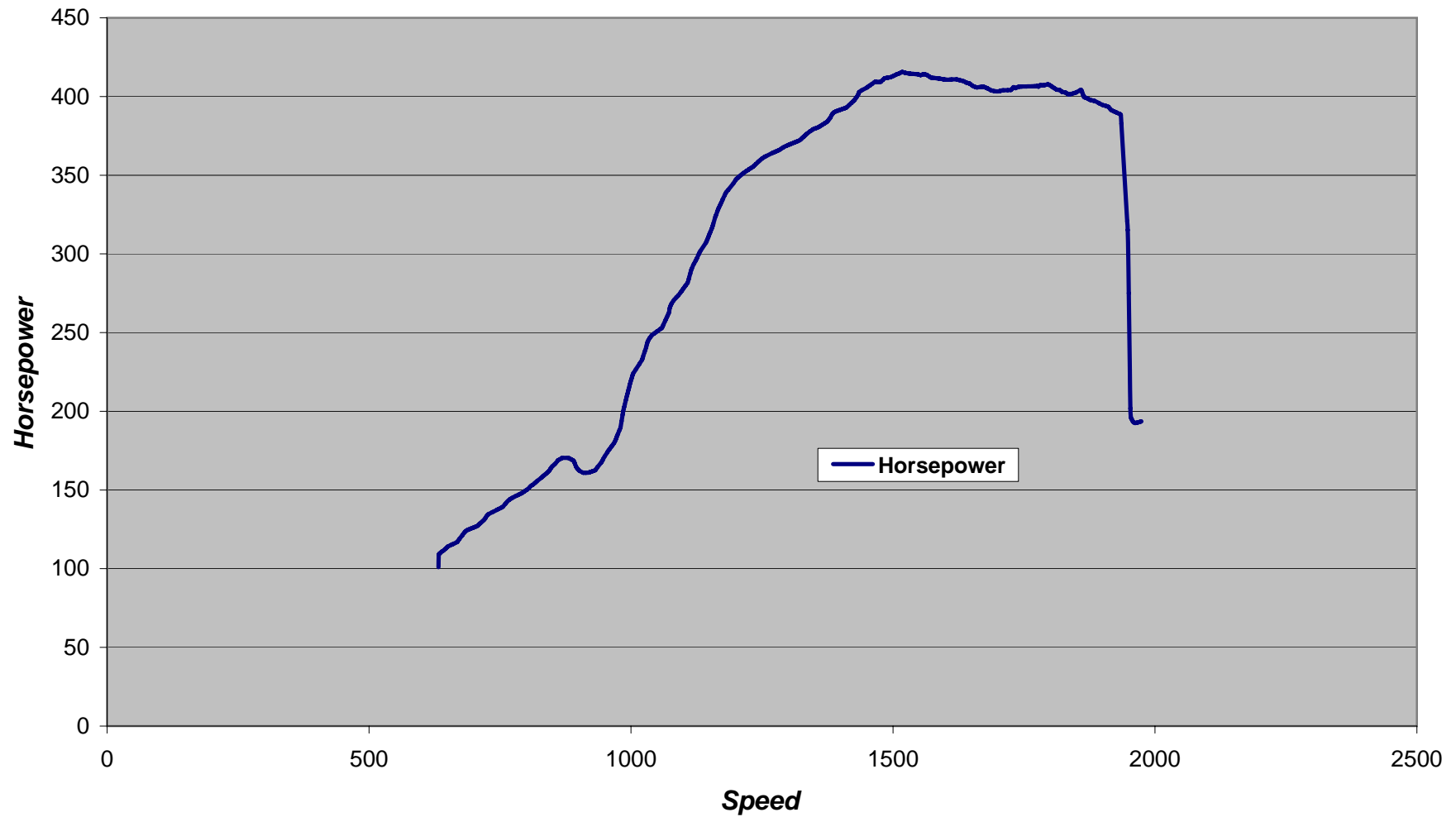


M-11 Candidate Fuel With Viscon 6-28-05  
Horsepower Curve (Prior to Test 45)

