PAVE Research Institute
1600 Lee Road 151
Opelika, AL 36804
www.pavetrack.com
334-844-6857

at Auburn University

Report on

TMC RP-1102 (SAE J1321)
Type II Fuel Consumption Test with

TMC RP-1115
Fuel Economy Benefit Product Qualification

Conducted for

MSR, Inc.
PO Box 1372
Sterling, VA 20167

July 24, 2007

Prepared by:

R. Buzz Powell, PhD, PE
Research Engineer

Bob Rosenthal
Technical Consultant

ABSTRACT

The purpose of this testing program was to evaluate the performance of a lubricant additive known as DSX Extra. The product claims to derive its benefit from the addition of friction reducing flouropolymer particulates to lubricating fluids. In order to facilitate testing, DSX Extra was added to all driveline components, engine, transmission and tractor drive axles. The TMC / SAE Type II test procedure was used to evaluate the product's effectiveness in improving the fuel economy of Class 8 heavy trucks.

Testing was conducted by researchers at the PAVE Research Institute between the dates of April 19 and June 12, 2007 on the Pavement Test Track at Auburn University. The following data were collected after three progressive stages of product use:

- 0.1% improvement in fuel economy after oil change with treatment and 8,219 miles;
- 1.6% improvement after another oil change with treatment and 13,351 miles; and
- 2.6% improvement in fuel economy after 20,993 miles.

This research was conducted using the TMC / SAE Type II test procedure. Two 2004 Freightliner Columbia Series Model C120 tractors served as the treatment and control vehicles, both powered with identical 435 BHP Detroit Diesel 14L Series 60 engines. The test was conducted on a 1.7 mile closed loop oval test track at Auburn University in Opelika, Alabama. The primary purpose of the track is to damage experimental pavements, but the highly controlled fleet operations create a unique opportunity to concurrently study vehicle performance.

The research fleet at the Pavement Test Track consists of 155,000 pound, 8 axle heavy triples. Speeds are limited to approximately 48 mph, which require the tractors to be driven in direct gear (1:1) with an engine speed of 1533 rpm. Cruise control is engaged when test vehicles have reached optimum speeds. The demand wheel horse power varies between 200 hp on the track's ½ mile flat straight sections to 300 hp on the $^{1}/_{3}$ mile long west end curve on a ½% grade.

During testing, fuel consumption was measured in 50-gallon portable weigh tanks that accommodated 4 test runs on a single fill. The weight of fuel consumed after each 30-mile run was measured on an Ohaus Champ II Model CH300R digital scale with a 650 pound capacity. Fuel temperature was measured at the end of each test run using a digital temperature probe. The same drivers remained with both the control vehicle and the treatment vehicle for the duration of testing.

Two engine lube oil changes were made during testing in both vehicles. In each case, engine oil in the test vehicle was treated with DSX Extra. No maintenance or operational problems of any type were noted as a result of the addition of the additive. Treatment of the lube oil in the engine, transmission and drive axles did not show an immediate short-term fuel economy improvement; however, an apparent improvement of 1.6% was observed after 13,351 miles (and two treated oil changes). Ultimately, a 2.6% improvement was observed after 20,933 miles of operation. Long-term impact on fuel economy improvement was not considered in this evaluation.

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INTRODUCTION

Recent historical increases in the cost of diesel fuel have resulted in an unprecedented interest in products that have the potential to improve fuel economy. At the request of Equipment and Technology, Inc., the PAVE Research Institute at Auburn University recently conducted a fuel economy test utilizing class 8 diesel trucks. The purpose of the testing was to quantify any benefits derived from the addition of a fluoropolymer lubricant additive known as DSX Extra.

The procedure chosen for this evaluation was the *TMC/SAE In-Service Fuel Consumption Test Procedure – Type II*, also known as TMC's RP 1102 and SAE's J1321. This procedure was developed specifically to meet the needs of the trucking industry, and it is an integral part of TMC's *Guidelines for Qualifying Products Claiming a Fuel Economy Benefit* (RP 1115). Both recommended practices are included within the scope of this study.

To facilitate the experiment, fuel consumption in a treatment vehicle was compared to fuel consumption in an identical control vehicle before and after the installation of the lubricant additive. Because the vendor claimed that several thousand miles were needed to realize the full potential of the additive, post-treatment testing was conducted at several different mileage levels. This process resulted in four separate test segments: untreated baseline testing (0 miles), early stage treatment testing (after approximately 7500 miles of treated operation), intermediate stage treatment testing (after approximately 15,000 miles of treated operation), and advanced stage treatment testing (after approximately 20,000 miles of treated operation). The completion of each stage of post-treatment testing allowed for the determination of percent savings in fuel consumed.

PRODUCT INFORMATION

Technological Overview

According to documentation provided by Equipment and Technology, Inc., DSX Extra is an embedded fluoropolymer particle technology that was originally designed to maximize military equipment functionality in the Middle East during Desert Shield. Company literature states that DSX Extra fluoropolymer particulates are approximately 0.02 microns in diameter. When added to existing engine oils, these small particles are intended to fill micro-voids on critical engine wear surfaces without changing tolerances. A proprietary suspension system ensures that the product stays homogenized in order to deliver particulates uniformly to critical areas. Electrostatic attraction causes the fluoropolymer particulates to permanently bond with treated surfaces, providing for a low friction interface as well as locking out undesirable debris.