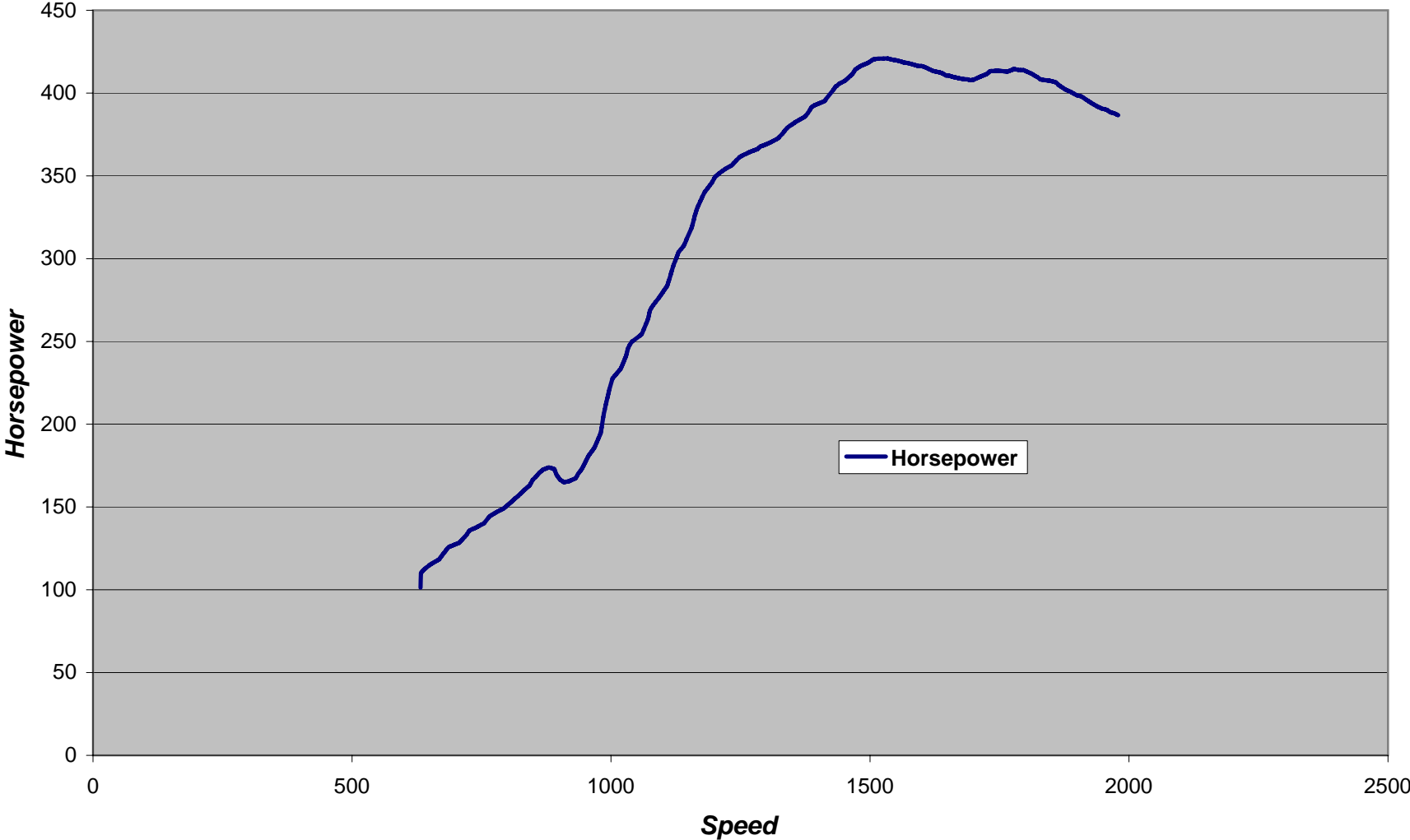


# M-11 Candidate Fuel With Viscon II 6-28-05

## Horsepower Mapping (Prior to Test 49)

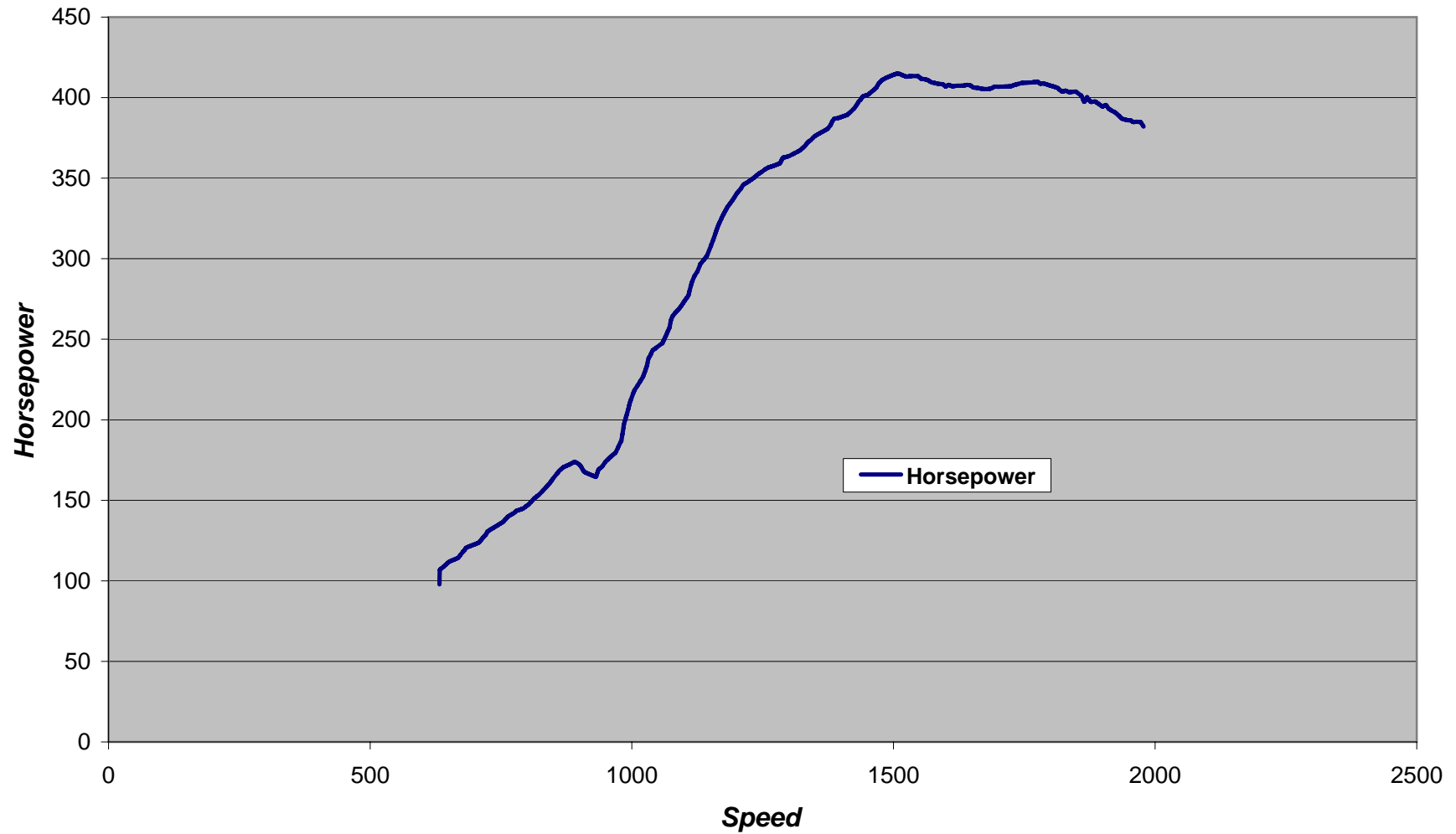


M-11 Candidate Fuel with Viscon 6-29-05  
Horsepower Mapping (Prior to Test 55)





M-11 Reference Fuel 6-29-05  
Horsepower Mapping (Prior to Test 59)



# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS02 Phase 1

#### Test Information

Test ID LPTRANS02  
 Date Fri, Jun 03, 2005  
 Time 3:06 PM  
 Fuel Specification DIESEL  
 Test Comments: LAS PALMAS REF.FUEL TRANS.TEST

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.601974 ppm  
 NOx Bag Conc 33.324459 ppm  
 NO Bag Conc 27.853804 ppm  
 CO2 Bag Conc 0.442402 percent  
 CO Bag Conc 26.723844 ppm  
 Methane Bag Conc 3.558223 ppm

#### Bag Background Concentrations

HC Bag Ambient 0.436328 ppm  
 NOx Bag Ambient -0.153947 ppm  
 NO Bag Ambient 0.287121 ppm  
 CO2 Bag Ambient 0.045000 percent  
 CO Bag Ambient 8.498626 ppm  
 Methane Bag Ambient 3.073521 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.159047 ppm  
 NOx Conc 35.818035 ppm  
 NO Conc 32.606275 ppm  
 CO2 Conc 0.402498 percent  
 CO Conc 18.892626 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.824566 inHg  
 Relative Humidity 38.551407 percent  
 Engine Inlet Air Temp 79.498166 deg F  
 Absoute Humidity 57.767642 gr/lb

#### Mass Emissions

HC Mass 3.654880 grams  
 NOx Mass 132.501763 grams  
 NO Mass 120.954320 grams  
 CO2 Mass 14817.616033 grams  
 CO Mass 43.905647 grams  
 Methane Bag Mass 1.580862 grams

#### Brake Specific Emissions

HC 0.140160 g/bhp-hr  
 NOx 5.081283 g/bhp-hr  
 NO 4.638452 g/bhp-hr  
 CO2 568.237690 g/bhp-hr  
 CO 1.683729 g/bhp-hr  
 Non-Methane HC 0.079536 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.957798 Kh  
 Dry to Wet CF 0.987728 Kw  
 Dilution Factor 108.050839 df

#### Sample Flow Data

Total Volume (Vmix) 71418.433336 scf  
 Dilution Flow 64402.262427 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.076440 bhp-hr  
 Reference Work 24.102550 bhp-hr

#### Fuel Data

Fuel Usage 4604.500000 grams  
 BSFC 0.389286 lb/bhp-hr

Particulate 0.249 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS04 Phase 1

#### Test Information

Test ID LPTRANS04  
 Date Fri, Jun 03, 2005  
 Time 5:49 PM  
 Fuel Specification DIESEL  
 Test Comments: LAS PALMAS REF.FUEL TRANS.TEST

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 2.824722 ppm  
 NOx Bag Conc 32.899860 ppm  
 NO Bag Conc 28.017521 ppm  
 CO2 Bag Conc 0.442858 percent  
 CO Bag Conc 26.011447 ppm  
 Methane Bag Conc 4.181793 ppm

#### Bag Background Concentrations

HC Bag Ambient 1.725096 ppm  
 NOx Bag Ambient 0.138907 ppm  
 NO Bag Ambient 0.502581 ppm  
 CO2 Bag Ambient 0.044718 percent  
 CO Bag Ambient 7.888850 ppm  
 Methane Bag Ambient 3.729158 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.874388 ppm  
 NOx Conc 34.239675 ppm  
 NO Conc 30.920991 ppm  
 CO2 Conc 0.401099 percent  
 CO Conc 19.646913 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.724486 inHg  
 Relative Humidity 40.723153 percent  
 Engine Inlet Air Temp 78.863592 deg F  
 Absoute Humidity 60.035467 gr/lb

#### Mass Emissions

HC Mass 3.288323 grams  
 NOx Mass 127.373647 grams  
 NO Mass 115.643652 grams  
 CO2 Mass 14769.382778 grams  
 CO Mass 45.724081 grams  
 Methane Bag Mass 1.553557 grams

#### Brake Specific Emissions

HC 0.126161 g/bhp-hr  
 NOx 4.886858 g/bhp-hr  
 NO 4.436821 g/bhp-hr  
 CO2 566.646822 g/bhp-hr  
 CO 1.754265 g/bhp-hr  
 Non-Methane HC 0.066551 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.963269 Kh  
 Dry to Wet CF 0.987221 Kw  
 Dilution Factor 109.512416 df

#### Sample Flow Data

Total Volume (Vmix) 71420.848559 scf  
 Dilution Flow 64441.226571 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.064529 bhp-hr  
 Reference Work 24.093032 bhp-hr

#### Fuel Data

Fuel Usage 4396.500000 grams  
 BSFC 0.371870 lb/bhp-hr

Particulate 0.251 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS05 Phase 1

#### Test Information

Test ID LPTRANS05  
 Date Fri, Jun 03, 2005  
 Time 7:46 PM  
 Fuel Specification DIESEL  
 Test Comments: LAS PALMAS REF.FUEL TRANS.TEST

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 2.139144 ppm  
 NOx Bag Conc 33.922188 ppm  
 NO Bag Conc 27.956823 ppm  
 CO2 Bag Conc 0.439334 percent  
 CO Bag Conc 26.184497 ppm  
 Methane Bag Conc 3.800169 ppm