In simple terms, the product is intended to allow machinery parts to move against each other with less friction, wear, corrosion, carbonization and oxidation. This could result in extended engine and parts life, better mileage and fuel economy, greater system efficiency, emission reduction and energy conservation. Equipment and Technology, Inc. includes seizure test results in promotional literature (Figure 1) that seem to support this type of improvement.

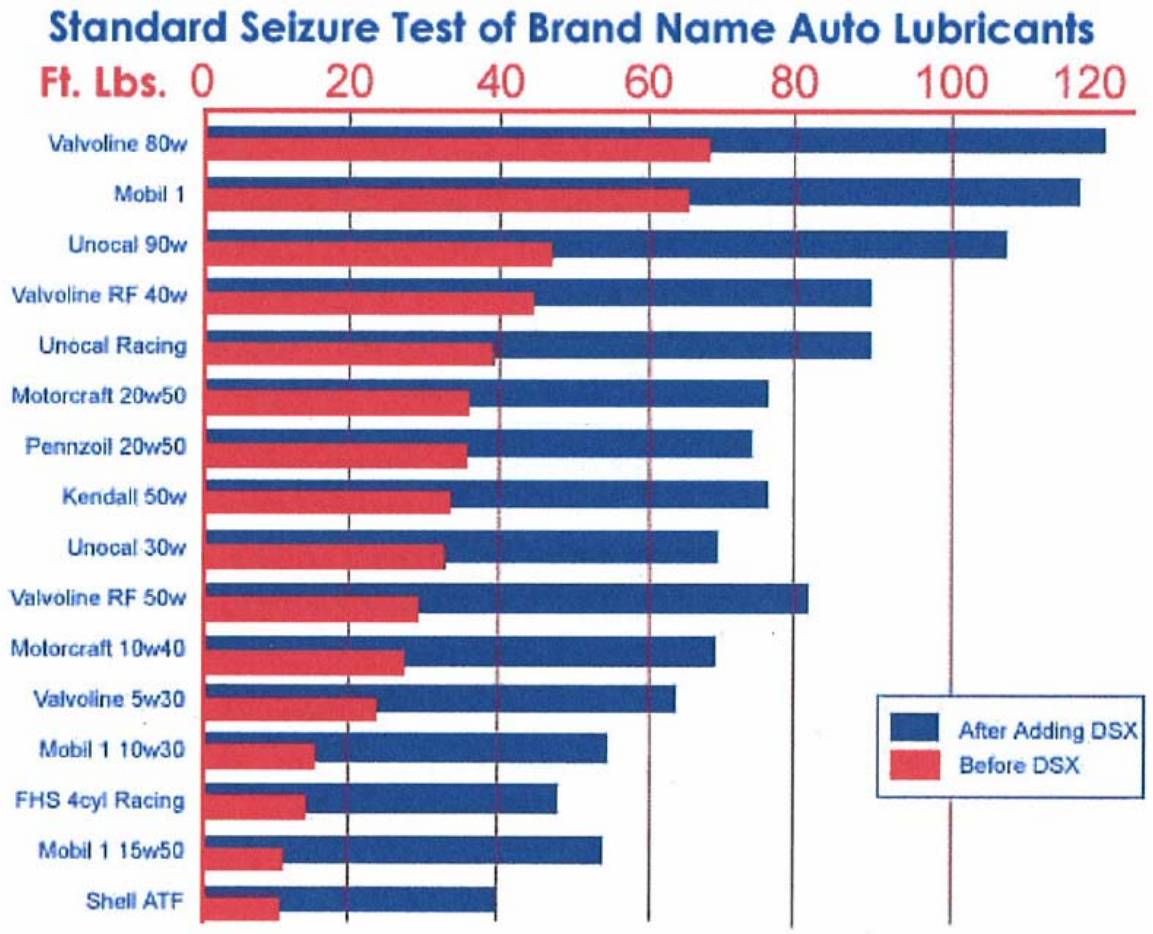

Figure 1 - Seizure Test Results from Promotional Literature

RP 1115 Qualification

The purpose of RP 1115 is to provide equipment users with guidelines on how to qualify products that claim to improve fuel economy. TMC recommends that manufacturers of such products conduct a Type II, III or IV fuel economy test to verify product claims. It is also recommended that such products must be readily available on the market with firm equipment user validation before any fuel economy improvement claims are made.

Because the product was developed to overcome adverse temperature and grit conditions during Desert Shield, the focus of past research has not been potential fuel economy improvement. Fuel economy research included herein is intended to overcome this limitation. The following verbiage is provided by Equipment and Technology, Inc. in promotional materials:

> "The scientist who discovered/developed the DSX products focused on the benefit to reduce metal wear rather than improve fuel economy. Basically, it was then and is now, easier to prove a reduction in metal wear than it is to overcome the concerns related to all the variables in fuel economy improvement. Furthermore, the cost of fuel in the early

1990s was lower than it is today and not as critical to the transportation industry as it is now."