#### Bag Background Concentrations

HC Bag Ambient 1.033651 ppm  
 NOx Bag Ambient 0.485275 ppm  
 NO Bag Ambient 0.554677 ppm  
 CO2 Bag Ambient 0.041930 percent  
 CO Bag Ambient 7.448219 ppm  
 Methane Bag Ambient 3.298262 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.478805 ppm  
 NOx Conc 34.620029 ppm  
 NO Conc 31.420016 ppm  
 CO2 Conc 0.400151 percent  
 CO Conc 19.046661 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.724486 inHg  
 Relative Humidity 48.821019 percent  
 Engine Inlet Air Temp 75.074465 deg F  
 Absoute Humidity 63.499041 gr/lb

#### Mass Emissions

HC Mass 2.848369 grams  
 NOx Mass 129.899070 grams  
 NO Mass 118.604990 grams  
 CO2 Mass 14737.399535 grams  
 CO Mass 44.339709 grams  
 Methane Bag Mass 1.645195 grams

#### Brake Specific Emissions

HC 0.109390 g/bhp-hr  
 NOx 4.988685 g/bhp-hr  
 NO 4.554943 g/bhp-hr  
 CO2 565.979721 g/bhp-hr  
 CO 1.702836 g/bhp-hr  
 Non-Methane 0.046207 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.971675 Kh  
 Dry to Wet CF 0.986448 Kw  
 Dilution Factor 114.466207 df

#### Sample Flow Data

Total Volume (Vmix) 71418.117337 scf  
 Dilution Flow 64460.722748 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.038741 bhp-hr  
 Reference Work 24.104291 bhp-hr

#### Fuel Data

Fuel Usage 4429.000000 grams  
 BSFC 0.374990 lb/bhp-hr

Particulate 0.221 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS06 Phase 1

#### Test Information

Test ID LPTRANS06  
 Date Sat, Jun 04, 2005  
 Time 11:33 AM  
 Fuel Specification DIESEL  
 Test Comments: LAS PALMAS REF.FUEL TRANS.TEST

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 2.899431 ppm  
 NOx Bag Conc 33.379402 ppm  
 NO Bag Conc 27.960699 ppm  
 CO2 Bag Conc 0.446980 percent  
 CO Bag Conc 25.871809 ppm  
 Methane Bag Conc 4.042669 ppm

#### Bag Background Concentrations

HC Bag Ambient 1.756562 ppm  
 NOx Bag Ambient 0.036344 ppm  
 NO Bag Ambient 0.027346 ppm  
 CO2 Bag Ambient 0.046024 percent  
 CO Bag Ambient 7.627336 ppm  
 Methane Bag Ambient 3.586189 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.824007 ppm  
 NOx Conc 34.843905 ppm  
 NO Conc 32.187686 ppm  
 CO2 Conc 0.403396 percent  
 CO Conc 18.614687 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.724486 inHg  
 Relative Humidity 57.021747 percent  
 Engine Inlet Air Temp 74.687136 deg F  
 Absoute Humidity 73.371686 gr/lb

#### Mass Emissions

HC Mass 3.229030 grams  
 NOx Mass 134.089332 grams  
 NO Mass 123.909670 grams  
 CO2 Mass 14851.000954 grams  
 CO Mass 43.299689 grams  
 Methane Bag Mass 1.554190 grams

#### Brake Specific Emissions

HC 0.123766 g/bhp-hr  
 NOx 5.139548 g/bhp-hr  
 NO 4.749369 g/bhp-hr  
 CO2 569.228186 g/bhp-hr  
 CO 1.659646 g/bhp-hr  
 Non-Methane 0.064195 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.996470 Kh  
 Dry to Wet CF 0.984249 Kw  
 Dilution Factor 106.968275 df

#### Sample Flow Data

Total Volume (Vmix) 71428.072419 scf  
 Dilution Flow 64466.629257 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.089715 bhp-hr  
 Reference Work 24.125953 bhp-hr

#### Fuel Data

Fuel Usage 4471.000000 grams  
 BSFC 0.377807 lb/bhp-hr

Particulate 0.153 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS07 Phase 1

#### Test Information

Test ID LPTRANS07  
 Date Sat, Jun 04, 2005  
 Time 12:42 PM  
 Fuel Specification DIESEL  
 Test Comments: LAS PALMAS REF.FUEL TRANS.TEST

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 2.877134 ppm  
 NOx Bag Conc 34.187424 ppm  
 NO Bag Conc 28.439358 ppm  
 CO2 Bag Conc 0.446916 percent  
 CO Bag Conc 25.205154 ppm  
 Methane Bag Conc 4.071627 ppm

#### Bag Background Concentrations

HC Bag Ambient 1.676271 ppm  
 NOx Bag Ambient 0.542130 ppm  
 NO Bag Ambient 0.449581 ppm  
 CO2 Bag Ambient 0.047213 percent  
 CO Bag Ambient 7.682533 ppm  
 Methane Bag Ambient 3.539098 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.895602 ppm  
 NOx Conc 34.712190 ppm  
 NO Conc 31.993024 ppm  
 CO2 Conc 0.397449 percent  
 CO Conc 18.514717 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.724486 inHg  
 Relative Humidity 54.997958 percent  
 Engine Inlet Air Temp 71.636763 deg F  
 Absoute Humidity 63.732143 gr/lb

#### Mass Emissions

HC Mass 3.314331 grams  
 NOx Mass 130.348366 grams  
 NO Mass 120.729336 grams  
 CO2 Mass 14638.925967 grams  
 CO Mass 43.087565 grams  
 Methane Bag Mass 1.754413 grams

#### Brake Specific Emissions

HC 0.127079 g/bhp-hr  
 NOx 4.997851 g/bhp-hr  
 NO 4.629036 g/bhp-hr  
 CO2 561.289518 g/bhp-hr  
 CO 1.652075 g/bhp-hr  
 Non-Methane 0.059811 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.972289 Kh  
 Dry to Wet CF 0.986396 Kw  
 Dilution Factor 113.679866 df

#### Sample Flow Data

Total Volume (Vmix) 71417.177078 scf  
 Dilution Flow 64370.110185 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.080882 bhp-hr  
 Reference Work 24.121165 bhp-hr

#### Fuel Data

Fuel Usage 4468.000000 grams  
 BSFC 0.377681 lb/bhp-hr

Particulate 0.186 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS08 Phase 1

#### Test Information

Test ID LPTRANS08  
 Date Sat, Jun 04, 2005  
 Time 1:51 PM  
 Fuel Specification DIESEL  
 Test Comments: LAS PALMAS REF.FUEL TRANS.TEST

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 2.210639 ppm  
 NOx Bag Conc 33.908382 ppm  
 NO Bag Conc 28.860918 ppm  
 CO2 Bag Conc 0.442196 percent  
 CO Bag Conc 25.932428 ppm  
 Methane Bag Conc 3.852710 ppm

#### Bag Background Concentrations

HC Bag Ambient 0.951934 ppm  
 NOx Bag Ambient -0.072570 ppm  
 NO Bag Ambient 0.247275 ppm  
 CO2 Bag Ambient 0.044610 percent  
 CO Bag Ambient 8.704456 ppm  
 Methane Bag Ambient 3.322564 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.638907 ppm  
 NOx Conc 35.636784 ppm  
 NO Conc 32.287714 ppm  
 CO2 Conc 0.397338 percent  
 CO Conc 16.300997 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.724486 inHg  
 Relative Humidity 53.093072 percent  
 Engine Inlet Air Temp 71.903037 deg F  
 Absolute Humidity 62.067206 gr/lb

#### Mass Emissions

HC Mass 4.231084 grams  
 NOx Mass 134.168745 grams  
 NO Mass 121.852825 grams  
 CO2 Mass 14764.750500 grams  
 CO Mass 38.133558 grams  
 Methane Bag Mass 1.739059 grams

#### Brake Specific Emissions

HC 0.162298 g/bhp-hr  
 NOx 5.146517 g/bhp-hr  
 NO 4.674096 g/bhp-hr  
 CO2 566.354211 g/bhp-hr  
 CO 1.462747 g/bhp-hr  
 Non-Methane 0.09559 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.968176 Kh  
 Dry to Wet CF 0.986767 Kw  
 Dilution Factor 112.641607 df

#### Sample Flow Data

Total Volume (Vmix) 71983.918099 scf  
 Dilution Flow 64886.421292 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.069817 bhp-hr  
 Reference Work 24.114332 bhp-hr

#### Fuel Data

Fuel Usage 4464.000000 grams  
 BSFC 0.377503 lb/bhp-hr

Particulate 0.219 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS20 Phase 1

#### Test Information

Test ID LPTRANS20  
 Date Thu, Jun 09, 2005  
 Time 11:56 AM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 2.119693 ppm  
 NOx Bag Conc 40.959324 ppm  
 NO Bag Conc 34.174927 ppm  
 CO2 Bag Conc 0.493935 percent  
 CO Bag Conc 39.047825 ppm  
 Methane Bag Conc 4.016525 ppm

#### Bag Background Concentrations

HC Bag Ambient 0.742797 ppm  
 NOx Bag Ambient 0.076741 ppm  
 NO Bag Ambient 0.141820 ppm  
 CO2 Bag Ambient 0.047028 percent  
 CO Bag Ambient 16.880663 ppm  
 Methane Bag Ambient 3.414088 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 4.173564 ppm  
 NOx Conc 41.309090 ppm  
 NO Conc 37.858940 ppm  
 CO2 Conc 0.428527 percent  
 CO Conc 17.995421 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 42.896805 percent  
 Engine Inlet Air Temp 74.685384 deg F  
 Absoute Humidity 54.584765 gr/lb

#### Mass Emissions

HC Mass 4.823965 grams  
 NOx Mass 151.658446 grams  
 NO Mass 139.168735 grams  
 CO2 Mass 15780.231354 grams  
 CO Mass 41.240159 grams  
 Methane Bag Mass 1.965771 grams

#### Brake Specific Emissions

HC 0.174390 g/bhp-hr  
 NOx 5.482573 g/bhp-hr  
 NO 5.031060 g/bhp-hr  
 CO2 570.467865 g/bhp-hr  
 CO 1.490864 g/bhp-hr  
 Non-Methane HC 0.1033 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.950279 Kh  
 Dry to Wet CF 0.988441 Kw  
 Dilution Factor 103.880950 df

#### Sample Flow Data

Total Volume (Vmix) 71437.097364 scf  
 Dilution Flow 64461.731609 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 27.661911 bhp-hr  
 Reference Work 25.571281 bhp-hr

#### Fuel Data

Fuel Usage 4554.500000 grams  
 BSFC 0.362988 lb/bhp-hr

Particulate 0.256 g/bhp-hr



# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS21 Phase 1

#### Test Information

Test ID LPTRANS21  
 Date Thu, Jun 09, 2005  
 Time 5:37 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc	2.368175	ppm
NOx Bag Conc	36.735130	ppm
NO Bag Conc	32.038666	ppm
CO2 Bag Conc	0.458587	percent
CO Bag Conc	30.007247	ppm
Methane Bag Conc	3.627730	ppm

#### Bag Background Concentrations

HC Bag Ambient	0.605105	ppm
NOx Bag Ambient	0.062468	ppm
NO Bag Ambient	0.384249	ppm
CO2 Bag Ambient	0.044319	percent
CO Bag Ambient	8.467410	ppm
Methane Bag Ambient	2.827934	ppm

#### Integrated Concentrations Corrected for Background

HC Conc	3.577543	ppm
NOx Conc	37.181885	ppm
NO Conc	34.712537	ppm
CO2 Conc	0.411669	percent
CO Conc	20.315949	ppm

#### Dilution/Engine Air Data

Barometric Pressure	29.924649	inHg
Relative Humidity	47.590013	percent
Engine Inlet Air Temp	72.162215	deg F
Absolute Humidity	55.701577	gr/lb

#### Mass Emissions

HC Mass	4.135472	grams
NOx Mass	136.831486	grams
NO Mass	128.205005	grams
CO2 Mass	15158.593987	grams
CO Mass	47.249910	grams
Methane Bag Mass	2.416614	grams

#### Brake Specific Emissions

HC	0.158940	g/bhp-hr
NOx	5.258897	g/bhp-hr
NO	4.927352	g/bhp-hr
CO2	582.596073	g/bhp-hr
CO	1.815974	g/bhp-hr
Non-Methane HC	0.0660	g/bhp-hr

#### Correction Factors

NOx Humidity CF	0.952960	Kh
Dry to Wet CF	0.988191	Kw
Dilution Factor	106.701534	df

#### Sample Flow Data

Total Volume (Vmix)	71411.669573	scf
Dilution Flow	64478.346451	scf

#### Test Cycle Data

Hot-Cold Test	2.000000	1=Cold, 2=Hot
Test Time	1213.000000	sec
Total Work	26.019046	bhp-hr
Reference Work	24.101156	bhp-hr

#### Fuel Data

Fuel Usage	4403.000000	grams
BSFC	0.373071	lb/bhp-hr

Particulate	0.304	g/bhp-hr
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# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS22 Phase 1

#### Test Information

Test ID LPTRANS22  
 Date Thu, Jun 09, 2005  
 Time 7:34 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.837237 ppm  
 NOx Bag Conc 38.242493 ppm  
 NO Bag Conc 32.508038 ppm  
 CO2 Bag Conc 0.452355 percent  
 CO Bag Conc 28.418339 ppm  
 Methane Bag Conc 3.500378 ppm

#### Bag Background Concentrations

HC Bag Ambient 0.615093 ppm  
 NOx Bag Ambient -0.007998 ppm  
 NO Bag Ambient 0.350623 ppm  
 CO2 Bag Ambient 0.043771 percent  
 CO Bag Ambient 9.799233 ppm  
 Methane Bag Ambient 2.918870 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.104980 ppm  
 NOx Conc 39.556453 ppm  
 NO Conc 36.312680 ppm  
 CO2 Conc 0.404945 percent  
 CO Conc 17.927017 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 40.960499 percent  
 Engine Inlet Air Temp 69.963830 deg F  
 Absoute Humidity 44.323140 gr/lb

#### Mass Emissions

HC Mass 2.426931 grams  
 NOx Mass 141.653238 grams  
 NO Mass 130.437081 grams  
 CO2 Mass 14916.649859 grams  
 CO Mass 41.575786 grams  
 Methane Bag Mass 1.834564 grams

#### Brake Specific Emissions

HC 0.093057 g/bhp-hr  
 NOx 5.431484 g/bhp-hr  
 NO 5.001417 g/bhp-hr  
 CO2 571.956836 g/bhp-hr  
 CO 1.594162 g/bhp-hr  
 Non-Methane HC 0.0227 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.926819 Kh  
 Dry to Wet CF 0.990745 Kw  
 Dilution Factor 110.984275 df

#### Sample Flow Data

Total Volume (Vmix) 71450.811179 scf  
 Dilution Flow 64446.771550 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.080027 bhp-hr  
 Reference Work 24.101789 bhp-hr

#### Fuel Data

Fuel Usage 4357.000000 grams  
 BSFC 0.368310 lb/bhp-hr

Particulate 0.200 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS45 Phase 1

#### Test Information

Test ID LPTRANS45  
 Date Tue, Jun 28, 2005  
 Time 9:31 AM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.170845 ppm  
 NOx Bag Conc 35.179276 ppm  
 NO Bag Conc 28.075714 ppm  
 CO2 Bag Conc 0.424538 percent  
 CO Bag Conc 28.473354 ppm  
 Methane Bag Conc 3.677748 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.480782 ppm  
 NOx Bag Ambient 0.674172 ppm  
 NO Bag Ambient 0.053193 ppm  
 CO2 Bag Ambient 0.044149 percent  
 CO Bag Ambient 10.010111 ppm  
 Methane Bag Ambient 3.152554 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.498144 ppm  
 NOx Conc 34.915343 ppm  
 NO Conc 32.780026 ppm  
 CO2 Conc 0.375027 percent  
 CO Conc 19.410418 ppm

#### Dilution/Engine Air Data

Barometric Pressure 30.024732 inHg  
 Relative Humidity 45.428049 percent  
 Engine Inlet Air Temp 70.533716 deg F  
 Absolute Humidity 50.051326 gr/lb

#### Mass Emissions

HC Mass 4.127948 grams  
 NOx Mass 127.778166 grams  
 NO Mass 120.082204 grams  
 CO2 Mass 13915.918189 grams  
 CO Mass 45.616469 grams  
 Methane Bag Mass 0.871024 grams

#### Brake Specific Emissions

HC 0.157695 g/bhp-hr  
 NOx 4.881341 g/bhp-hr  
 NO 4.587342 g/bhp-hr  
 CO2 531.611443 g/bhp-hr  
 CO 1.742626 g/bhp-hr  
 Non-Methane HC 0.124420 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.939786 Kh  
 Dry to Wet CF 0.989458 Kw  
 Dilution Factor 118.879153 df