The purchase price of DSX Extra is reported to be approximately $98 per quart (with a quantity discount on cases), so on long haul vehicles the cost per mile would provide a positive rate of return with a relatively small improvement in fuel economy. The product is reported to be currently in use by several fleets, and reference letters are provided in Appendix A. The product is currently available for purchase via the following contact information:

Lee Lippert
Equipment and Technology, Inc. & DSX Products
PO Box 8766
Jacksonville, FL 32239
877-379-9872 (877-DSX-Xtra)
equiptech@bellsouth.net

The vendor indicates DSX Extra contains no hazardous hydrocarbons or chlorofluorocarbons (CFCs), and that it is environmentally safe to handle, ship, store and dispose of. Bonded fluoropolymer particulates are said to repel sand, debris, rain, snow, ice and salt, and are non-flammable, non-toxic, non-corrosive, containing no petroleums. The vendor further states that DSX Extra products meet worldwide specifications for high and low temperature motor vehicle usage (on land or water, at high altitudes or low altitudes), including MIL-L-2104E, MIL-L-46152E and API SC/CD. Promotional literature indicates it is fully compatible with all conventional and synthetic oils.

None of the above information was independently verified by PAVE researchers.

TEST PROCEDURE

Test Vehicles

The control and treatment tractors used in the experiment were sequential serial number 2004 Freightliner Columbia series Model C120 day cabs with no aerodynamic modifications. Both units were equipped with Detroit Diesel 60 Series DDEC-IV (EGR) engines rated at 435 hp at 2,100 rpm, with odometer readings of approximately 415,000 miles. Both tractors were equipped with Eaton Fuller 9 speed manual transmissions and cruise control, which produced approximately 1500 rpm at cruise speeds. Detailed information about the tractors are provided in Appendix B. All crankcase oil used during testing was the standard 15W-40 weight Delo 400 LE heavy-duty formulated for low emissions (API CJ-4), and all fuel used was ultra low sulfur #2 diesel containing off-road dye.

Any accessories that would have pulled auxiliary power were used in an identical manner in both tractors during all stages of Type II testing. Mirrors and windows were maintained in the same position for all stages of operation. Each tractor pulled flatbed triple trailer trains (shown in Figure 3) with every axle loaded up to the legal limit. This produced identical gross vehicle weights of approximately 155,000 pounds. The control truck was identified as unit #3, while the treatment truck was identified as unit #2.

Figure 3 – Control and Treatment Trucks During the Testing Process

Test Route

As seen in Figure 4, the test route consisted of a 1.7-mile closed loop oval adjacent to a research staging area. The Pavement Test Track at Auburn University is a controlled access facility on which a fleet of 5 heavy triple trucks each run over 3,000 miles a week in order to damage experimental pavements. Interest in the Track is not limited to pavements, and the operation of the heavy truck fleet on the closed loop oval provides an excellent opportunity to study the effect of various treatments on fuel economy.

The due east-west straight sections on the Auburn track are precisely 2600 feet long, connected with spiral-curve-spiral sections approximately 1900 feet in length. The east curve profile travels down a –0.5 percent grade, while the west curve profile travels up a +0.5 percent grade. The maximum super-elevation of both curves is 15 percent, which supports a design speed of approximately 46½ mph. The profiles of both the north and south straight sections are level with 2 percent normal cross-slopes (the typical interstate standard). Consequently, the duty cycle consists of approximately 60 percent on level pavement (with 2 percent normal cross-slope), 15 percent up grade and 15 percent down grade (both with 15 percent super-elevation). The pavement type changes every 200 feet such that the surface of the track represents a microcosm of the national interstate highway system, with materials hauled in from all over the country to maximize the quality of the simulation.

Figure 4 – Auburn University Track Used for Type II Test Route

Each Type II test run consisted of at least 28 miles of continuous operation on the closed oval in this manner, with vehicles spaced out in order to prevent aerodynamic

interaction. Typical vehicle spacing during testing is shown in Figure 5. The travel speed of the test vehicles was maintained between 45 and 50 mph using cruise control, running in 8th gear to produce rpm levels comparable to interstate speeds.

Figure 5 – Proper Spacing During Testing To Avoid Aerodynamic Interaction

RP 1102 Methodology

A work plan was developed based upon the TMC/SAE Recommended Practice 1102 (*In-Service Fuel Consumption Test Procedure – Type II*). In this procedure, fuel consumption measurements in a test vehicle (T) are compared to measurements from a control vehicle (C) before and after treatment. The difference between the before and after T/C ratios are used to calculate a fuel savings percentage presumably resulting from the treatment. For the purpose of this study, a test run was defined as at least 28 miles of continuous driving on the Pavement Test Track. Vehicle operation was synchronized using handheld radios to ensure precisely identical duty cycles. Both trucks were outfitted with removable fuel tanks (shown in Figure 6) that were weighed between each test run in order to determine the amount of fuel consumed. The weighing process is shown in Figure 7, with fuel temperature documentation shown in Figure 8. The T/C ratios for all test runs were calculated, and the first 3 ratios that fell within TMC's prescribed 2 percent filtering band were used to compute an average value representing each segment of testing.

Figure 6 – Removing Portable Tank for Fuel Weight Determination

Figure 7 – Weighing Portable Tank to Within a Tenth of a Pound

Figure 8 – Checking Temperature of Fuel in Portable Tank Between Test Runs

Type II Test Data

All experimental data for the Type II procedure are provided in Table 1. Baseline testing was completed on April 19, 2007, after which time the treatment was applied and the process of running conditioning miles was initiated. Treatment testing was conducted after 8,219 miles, 13,351 miles and 20,993 miles had been run in order to assess the ½ oil change, 1 oil change and 1½ oil change intervals, respectively (based on the Track's 15,000 mile oil change standard practice). The entire testing program was completed in less than 2 months.

Run Date	Test Segment	30-Mile Test Runs	Mid Time	$Fuel_T$ (lbs)	$Fuel_T$ (°F)	$Fuel_C$ (lbs)	$Fuel_C$ (°F)
4/19/2007	Baseline	1	811	49.8	113	52.2	105
	(0 miles)	2	904	49.5	136	51.0	138
	No Treatment	3	959	49.7	151	51.1	153
		4	1054	49.7	159	51.0	163
5/10/2007	1/2 Oil Change	1	815	48.9	126	50.7	120
	(8,219 miles)	2	906	48.5	143	49.8	148
		3	1001	48.1	152	49.3	157
		4	1151	49.4	158	50.9	164
		5	1245	49.6	166	50.9	170
5/23/2007	Oil Change	1	840	49.7	109	52.3	122
	(13,351 miles)	2	1009	50.0	150	52.1	149
		3	1104	48.6	149	50.5	155
		4	1203	49.3	154	51.0	167
6/12/2007	Oil Change + 1/2	1	951	48.4	146	51.3	147
	(20,993 miles)	2	1042	48.1	165	50.6	154
		3	1134	48.1	153	50.7	159
		4+	1308	84.7	145	90.0	153

Table 1 – Type II Test Raw Data (T=Treatment Vehicle, C=Control Vehicle)

Type II Calculations

It is seen in Table 2 that the addition of DSX Extra to engine oil produced an apparent short-term improvement of only 0.1 percent approximately half way through the first treated oil change interval (at 8,219 miles). Because the stated accuracy of the Type II test procedure is ± 1 percent, this is equivalent to observing no improvement at all. An apparent mid-term improvement of 1.6 percent was observed immediately after the oil was changed and DSX Extra was again added to the crankcase (at 13,351 miles). Finally, a long-term improvement of 2.6 percent was observed approximately half way through the second oil change interval (at 20,993 miles).

Run Date	Test Segment	30-Mile Test Runs	Mid Time	Air (°F)	Dew (%)	Hum (%)	Wind (mph)	Wind Dir	Precip (in)	$Fuel_T$ (lbs)	$Fuel_C$ (lbs)	T/C (All)	T/C (Band)	T/C (Filt)	T/C (Avg)	T/C (% Improved)
4/19/2007	Baseline	1	811	56	45	68	2	101	0.0	49.8	52.2	0.9540				
	(0 miles)	2	904	62	46	57	3	71	0.0	49.5	51.0	0.9706	99.6%	0.9706		
		3	959	68	45	48	3	91	0.0	49.7	51.1	0.9726	99.8%	0.9726		
		4	1054	72	45	39	4	108	0.0	49.7	51.0	0.9745	100.0%	0.9745	0.9726	Baseline
5/10/2007	1/2 Oil Change	1	815	67	57	76	3	80	0.0	48.9	50.7	0.9645	98.9%	0.9645		
	(8,219 miles)	2	906	71	55	65	4	94	0.0	48.5	49.8	0.9739	99.8%	0.9739		
		3	1001	75	55	56	3	91	0.0	48.1	49.3	0.9757	100.0%	0.9757		
		4	1151	81	55	42	3	146	0.0	49.4	50.9	0.9705				
		5	1245	83	54	39	3	164	0.0	49.6	50.9	0.9745			0.9714	0.1%
5/23/2007	Oil Change	1	840	71	57	73	5	126	0.0	49.7	52.3	0.9503	98.7%	0.9503		
	(13,351 miles)	2	1009	75	55	58	7	145	0.0	50.0	52.1	0.9597	99.7%	0.9597		
		3	1104	77	55	52	7	132	0.0	48.6	50.5	0.9624	100.0%	0.9624		
		4	1203	80	55	45	8	144	0.0	49.3	51.0	0.9667			0.9575	1.6%
6/12/2007	Oil Change + 1/2	1	951	72	70	87	2	79	0.0	48.4	51.3	0.9435	99.3%	0.9435		
	(20,993 miles)	2	1042	76	70	77	3	107	0.0	48.1	50.6	0.9506	100.0%	0.9506		
		3	1134	79	72	71	3	96	0.0	48.1	50.7	0.9487	99.8%	0.9487		
		4+	1308	81	70	68	3	122	0.0	84.7	90.0	0.9411			0.9476	2.6%

Table 2 – Type II Fuel Economy Test Calculations

Daily Fleet Records

Each vehicle in the 5-truck fleet is run approximately 680 miles per day in order to damage experimental pavements on the Pavement Test Track. Detailed records of fleet operations are maintained to aid in minimizing cost as well as in supporting ongoing vehicle research projects. Single 100-gallon tanks on each truck are topped off using an onsite fueling station at the end of each 340-mile AM (5:00 AM until 2:00 PM) and PM (2:00 PM until 11:00 PM) shift. A driver shift change occurs at 2:00 PM; however, drivers are assigned to the same vehicle on a daily basis. A digital pumping system is used to dispense the fuel that is calibrated to the nearest one-thousandth of a gallon. Idling practices are identical for every truck in the fleet in order to produce duty cycles that do not confound test data.

Maintenance Observations

Drivers did not report any change in performance of the test vehicle during the time under treatment. Oil was changed in the both the control and test vehicles every 15,000 miles. The results of sample analyses are pending.