#### Sample Flow Data

Total Volume (Vmix) 72407.349128 scf  
 Dilution Flow 65472.980163 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.176860 bhp-hr  
 Reference Work 27.510623 bhp-hr

#### Fuel Data

Fuel Usage 4157.000000 grams  
 BSFC 0.350104 lb/bhp-hr

Particulate 0.205 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS46 Phase 1

#### Test Information

Test ID LPTRANS46  
 Date Tue, Jun 28, 2005  
 Time 10:26 AM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.232938 ppm  
 NOx Bag Conc 34.063335 ppm  
 NO Bag Conc 27.255125 ppm  
 CO2 Bag Conc 0.430984 percent  
 CO Bag Conc 27.805577 ppm  
 Methane Bag Conc 3.793911 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.404456 ppm  
 NOx Bag Ambient -0.231246 ppm  
 NO Bag Ambient -0.173696 ppm  
 CO2 Bag Ambient 0.046206 percent  
 CO Bag Ambient 10.147407 ppm  
 Methane Bag Ambient 3.249809 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.056549 ppm  
 NOx Conc 35.482582 ppm  
 NO Conc 32.892309 ppm  
 CO2 Conc 0.373999 percent  
 CO Conc 17.340847 ppm

#### Dilution/Engine Air Data

Barometric Pressure 30.024732 inHg  
 Relative Humidity 44.771247 percent  
 Engine Inlet Air Temp 71.994809 deg F  
 Absolute Humidity 51.851288 gr/lb

#### Mass Emissions

HC Mass 3.565019 grams  
 NOx Mass 129.525195 grams  
 NO Mass 119.855292 grams  
 CO2 Mass 13789.653336 grams  
 CO Mass 40.273256 grams  
 Methane Bag Mass 0.892972 grams

#### Brake Specific Emissions

HC 0.136304 g/bhp-hr  
 NOx 4.952215 g/bhp-hr  
 NO 4.582500 g/bhp-hr  
 CO2 527.228126 g/bhp-hr  
 CO 1.539792 g/bhp-hr  
 Non-Methane HC 0.102162 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.943928 Kh  
 Dry to Wet CF 0.989054 Kw  
 Dilution Factor 122.988258 df

#### Sample Flow Data

Total Volume (Vmix) 71538.494640 scf  
 Dilution Flow 64553.208459 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.155003 bhp-hr  
 Reference Work 27.496686 bhp-hr

#### Fuel Data

Fuel Usage 4230.000000 grams  
 BSFC 0.356549 lb/bhp-hr

Particulate 0.166 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS47 Phase 1

#### Test Information

Test ID LPTRANS47  
 Date Tue, Jun 28, 2005  
 Time 11:26 AM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.670630 ppm  
 NOx Bag Conc 33.987423 ppm  
 NO Bag Conc 26.520603 ppm  
 CO2 Bag Conc 0.428053 percent  
 CO Bag Conc 27.665300 ppm  
 Methane Bag Conc 3.582931 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.022302 ppm  
 NOx Bag Ambient -0.035786 ppm  
 NO Bag Ambient -0.181803 ppm  
 CO2 Bag Ambient 0.043172 percent  
 CO Bag Ambient 9.205391 ppm  
 Methane Bag Ambient 3.012833 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.718653 ppm  
 NOx Conc 34.160667 ppm  
 NO Conc 31.714619 ppm  
 CO2 Conc 0.380789 percent  
 CO Conc 19.091698 ppm

#### Dilution/Engine Air Data

Barometric Pressure 30.024732 inHg  
 Relative Humidity 47.151848 percent  
 Engine Inlet Air Temp 70.162079 deg F  
 Absolute Humidity 51.322501 gr/lb

#### Mass Emissions

HC Mass 3.218448 grams  
 NOx Mass 125.770166 grams  
 NO Mass 116.586750 grams  
 CO2 Mass 14163.740112 grams  
 CO Mass 45.123178 grams  
 Methane Bag Mass 0.934222 grams

#### Brake Specific Emissions

HC 0.123332 g/bhp-hr  
 NOx 4.819553 g/bhp-hr  
 NO 4.467641 g/bhp-hr  
 CO2 542.759005 g/bhp-hr  
 CO 1.729134 g/bhp-hr  
 Non-Methane HC 0.08752 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.942734 Kh  
 Dry to Wet CF 0.989173 Kw  
 Dilution Factor 116.579037 df

#### Sample Flow Data

Total Volume (Vmix) 72866.206899 scf  
 Dilution Flow 65869.025749 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.095818 bhp-hr  
 Reference Work 27.496445 bhp-hr

#### Fuel Data

Fuel Usage 4253.000000 grams  
 BSFC 0.359301 lb/bhp-hr

Particulate 0.170 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS49 Phase 1

#### Test Information

Test ID LPTRANS49  
 Date Tue, Jun 28, 2005  
 Time 4:16 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.557551 ppm  
 NOx Bag Conc 38.216518 ppm  
 NO Bag Conc 27.928102 ppm  
 CO2 Bag Conc 0.436047 percent  
 CO Bag Conc 29.146514 ppm  
 Methane Bag Conc 3.451803 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.106473 ppm  
 NOx Bag Ambient 0.137914 ppm  
 NO Bag Ambient 0.243798 ppm  
 CO2 Bag Ambient 0.043769 percent  
 CO Bag Ambient 10.365651 ppm  
 Methane Bag Ambient 2.908527 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.134297 ppm  
 NOx Conc 36.176509 ppm  
 NO Conc 32.990862 ppm  
 CO2 Conc 0.392613 percent  
 CO Conc 19.699705 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 49.918457 percent  
 Engine Inlet Air Temp 70.472702 deg F  
 Absolute Humidity 55.174525 gr/lb

#### Mass Emissions

HC Mass 3.645782 grams  
 NOx Mass 133.079809 grams  
 NO Mass 121.663280 grams  
 CO2 Mass 14472.584975 grams  
 CO Mass 45.780534 grams  
 Methane Bag Mass 0.877712 grams

#### Brake Specific Emissions

HC 0.139654 g/bhp-hr  
 NOx 5.097695 g/bhp-hr  
 NO 4.660378 g/bhp-hr  
 CO2 554.380281 g/bhp-hr  
 CO 1.753648 g/bhp-hr  
 Non-Methane HC 0.106033 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.951723 Kh  
 Dry to Wet CF 0.988309 Kw  
 Dilution Factor 106.664145 df

#### Sample Flow Data

Total Volume (Vmix) 71501.107421 scf  
 Dilution Flow 64532.534456 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.105880 bhp-hr  
 Reference Work 27.506581 bhp-hr

#### Fuel Data

Fuel Usage 4344.000000 grams  
 BSFC 0.366848 lb/bhp-hr

Particulate 0.183 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS50 Phase 1

#### Test Information

Test ID LPTRANS50  
 Date Tue, Jun 28, 2005  
 Time 5:47 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.005460 ppm  
 NOx Bag Conc 34.614365 ppm  
 NO Bag Conc 27.240602 ppm  
 CO2 Bag Conc 0.434486 percent  
 CO Bag Conc 28.186847 ppm  
 Methane Bag Conc 3.593572 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.634467 ppm  
 NOx Bag Ambient 0.049467 ppm  
 NO Bag Ambient -0.093353 ppm  
 CO2 Bag Ambient 0.043942 percent  
 CO Bag Ambient 9.813229 ppm  
 Methane Bag Ambient 3.048004 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.233331 ppm  
 NOx Conc 34.969765 ppm  
 NO Conc 32.619752 ppm  
 CO2 Conc 0.392612 percent  
 CO Conc 17.934192 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 28.842440 percent  
 Engine Inlet Air Temp 71.546936 deg F  
 Absolute Humidity 32.876379 gr/lb

#### Mass Emissions

HC Mass 3.790155 grams  
 NOx Mass 122.270435 grams  
 NO Mass 113.969234 grams  
 CO2 Mass 14513.202681 grams  
 CO Mass 41.840313 grams  
 Methane Bag Mass 0.890003 grams

#### Brake Specific Emissions

HC 0.145220 g/bhp-hr  
 NOx 4.684812 g/bhp-hr  
 NO 4.366750 g/bhp-hr  
 CO2 556.075802 g/bhp-hr  
 CO 1.603119 g/bhp-hr  
 Non-Methane HC 0.111119 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.901987 Kh  
 Dry to Wet CF 0.993329 Kw  
 Dilution Factor 107.001689 df