DISCUSSION OF RESULTS

The DSX Extra oil additive did not create any discernable maintenance or performance problems over the course of the experiment, which ultimately included two oil change intervals. Treatment with the experimental additive was included with both oil changes. All environmental and experimental data for the Type II procedure have been provided in Tables 1 and 2. It was found that the addition of DSX Extra to conventional lubricants in all driveline components (engine, transmission and tractor drive axles) produced an apparent short-term fuel economy improvement that was not significant (i.e., not greater than the ± 1 percent accuracy of the test procedure); however, after 13,351 miles (and a second treated oil change) an apparent improvement in fuel economy of 1.6 percent was observed. Ultimately, a 2.6 percent improvement was observed after 20,993 miles of operation.

The fuel economy performance of both the treatment and control vehicles were monitored on a daily basis for approximately 24,000 miles in order to validate these findings. As seen in Figure 9, fleet data collected after the addition of DSX Extra agreed well with the long-term Type II data. Differences between daily fleet records and short- and mid-term testing could not be explained.

Based on these findings, fleets choosing to use DSX Extra treatment should expect to begin to see positive results after the second oil change. It will be necessary to add DSX Extra treatment to two consecutive oil changes in order to replicate these results. It is not known if additional DSX Extra will be required in future oil changes in order to maintain observed improvements.

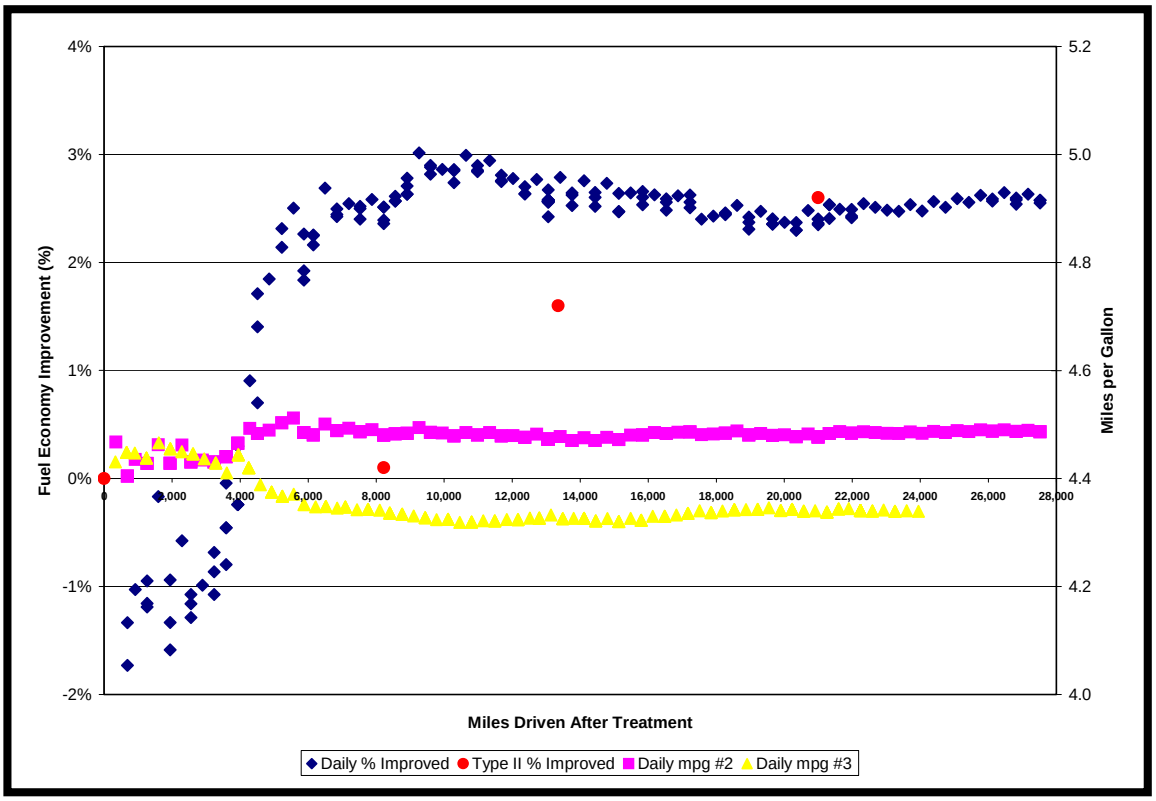

Figure 9 – Apparent Long-Term Fuel Savings via Daily Fuel Records

Please note that TMC cautions a single test is inconclusive regardless of the results; however, these positive findings should be interpreted by fleets as an indicator of the potential of the technology to produce real fuel savings in their own daily operations.

APPENDIX A – REFERENCES

Bar B Contracting, Inc
P O Box 224
Valley Mills, TX 76689

August 6, 2007

Mr. Lee Lippert
Equipment & Technology, Inc
P O Box 8766
Jacksonville, FL 32239

Re: DSX Products

Dear Mr. Lippert:

Thank you for introducing me to DSX Products.

I contacted you after reading about the DSX Products in Independent Contractor. The technical information you provided convinced me that I should try DSX Products. Being a Service Manager for a Peterbilt Dealer in Alabama and Director of Maintenance for a couple of premier carriers in the Southeast, I have extensive knowledge of mechanics and fuel consumption. This background enables me, as an owner operator, to search for new and innovative products that extend the life of the equipment and contribute to bottom line profits. I used DSX Extra in my engine, differentials and DSX Defender II, the protective wax, on the exterior of my cab. I am extremely happy with the results from both products.