#### Sample Flow Data

Total Volume (Vmix) 71774.214133 scf  
 Dilution Flow 64774.354469 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.099324 bhp-hr  
 Reference Work 27.493794 bhp-hr

#### Fuel Data

Fuel Usage 4279.500000 grams  
 BSFC 0.361491 lb/bhp-hr

Particulate 0.184 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS51 Phase 1

#### Test Information

Test ID LPTRANS51  
 Date Tue, Jun 28, 2005  
 Time 7:35 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.361247 ppm  
 NOx Bag Conc 34.742508 ppm  
 NO Bag Conc 27.650505 ppm  
 CO2 Bag Conc 0.432310 percent  
 CO Bag Conc 28.285602 ppm  
 Methane Bag Conc 3.790324 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.131273 ppm  
 NOx Bag Ambient -0.680644 ppm  
 NO Bag Ambient 0.069750 ppm  
 CO2 Bag Ambient 0.044011 percent  
 CO Bag Ambient 9.298912 ppm  
 Methane Bag Ambient 3.259084 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.190977 ppm  
 NOx Conc 36.824478 ppm  
 NO Conc 33.401227 ppm  
 CO2 Conc 0.386548 percent  
 CO Conc 19.884505 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 29.890836 percent  
 Engine Inlet Air Temp 70.934171 deg F  
 Absolute Humidity 33.379307 gr/lb

#### Mass Emissions

HC Mass 3.730600 grams  
 NOx Mass 129.033051 grams  
 NO Mass 117.074518 grams  
 CO2 Mass 14296.973178 grams  
 CO Mass 46.542119 grams  
 Methane Bag Mass 0.879681 grams

#### Brake Specific Emissions

HC 0.142723 g/bhp-hr  
 NOx 4.936465 g/bhp-hr  
 NO 4.478963 g/bhp-hr  
 CO2 546.964526 g/bhp-hr  
 CO 1.780579 g/bhp-hr  
 Non-Methane HC 0.109069 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.903052 Kh  
 Dry to Wet CF 0.993215 Kw  
 Dilution Factor 112.618414 df

#### Sample Flow Data

Total Volume (Vmix) 71828.210583 scf  
 Dilution Flow 64825.698263 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.138758 bhp-hr  
 Reference Work 27.492311 bhp-hr

#### Fuel Data

Fuel Usage 4271.000000 grams  
 BSFC 0.360229 lb/bhp-hr

Particulate 0.200 g/bhp-hr



# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS55 Phase 1

#### Test Information

Test ID LPTRANS55  
 Date Wed, Jun 29, 2005  
 Time 11:35 AM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON; H.S.

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.744559 ppm  
 NOx Bag Conc 34.304047 ppm  
 NO Bag Conc 26.835037 ppm  
 CO2 Bag Conc 0.436426 percent  
 CO Bag Conc 29.079829 ppm  
 Methane Bag Conc 3.645158 ppm

#### Bag Background Concentrations

HC Bag Ambient 0.431757 ppm  
 NOx Bag Ambient -0.044555 ppm  
 NO Bag Ambient 0.227383 ppm  
 CO2 Bag Ambient 0.044909 percent  
 CO Bag Ambient 10.122647 ppm  
 Methane Bag Ambient 3.128281 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.555551 ppm  
 NOx Conc 35.988729 ppm  
 NO Conc 32.124590 ppm  
 CO2 Conc 0.383852 percent  
 CO Conc 18.621034 ppm

#### Dilution/Engine Air Data

Barometric Pressure 30.124815 inHg  
 Relative Humidity 27.057165 percent  
 Engine Inlet Air Temp 72.453382 deg F  
 Absolute Humidity 31.648071 gr/lb

#### Mass Emissions

HC Mass 2.956861 grams  
 NOx Mass 125.080040 grams  
 NO Mass 111.900612 grams  
 CO2 Mass 14138.547295 grams  
 CO Mass 43.228159 grams  
 Methane Bag Mass 0.851105 grams

#### Brake Specific Emissions

HC 0.113178 g/bhp-hr  
 NOx 4.787620 g/bhp-hr  
 NO 4.283158 g/bhp-hr  
 CO2 541.173362 g/bhp-hr  
 CO 1.654620 g/bhp-hr  
 Non-Methane HC 0.080601 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.899436 Kh  
 Dry to Wet CF 0.993607 Kw  
 Dilution Factor 116.566603 df

#### Sample Flow Data

Total Volume (Vmix) 71471.109903 scf  
 Dilution Flow 64460.292167 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.125727 bhp-hr  
 Reference Work 27.505873 bhp-hr

#### Fuel Data

Fuel Usage 4271.000000 grams  
 BSFC 0.360409 lb/bhp-hr

Particulate 0.200 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS56 Phase 1

#### Test Information

Test ID LPTRANS56  
 Date Wed, Jun 29, 2005  
 Time 12:32 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON.

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc	1.433621	ppm
NOx Bag Conc	31.563009	ppm
NO Bag Conc	24.176653	ppm
CO2 Bag Conc	0.396525	percent
CO Bag Conc	26.885455	ppm
Methane Bag Conc	3.560192	ppm

#### Bag Background Concentrations

HC Bag Ambient	0.074383	ppm
NOx Bag Ambient	0.456323	ppm
NO Bag Ambient	-0.170750	ppm
CO2 Bag Ambient	0.044019	percent
CO Bag Ambient	9.238004	ppm
Methane Bag Ambient	3.064902	ppm

#### Integrated Concentrations Corrected for Background

HC Conc	2.806701	ppm
NOx Conc	30.616832	ppm
NO Conc	28.849822	ppm
CO2 Conc	0.345720	percent
CO Conc	19.375105	ppm

#### Dilution/Engine Air Data

Barometric Pressure	30.024732	inHg
Relative Humidity	26.151604	percent
Engine Inlet Air Temp	71.666111	deg F
Absolute Humidity	29.802140	gr/lb

#### Mass Emissions

HC Mass	3.579929	grams
NOx Mass	117.345402	grams
NO Mass	110.400782	grams
CO2 Mass	14137.246579	grams
CO Mass	49.021487	grams
Methane Bag Mass	0.876260	grams

#### Brake Specific Emissions

HC	0.137027	g/bhp-hr
NOx	4.491560	g/bhp-hr
NO	4.225745	g/bhp-hr
CO2	541.122968	g/bhp-hr
CO	1.876366	g/bhp-hr
Non-Methane HC	0.103487	g/bhp-hr

#### Correction Factors

NOx Humidity CF	0.895535	Kh
Dry to Wet CF	0.994025	Kw
Dilution Factor	119.735601	df

#### Sample Flow Data

Total Volume (Vmix)	77704.757131	scf
Dilution Flow	70540.516985	scf

#### Test Cycle Data

Hot-Cold Test	2.000000	1=Cold, 2=Hot
Test Time	1213.000000	sec
Total Work	26.125756	bhp-hr
Reference Work	27.499970	bhp-hr

#### Fuel Data

Fuel Usage	4278.500000	grams
BSFC	0.361041	lb/bhp-hr

Particulate	0.160	g/bhp-hr
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# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS57 Phase 1

#### Test Information

Test ID LPTRANS57  
 Date Wed, Jun 29, 2005  
 Time 1:22 PM  
 Fuel Specification DIESEL  
 Test Comments: CANDIDATE FUEL W/VISCON

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.147952 ppm  
 NOx Bag Conc 35.282188 ppm  
 NO Bag Conc 27.093840 ppm  
 CO2 Bag Conc 0.431772 percent  
 CO Bag Conc 28.291375 ppm  
 Methane Bag Conc 3.530399 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.250132 ppm  
 NOx Bag Ambient 0.454717 ppm  
 NO Bag Ambient 0.212570 ppm  
 CO2 Bag Ambient 0.043751 percent  
 CO Bag Ambient 9.893855 ppm  
 Methane Bag Ambient 2.957901 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.165524 ppm  
 NOx Conc 34.800162 ppm  
 NO Conc 32.132139 ppm  
 CO2 Conc 0.385913 percent  
 CO Conc 17.379943 ppm

#### Dilution/Engine Air Data

Barometric Pressure 30.024732 inHg  
 Relative Humidity 26.401141 percent  
 Engine Inlet Air Temp 72.231740 deg F  
 Absolute Humidity 30.685147 gr/lb

#### Mass Emissions

HC Mass 3.727325 grams  
 NOx Mass 121.640859 grams  
 NO Mass 112.607398 grams  
 CO2 Mass 14341.300458 grams  
 CO Mass 40.777391 grams  
 Methane Bag Mass 0.928778 grams

#### Brake Specific Emissions

HC 0.142598 g/bhp-hr  
 NOx 4.653668 g/bhp-hr  
 NO 4.308071 g/bhp-hr  
 CO2 548.661426 g/bhp-hr  
 CO 1.560039 g/bhp-hr  
 Non-Methane HC 0.107065 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.897382 Kh  
 Dry to Wet CF 0.993825 Kw  
 Dilution Factor 112.405986 df

#### Sample Flow Data

Total Volume (Vmix) 72281.386719 scf  
 Dilution Flow 65263.947407 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.138707 bhp-hr  
 Reference Work 27.492154 bhp-hr

#### Fuel Data

Fuel Usage 4285.000000 grams  
 BSFC 0.361411 lb/bhp-hr

Particulate 0.167 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS59 Phase 1

#### Test Information

Test ID LPTRANS59  
 Date Wed, Jun 29, 2005  
 Time 4:20 PM  
 Fuel Specification DIESEL  
 Test Comments: REFERENCE FUEL

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 0.893580 ppm  
 NOx Bag Conc 34.745804 ppm  
 NO Bag Conc 27.829479 ppm  
 CO2 Bag Conc 0.433836 percent  
 CO Bag Conc 30.077464 ppm  
 Methane Bag Conc 3.486097 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.412537 ppm  
 NOx Bag Ambient 0.120001 ppm  
 NO Bag Ambient 0.160872 ppm  
 CO2 Bag Ambient 0.044252 percent  
 CO Bag Ambient 10.579368 ppm  
 Methane Bag Ambient 2.970753 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 2.664362 ppm  
 NOx Conc 34.992654 ppm  
 NO Conc 32.595868 ppm  
 CO2 Conc 0.385389 percent  
 CO Conc 19.752188 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 53.120629 percent  
 Engine Inlet Air Temp 70.959861 deg F  
 Absoute Humidity 59.791450 gr/lb

#### Mass Emissions

HC Mass 3.107121 grams  
 NOx Mass 130.207570 grams  
 NO Mass 121.494823 grams  
 CO2 Mass 14203.832173 grams  
 CO Mass 45.880715 grams  
 Methane Bag Mass 0.841459 grams

#### Brake Specific Emissions

HC 0.119018 g/bhp-hr  
 NOx 4.987599 g/bhp-hr  
 NO 4.653858 g/bhp-hr  
 CO2 544.077609 g/bhp-hr  
 CO 1.757460 g/bhp-hr  
 Non-Methane HC 0.086786 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.962754 Kh  
 Dry to Wet CF 0.987276 Kw  
 Dilution Factor 115.382845 df

#### Sample Flow Data

Total Volume (Vmix) 71497.483217 scf  
 Dilution Flow 64590.918791 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.106261 bhp-hr  
 Reference Work 27.502168 bhp-hr

#### Fuel Data

Fuel Usage 4254.000000 grams  
 BSFC 0.359242 lb/bhp-hr

Particulate 0.202 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS60 Phase 1

#### Test Information

Test ID LPTRANS60  
 Date Wed, Jun 29, 2005  
 Time 5:13 PM  
 Fuel Specification DIESEL  
 Test Comments: REFERENCE FUEL

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 1.712905 ppm  
 NOx Bag Conc 34.435295 ppm  
 NO Bag Conc 27.563353 ppm  
 CO2 Bag Conc 0.433983 percent  
 CO Bag Conc 28.471768 ppm  
 Methane Bag Conc 3.513423 ppm

#### Bag Background Concentrations

HC Bag Ambient 0.313582 ppm  
 NOx Bag Ambient 0.366918 ppm  
 NO Bag Ambient -0.023676 ppm  
 CO2 Bag Ambient 0.043947 percent  
 CO Bag Ambient 9.879357 ppm  
 Methane Bag Ambient 2.957788 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 1.800650 ppm  
 NOx Conc 34.412807 ppm  
 NO Conc 32.177971 ppm  
 CO2 Conc 0.388288 percent  
 CO Conc 19.713927 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 52.966538 percent  
 Engine Inlet Air Temp 71.091315 deg F  
 Absoute Humidity 59.909480 gr/lb

#### Mass Emissions

HC Mass 2.082679 grams  
 NOx Mass 128.018063 grams  
 NO Mass 119.713600 grams  
 CO2 Mass 14307.923725 grams  
 CO Mass 45.832938 grams  
 Methane Bag Mass 0.895859 grams

#### Brake Specific Emissions

HC 0.079701 g/bhp-hr  
 NOx 4.899076 g/bhp-hr  
 NO 4.581276 g/bhp-hr  
 CO2 547.544671 g/bhp-hr  
 CO 1.753964 g/bhp-hr  
 Non-Methane HC 0.045418 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.963056 Kh  
 Dry to Wet CF 0.987250 Kw  
 Dilution Factor 110.744641 df

#### Sample Flow Data

Total Volume (Vmix) 71469.574182 scf  
 Dilution Flow 64497.988724 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.131062 bhp-hr  
 Reference Work 27.517209 bhp-hr

#### Fuel Data

Fuel Usage 4260.500000 grams  
 BSFC 0.359449 lb/bhp-hr

Particulate 0.201 g/bhp-hr

# Olson-Ecologic Engine Testing Laboratories, LLC

## Heavy Duty Transient Test Results

### LPTRANS61 Phase 1

#### Test Information

Test ID LPTRANS61  
 Date Wed, Jun 29, 2005  
 Time 6:12 PM  
 Fuel Specification DIESEL  
 Test Comments: REFERENCE FUEL

#### Engine Information

Engine Manufacturer Cummins  
 Engine Model M11 400E  
 Engine Serial Number 34989531

#### Bag Emissions Concentrations

HC Bag Conc 0.593764 ppm  
 NOx Bag Conc 34.243477 ppm  
 NO Bag Conc 27.245707 ppm  
 CO2 Bag Conc 0.433920 percent  
 CO Bag Conc 28.507571 ppm  
 Methane Bag Conc 3.576957 ppm

#### Bag Background Concentrations

HC Bag Ambient -0.813489 ppm  
 NOx Bag Ambient -0.162701 ppm  
 NO Bag Ambient -0.113992 ppm  
 CO2 Bag Ambient 0.044270 percent  
 CO Bag Ambient 10.665273 ppm  
 Methane Bag Ambient 2.970471 ppm

#### Integrated Concentrations Corrected for Background

HC Conc 3.831396 ppm  
 NOx Conc 35.679534 ppm  
 NO Conc 32.445993 ppm  
 CO2 Conc 0.385046 percent  
 CO Conc 17.754635 ppm

#### Dilution/Engine Air Data

Barometric Pressure 29.924649 inHg  
 Relative Humidity 52.667796 percent  
 Engine Inlet Air Temp 70.506592 deg F  
 Absolute Humidity 58.401759 gr/lb

#### Mass Emissions

HC Mass 4.473315 grams  
 NOx Mass 132.347699 grams  
 NO Mass 120.208864 grams  
 CO2 Mass 14196.710820 grams  
 CO Mass 41.169298 grams  
 Methane Bag Mass 0.966153 grams

#### Brake Specific Emissions

HC 0.171318 g/bhp-hr  
 NOx 5.068625 g/bhp-hr  
 NO 4.603734 g/bhp-hr  
 CO2 543.702697 g/bhp-hr  
 CO 1.576693 g/bhp-hr  
 Non-Methane HC 0.134316 g/bhp-hr

#### Correction Factors

NOx Humidity CF 0.959456 Kh  
 Dry to Wet CF 0.987587 Kw  
 Dilution Factor 115.677212 df

#### Sample Flow Data

Total Volume (Vmix) 71460.510138 scf  
 Dilution Flow 64510.044902 scf

#### Test Cycle Data

Hot-Cold Test 2.000000 1=Cold, 2=Hot  
 Test Time 1213.000000 sec  
 Total Work 26.111165 bhp-hr  
 Reference Work 27.495921 bhp-hr

#### Fuel Data

Fuel Usage 4266.000000 grams  
 BSFC 0.360188 lb/bhp-hr

Particulate 0.185 g/bhp-hr

----- Original Message -----

From: <Caldwell.Jim@epamail.epa.gov>

To: "stephanie/mike anfinson" <anfinson@fea.net>

Cc: <porter@a-logic.com>

Sent: Monday, April 26, 2004 7:44 AM

Subject: Re: Regarding the facts concerning VISCON

>

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>

>

> Mike,

>

> A substance composed solely of carbon and/or hydrogen does not meet the  
> definition of an additive at 40 CFR 79.2(e), and thus is not subject to  
> the registration requirements for a fuel additive at 40 CFR 79.