My truck is a new Peterbilt with a CAT C-15 engine. For the first 6,440 miles I averaged 4.44 MPG. I have now been using DSX Extra in my engine for approximately 113,000 miles. The MPG ranges from 5.5 to 6.0 since adding DSX Extra and using DSX Defender II.

I was so pleased with the DSX Extra engine application that I decided to apply DSX Extra to the front and rear differentials of my truck. Temperatures in the front differential, prior to application, ran approximately 190 degrees and the rear approximately 180 degrees. Now temperatures are approximately 170 degrees (front) and 160 degrees (rear). Lower temperatures are a direct result of less friction, which results in extending the life of major components. With today's rising cost of equipment and repairs, extending equipment life is a bonus that adds to profits.

You told me how good the DSX Defender II wax was and what I should expect. To be fair, I did not believe any product could be that good. I applied the DSX Defender II to the cab, glass and mirrors as instructed. My first application did not include the stainless steel. The

shiny appearance was very impressive. The big surprise came when I washed the bugs, bird dirt, etc., off the truck at the end of the week, with a simple spray from the garden hose. A job that normally takes an hour each week was done in minutes. In early February, you called to ask about any experience in snow. At that time we had not driven in snow or ice so could not respond. In late February and March we drove in freezing weather with snow, ice and extremely windy conditions. NOTHING STICKS! Just like you told me, nothing sticks. Even the salt solution used on icy roads washes off easily, if washing is needed. I believe DSX Defender II is important as a safety factor, because the glass, windows and mirrors, are so clean and easy to keep clean. DSX Defender II is now on the stainless steel.

The DSX Products are saving me money everyday.

My next order for DSX Products is in the mail.

Thank you,

Bill Borom

8-10-2007

Robert R. Remsen
RAMHORN T RANCH
Carson City, Nevada

Mr. Lee Lippert
Equipment & Technology, Inc.
P.O. Box 8766
Jacksonville, FL 32239

Re: DSX Extra and DSX defender II

Dear Lee;

As you know, I was skeptical about the DSX products when we first talked. I also expressed an interest. My tractor is a 10 year old Freightliner with a Detroit 60 series engine. It now has almost 1,300,000 miles on it. Shortly after I purchased the truck I made some modifications to the engine and pumped it up to slightly over 700 HP.

I evaluated DSX products for about 6 months by adding DSX Extra to the engine lubricants. I did not put any into the transmission or the other gear boxes. I wanted to evaluate the effect on the engine. The following is the result of the testing:

1. The engine runs quieter with DSX Extra than without. It seems to run cooler, appears stronger. There was an overall slight increase in fuel mileage.

2. I change lubricants at 20,000 mile intervals. Prior to using DSX products I would add 4 to 6 gallons of oil between changes. After using the DSX Extra I add 3 to 4 gallons of oil. Remember the engine already had over a million miles on it before I began using these products.

3. Comparing fuel used at idle I would consume 1 1/2 to 2 gallons per hour. I now burn about 1 GPH. I consider this a significant increase. I have also noticed an increase of oil pressure while at idle and the engine idles cooler.

4. Recently I cleaned the fan and applied DSX Defender II to the blades. The fan appears to cool more efficiently, and the blades have remained clean. Individually, things like this have a small effect on vehicle performance, however, collectively they can have an enormous impact on vehicle performance and operating costs.

5. About two months ago a heater hose failed when pulling a full load in the mountains of Utah. Road conditions did not allow for stopping, so I pulled on up the hill until I could safely get off the roadway. I thought I was looking at an extensive and costly engine rebuild. we replaced the heater hose and added coolant. I have noticed no damage to the engine. I believe the DSX Extra helped prevent serious internal damage to the motor.

I continue to explore new applications for your products. I'll keep you advised of my findings.

Bob Remsen

H&D TRANSPORTATION SERVICES INC.
4371 PINE INLET EAST
JACKSONVILLE, FL 32277

Phone :904-237-3571
Email:
hdtransportserv@bellsouth.net

15 de Septiembre 2007

Mr. Lee Lippert
Equipment & Technology, Inc
P.O. B ox 8766 Jacksonville, Fl 32239

Re: DSX Products

Mr. Lippert ;

La presente es para darles las gracias por presentarnos los productos **DSX.**

En nuestra Comapañia comenzamos a usar el **DSX EXTRA** con nuestro primer camión, un Kenworth con motor Detroit Diesel. Despues de añadir **DSX EXTRA** al motor, yo note que el motor del camión comenzo a ser más silencioso y que la presión del aceite estaba más arriba y estable.

La economia de la diesel mejoro **6.45 MPG A 7.54 MPG** en cada **15,000** millas obteniendo haci una mejoria de un **17%.** Desde que yo le añadi **DSX EXTRA** los wheel bearings, power steering en el motor en cada cambio de aceite, la economia de diesel es constante de **7.25 MPG A 7.5 MPG** y yo cambio el aceite cada 20,000 millas. Este camión ahora tiene mas de **280,000 millas con DSX EXTRA (24 meses a 12,000 millas por mes)**

Con mi segundo camión un **Kenworth** con motor **CAT 3406,** yo he usado **DSX EXTRA** para mas de **210,000 millas.** El uso de diesel a mejorado de **6.0 MPG a 7.0 MPG** casi inmediatamente. Esto es una mejoria de un poquito mas de un **16%.**

En los dos camiones , el consumo de aceite entre los cambios de aceite a bajado, tambien el aceite usado es notablemente mas limpio en apariencia y al tocar el mismo. Antes de usar **DSX EXTRA,** el aceite lucia extremadamente sucio y sin vicosidad **.**

Yo tambien uso **DSX DEFENDER II** para darle el brillo protectivo a los dos camiones. Una botella es muy efectiva y tiene una duracíon de cuatro meses. Los dos camiones siempre lucen bien y en la noche es mas facil para conducir ya que el cristal se mantien más limpio y puedo conducir con mayor confianza ya que nada se adhiera a los cristales porque este producto ayuda a repela los insectos. Y las vaquillas.

Yo continuare usando los productos **DSX EXTRA** ya que estan ayudando ha extender la vida de mis camiones.

Gracias,

Miguel S Hernandez

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, USA 78228-0510 • (512) 684-5111 • TELEX 244846

July 23, 1992

Moroso Performance Products, Inc.
Attn: Mr. Bruce Sperry
80 Carter Drive
P.O. Box 1470
Guilford, CT 06437

Re: Project No. 08-4531-074

Dear Mr. Sperry:

The following are the results on the samples sent for 4-Ball Wear Testing.

1200 RPM
40 kg
ASTM D2266
60 min
Comparitive

Sample	Results
Motor Oil #1 Mobil 1 15W-50	0.58 mm
Oil Additive #1 DSX Additive	0.33 mm
Oil Additive #2 Tufoil	0.46 mm
Oil Additive #3 Slick 50	0.49 mm
Additive #1/Motor Oil #1	0.35 mm

Scar Dia
The smaller the dia the better the additive.

If you have any questions regarding these results please call (512) 522-3006.

Sincerely,

Geronimo A. Estrada

Geronimo A. Estrada
Manager, Chemistry Laboratory
Petroleum Products Research
Automotive Products and
Emissions Research Division

GAE/gr

ASTM 3233

MEMORANDUM **EQUIP & TECH., INC.**

1 July 06

To: Our customers

From: Lee Lippert

Ref: DSX Extra – Results – Seizure Test – U.S. Navy.

Our product information package includes two pages – the cover of the manual for U.S. Nuclear Submarines and a page showing DSX Extra as approved. We contacted the U.S. Navy to request copies of information developed during the testing process. It was our understanding that this test process took more than 18 months.

After reviewing our request, the U.S. Navy released considerable information. Unfortunately, most of the information was redacted because "the responsive documents contain recommendations, it is considered pre-decisional in nature, and serve as part of the deliberative process", whatever that means.

We are not sure how any of that applies to our request, but we did find something of interest, specifically, a Test Memorandum on Measurement of Extreme-Pressure Properties of Lubricating Greases and Oils with comments.

Quote.

Method. Tester is operated with one steel ball under load rotating against three steel balls held stationary in the form of a cradle. Rotating speed and temperatures were set. Then the subject steel ball was subjected to a series of tests having a duration of 10 seconds at increasing loads until welding (seizure) occurs.

Grease. Results. Load increased to 800 Kg (machine limit) with no weld.

Liquid/Oil. Results. Load increased to 800 Kg (machine limit) with no weld.

Comments. Scar surfaces were exceedingly smooth and clear of scoring. In the Test Director's seven years of experience, this is a first in terms of performance. The test was conducted by the FALEX Corp, Aurora, Illinois.

End Quote.

From the information provided by the U.S. Navy, we were able to determine that DSX Extra was being tested for (1) running gear applications and (2) cylinder lubrication.

Correspondence: **PO Box 8766** **Jacksonville, Florida, USA** **32239-8766**
Telephone: **1-904-744-3400** **E-mail:** **equiptech@bellsouth.net** **Fax: 1-904-745-5319**

S9510-AB-ATM-010/(U)

0910-LP-574-7400

VOLUME 1
REV 2

TECHNICAL MANUAL FOR

NUCLEAR POWERED SUBMARINE ATMOSPHERE CONTROL MANUAL

DISTRIBUTION STATEMENT F: [redacted]

WARNING: [redacted]

DESTRUCTION NOTICE: [redacted]

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THIS MANUAL SUPERCEDES NAVSEA S9510-AB-ATM-010/(U) REV 1 DATED 16 OCTOBER 1989

PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND

30 JULY 1992

S9510-AB-ATM-010

TABLE A-12. LUBRICANTS

TRADEMARK	MANUFACTURER'S ADDRESS	ACC CAT	REPORT DATE	MIL-SPEC	NATIONAL STOCK NUMBER (NSN)	REASON FOR CAT
[illegible]	DOW CORNING	[illegible]	[illegible]			
[illegible]	DOW CORNING	L	[illegible]			
[illegible]	DOW CORNING	[illegible]	[illegible]			
[illegible]	[illegible] CORP	L	[illegible]			
[illegible]	[illegible], INC	[illegible]	[illegible]		[illegible]	
[illegible]		[illegible]	[illegible]	MIL-T-22361	[illegible]	
[illegible]		L	[illegible]			
[illegible]	[illegible] CORP.	L	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]		[illegible]	
[illegible]	DOW CORNING	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	L	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]		L	[illegible]			[illegible]
[illegible]	EVANS PRODUCTS CO.	[illegible]	[illegible]			
[illegible]		L	[illegible]			FULLY CURED
[illegible]	DOW CORNING	[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]		[illegible]	[illegible]		[illegible]	