>

> A fuel manufacturer is defined at 40 CFR 79.2(d). This definition is  
> not relevant to whether a substance is required to be registered as a  
> fuel additive.

>

> Under the health-effects testing regulations at 40 CFR 79, compounds  
> that are solely hydrocarbon are grouped in the baseline category. In  
> general, the evaporative and combustion emissions from the approximately  
> 300 hydrocarbon compounds in fuels are considered to pose a comparable  
> risk to the public. However, not all have been tested and there may be  
> some hydrocarbon compounds, in addition to benzene, aromatics, and  
> olefins, which are controlled in gasoline, with evaporative or  
> combustion emissions that might merit control in the future.

>

> Jim Caldwell

> (202) 343-9303

>

>

## MSDS SHEET

**GTA Technologies, Inc.**

**Technical Data Sheet #1103**

### **Viscon<sup>R</sup> For Diesel Applications**

#### **How it functions**

GTAT's proprietary Viscon technology improves the performance of compression ignition engines.

It is well known that the physical properties of diesel fuel interfere with creating a uniform air/fuel mixture in the cylinder. Viscon, unlike other fuel additives, modifies the physical behavior of diesel fuel during injection creating a more uniform air/fuel mixture at ignition and during burn.

Diesel fuel is a Newtonian Fluid and as such has physical properties which work against preparation of a uniform air/fuel mixture:

- o Spray from an injector nozzle contains a population of superfine, vapor-like droplets which ignite in advance of the main body of fuel and prior to complete spray droplet penetration and mixing.
  
- o The outer edge of the injector spray cone shears into smaller droplets which lose momentum and have poor penetration into the pressurized gas in the cylinder.
  
- o Droplets in the center area of the injector spray cone grow by collision and coalescence as they contact the slower moving droplets at the leading edge of the spray.
  
- o Droplets which reach the cylinder walls splatter and coat creating a cooled liquid film.

GTAT's Viscon technology uses a scientific phenomenon called extensional viscosity to modify the physical properties of diesel fuel during injection and mixture formation. Viscon eliminates the formation of superfine satellite droplets which cause early ignition before spray jet penetration and mixing has progressed. Diesel fuel droplets containing Viscon resist shear on the edge of the spray cone and therefore maintain momentum for better penetration. Viscon containing droplets resist growth by collision and have a tendency to rebound and reflect from the cylinder wall back into the gas in the cylinder limiting wall coating and cooling.

#### **Benefits**

Viscon increases engine power, reduces combustion gas temperatures, reduces fuel consumption and reduces emissions of unburned hydrocarbons and NOx.

These benefits derived from:



- o A more uniform distribution of droplet size across the cross section of the diesel spray cone.
- o Reduction of the mean volume diameter of the diesel injector spray.
- o A more even distribution of the fuel distributed across the cross section of the spray cone.
- o Elimination of superfine satellite droplets which cause early ignition.
- o Improved spray jet penetration.
- o Reduced wall wetting.

## **MSDS**

**FUEL ADDITIVE DIESEL  
CAS# 64742-47-8 CONTAINS PETROLEUM  
DISTILLATES**

**DANGER! COMBUSTIBLE  
CAUSES EYE & SKIN IRRITATION.  
MAYBE HARMFUL IF SWALLOWED.  
VAPOR MAY BE IRRITATING IF INHALED.  
MAY CAUSE CENTRAL NERVOUS SYSTEM DAMAGE.  
MAY CAUSE DIZZINESS & DROWSINESS**

**GTAT CALIFORNIA INC.  
3121 STANDARD ST.  
BAKERSFIELD, CA 93311  
(661) 327-7451**

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**BEFORE USING THIS PRODUCT, READ THIS MATERIAL SAFETY DATA SHEET**

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AVOID CONTACT WITH EYES, SKIN AND CLOTHING  
DO NOT TASTE OR SWALLOW  
AVOID BREATHING VAPOR  
USE WITH ADEQUATE VENTILATION  
WASH THOROUGHLY AFTER HANDLING  
DO NOT TRANSFER TO UNLABELED CONTAINERS

### **FIRST AID:**

IN CASE OF EYE CONTACT FLUSH EYES WITH LARGE AMOUNTS OF WATER UNTIL IRRITATION SUBSIDES. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION.

IN CASE OF CONTACT: FOR SKIN WASH AFFECTED AREAS WITH SOAP AND WATER. REMOVE AND LAUNDRY CONTAMINATED CLOTHING BEFORE REUSE. IF IRRITATION DEVELOPS; CONSULT A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING. KEEP AT REST. GET PROMT MEDICAL ATTENTION.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN, CALL A PHYSICIAN.

### **SPILLS OR LEAKS:**

**ELIMINATE ALL SOURCES OF IGNITION.**

**SMALL SPILLS-SOAK UP WITH ABSORBENT MATERIAL & SCOOP INTO DRUMS.**

**LARGE SPILLS-DIKE & PUMP INTO DRUM, PREVENT MATERIAL FROM ENTERING DRAINS, SEWERS OR WATERWAYS.**

**DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE & FEDERAL REGULATIONS.**

### **IN CASE OF FIRE:**

**USE FOAM, CARBON DIOXIDE, DRY CHEMICAL OR WATER FOG OR SPRAY.**

#### **DANGER**

**AFTER THIS CONTAINER HAS BEEN EMPTIED, IT MAY CONTAIN EXPLOSIVE AND HARMFUL VAPORS AND RESIDUE.**

**KEEP AWAY FROM HEAT, SPARKS, AND FLAMES. DO NOT CUT, PUNCTURE OR WELD ON OR NEAR THIS CONTAINER.**

**DO NOT REUSE CONTAINER FOR ANY PURPOSE UNTIL COMMERCIALY CLEANED.**

## **USAGE DIRECTIONS**

Use one ounce of Viscon to 20 gallons of fuel.

For best results, change/clean the fuel filter before applying Viscon.

**Do not overdose – more is not better.**

## **STORAGE AND HANDLING**

**Electrostatic Accumulation Hazard:** Yes, use proper bonding and/or grounding procedure.

Additional information regarding safe handling of products with static accumulation potential can be ordered by contacting the American Petroleum Institute (API) for API Recommended Practice 2003, entitled "Protection Against Ignitions Arising Out of Static, Lighting, and Stray Currents" (American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005), or the National Fire Protection Association (NFPA) for NFPA 77 entitled "Static Electricity" (National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101).

**Storage Temperature, Deg F:** Ambient

**Loading/Unloading Temperature, Deg F:** Ambient

**Storage/Transport Pressure, mmHg:** Atmospheric

**Storage and Handling:** Keep container closed. Handle and open containers with care. Store in a cool and well ventilated place away from incompatible materials. DO NOT allow prolonged exposure to direct sunlight. DO NOT handle or store near an open flame, heat or other sources of ignition. Protect material from direct sunlight. Material will accumulate static charges that may cause an electrical spark (ignition source). Use proper bonding and/or grounding procedures. DO NOT pressurize, cut, heat, or weld containers. Empty product containers may contain product residue. DO NOT reuse empty containers without commercial cleaning or reconditioning.

## **HEALTH HAZARD DATA**

**Eye Contact:** Slightly irritating but does not injure eye tissue.

**Skin Contact:** Low order of toxicity. Frequent or prolonged contact may irritate and cause dermatitis. Skin contact may aggravate an existing dermatitis condition.

**Inhalation:** High vapor concentrations are irritating to the eyes and the respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death.

**Ingestion:** Small amounts of this product aspirated into the respiratory system during ingestion or vomiting may cause mild to severe pulmonary injury, possibly progressing to death.

## **EMERGENCY AND FIRST AID PROCEDURES:**

**Eye Contact:** Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.

**Skin Contact:** Flush with large amounts of water, use soap if available. Remove grossly contaminated clothing, including shoes and laundry before reuse.

**Inhalation:** Using proper respiratory protection, immediately remove the affected victim from exposure. Administer artificial respiration if breathing is stopped. Keep at rest. Call for prompt medical attention.

**Ingestion:** If swallowed, DO NOT induce vomiting. Keep at rest. Get prompt medical attention.