P - PROHIBITED — NOT ALLOWED ON BOARD SUBMARINES AT ANY TIME EXCEPT UNDER SPECIFIC EXEMPTIONS

R - RESTRICTED — NOT ALLOWED ON BOARD SUBMARINES WHILE UNDERWAY, EXCEPT UNDER SPECIFIC EXEMPTIONS ALTHOUGH MAY BE USED ON BOARD IN LIMITED QUANTITIES WHILE IN PORT AND VENTILATING OUTBOARD

L - LIMITED — MAY BE USED WHILE UNDERWAY FOR A SPECIFIC PURPOSE AND FOR WHICH NO COMPLETELY INNOCUOUS SUBSTITUTE EXISTS. SHALL NOT BE CARRIED ON BOARD IN EXCESS OF REQUIRED QUANTITIES.

N - PERMITTED — NO RESTRICTIONS

POC - COMNAVSEASYSCOM [illegible]

APPENDIX B – TRACTOR SPECIFICATIONS

- Model Year – 2004
- GVW – 52,000
- Engine – Minimum 14.0 Liter 435HP @ 2100 RPM 1650 LB/FT Torque
- Batteries – (3) 12V with 2280 CCA
- Positive Post for jump starting the truck
- Compressor – Minimum of 15.9 CFM
- Clutch – Eaton Fuller 15-1/2" Adjust Free
- Exhaust – Right hand mounted vertical exhaust with 13' 06" curved vertical chrome tailpipe.
- Coolant filter – Fleetguard or approved equivalent
- Radiator – Minimum 1350 SQ-IN
- Antifreeze – Minimum rating of –34F
- Transmission – Eaton Fuller RTOC-16909A
- Transmission – Convert transmission to 13-speed at 500,000 miles (Provide total price for parts and labor as a separate line item)
- Transmission oil cooler – Air to oil
- Front Axle – Dana Spicer E-1200I 3.5" Drop Front Axle rated at 12,000 LB
- Front Brakes – Dana Spicer 15 x 4L ES LMS Extended Lube front brakes
- Front Suspension – 12,000 LB Taper-Leaf
- Front Slack adjusters – Dana Spicer LMS Extended Lube automatic front slack adjusters
- Front shock absorbers
- Rear Axle – Dana Spicer DSH40 rated at 40,000 LB
- Rear Axle Ratio – 3.70
- Main Driveline – Dana Spicer SPL250HD
- Interaxle Driveline – Dana Spicer SPL170 XL
- Interaxle Lockout – To include indicator light
- Synthetic Oil – 50W Transmission / 75W – 90W all axles
- Rear Brakes – Dana Spicer 16.5x7L LMS extended lube
- Rear Slack Adjusters – Dana Spicer LMS extended lube automatic rear slack adjusters
- Rear Suspension – Airliner 40,000 LB extra duty
- Air Suspension Dump Valve – Manual with indicator light and warning buzzer
- Rear Shock Absorbers – Both axles
- Trailer Air Hose – 15' coiled
- Trailer Electrical Cable – 15' Coiled
- Wheelbase – 187"
- Frame – 7/16" x 3-11/16" x 11-1/8" steel frame with a ¼" full C-Channel frame reinforcement with a minimum RBM rating 3,432,000 lbf-in per rail
- Frame Overhang – Minimum of 57 inches
- Front Tow Hooks – Frame mounted

- Clear Frame Rails 30” back of cab for cab guard mounting
- Air Slide 5th Wheel – 24” with a vertical load capacity of 70,000 lbs and a trailing load capacity of 200,000 lbs
- Fuel Tank – 100 - gallon aluminum right hand mounted fuel tank
- Front Tires – 275/80R 22.5 14 PLY Michelin XZA2
- Front Wheels – Aluminum 10-Hub Pilot
- Rear Tires – 275/80R 22.5 14 PLY Michelin XDA H/T
- Rear Wheels – 10-Hub Pilot 5-hand steel wheels
- Cab – Minimum of 120” conventional cab
- Cab Mounts – Air ride
- Air Horn
- Utility Light – Flush mounted back of cab
- Mirrors – Dual West Coast heated mirrors with right hand remote 102” wide
- Convex Mirrors – 8” convex mirrors mounted under primary mirrors on driver and passenger sides
- Factory tinted windshield and glass
- Vent Windows
- Ash Tray and Lighter – Dash mounted
- Fire Extinguisher – Mounted left hand of drivers seat
- Heater and Defroster
- Air Conditioning
- Driver Seat – High back air ride driver seat with adjustable lumbar support and dual armrest
- Passenger Seat – High back non-suspension
- Seat Covers – Heavy duty vinyl
- Gauges – To include all standard gauges plus tachometer, trip meter, hour meter, voltmeter, air restriction indicator, low air pressure light and buzzer, primary and secondary air pressure gauges, engine coolant temperature, and engine oil pressure
- Radio – AM/FM/WB Cassette
- Trailer Brake – Hand Controlled
- Park Brake System – Two valve system with warning indicator