BioPerformance
Fuel Additive Study

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FINAL REPORT

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Introduction

The purpose of this study was to determine the effectiveness of the BioPerformance fuel additive in reducing emissions and increasing fuel economy. The method used for such determination was a comparison of the emissions and fuel economy test results obtained prior to addition of the additive, with those achieved after the addition of the additive. To stabilize the vehicle prior to testing, 1500 miles were accumulated prior to each test series. For each vehicle, a series of three EPA-75 Federal Test Procedure (FTPs) and three Highway Fuel Economy Tests (HFETs) were performed without the fuel additive. After the fuel additive was introduced, each vehicle was subjected to another series of three EPA-75 FTPs and three HFETs.

All testing for this study was performed at Wallace Environmental Testing Laboratories, Inc. using the guidelines of 40CFR86.

Test Procedures

For this study, five late model vehicles were tested under dynamometer conditions. Three of the vehicles were rented from a rental car company, two were purchased from a local area used car dealership. The test selection consisted of 2000 and 2003 model year vehicles, including three passenger vehicles, an MPV, and a light duty truck (See Table 1 for a complete list of test vehicles). The starting mileage on the vehicles ranged from 11,000 to 171,221 miles.

All testing and mileage accumulation was performed using 87-octane, commercially available fuel.

Each vehicle's emission levels were tested using the three phase, EPA-75 Federal Test Procedure, as outlined in *Code of Federal Regulations, Title 40, Part 86*. A Clayton model ECE-50 dynamometer with direct-drive variable inertia flywheel system was used for testing. The inertia system on this dynamometer can simulate vehicle weights from 1,000-5,750 lbs. in 125-lb increments. A 5,000 cfm cooling fan in front of each test vehicles provided air flow during all tests. During soak periods, the fan was turned off. Wallace Environmental Testing Laboratories' Constant Volume Sampler, a Horiba Instruments CVS, was used for collecting vehicle emissions samples.

Table 1. Test Vehicles

Description	Classification	Engine Size	Starting Mileage
2003 Toyota Corolla	Passenger Vehicle	1.8 L, 4 cyl	55,168 miles
2003 Chevrolet Malibu	Passenger Vehicle	3.1 L, V-6	91,968 miles
2000 Nissan Altima	Passenger Vehicle	2.4 L, 4 cyl	102,889 miles
2000 Toyota Land Cruiser	MPV	4.7 L, V-8	11,000 miles
2000 Ford F-150	Light Duty Truck	5.4 L, V-8	171,221 miles

The EPA-75 Federal Test Procedure consists of three phases. The first phase is approximately 505 seconds, the second phase is approximately 870 seconds, and the third phase is 505 seconds. Between the second and third phase is a 540 second soak period. The HFET consists of one-765 second phase.

Prior to testing, all fuel was drained. 87-octane, commercially available fuel was added to the vehicles. Approximately 1500 miles were put on each vehicle to stabilize them before testing. Three EPA-75 FTPs and Three HFET were then performed without the fuel additive.

The fuel additive was added to each vehicle every time the vehicle was fueled. According to the instructions of BioPerformance, 7-10 gallons of 87-octane gasoline was added to the tank, one gallon was then mixed with the powdered fuel additive and poured in the tank, followed by another gallon to rinse the container, and then 7-10 gallons of additional fuel was added to the tank. Each vehicle was driven for an additional 1500 miles, being re-fueled in this manner. Three EPA-75 FTPs and Three HFET were then performed with the additive in the fuel tank.

Test Results

EPA-75 Testing

The effect of adding the BioPerformance Fuel Additive was found to reduce most regulated emissions. Emission of hydrocarbon (HC), carbon monoxide (CO) and oxides of nitrogen (NO_x) were all reduced on the 2003 Toyota Corrolla, the 2003 Chevrolet Malibu, and the 2000 Nissan Altima. The emissions of the 2000 Toyota Land Cruiser and the 2000 Ford F-150 were reduced in two out of three of the regulated emissions (See Table 2).

Table 2. Effect of BioPerformance Fuel Additive on Regulated Emissions

Vehicle	HC	CO	NO_x
2003 Toyota Corolla	-10.292 %	-9.627 %	-6.365 %
2003 Chevrolet Malibu	-1.909 %	-0.559 %	-0.391 %
2000 Nissan Altima	-6.550 %	-12.342 %	-12.699%
2000 Toyota Land Cruiser	-3.458 %	-11.291 %	1.846 %*
2000 Ford F-150	-4.725%	-2.754%	0.046%*

*Positive values indicate an increase in emissions levels.

The greatest decrease in HC was found when the fuel additive was present in the 2003 Toyota Corolla. The 2000 Nissan Altima had the greatest decrease in CO & NOx of the vehicles tested. A graphical representation of regulated emissions effect on each vehicle is provided in Chart 1.

Chart 1. **Graphical Representation of BioPerformance Fuel Additive on Regulated Emissions**

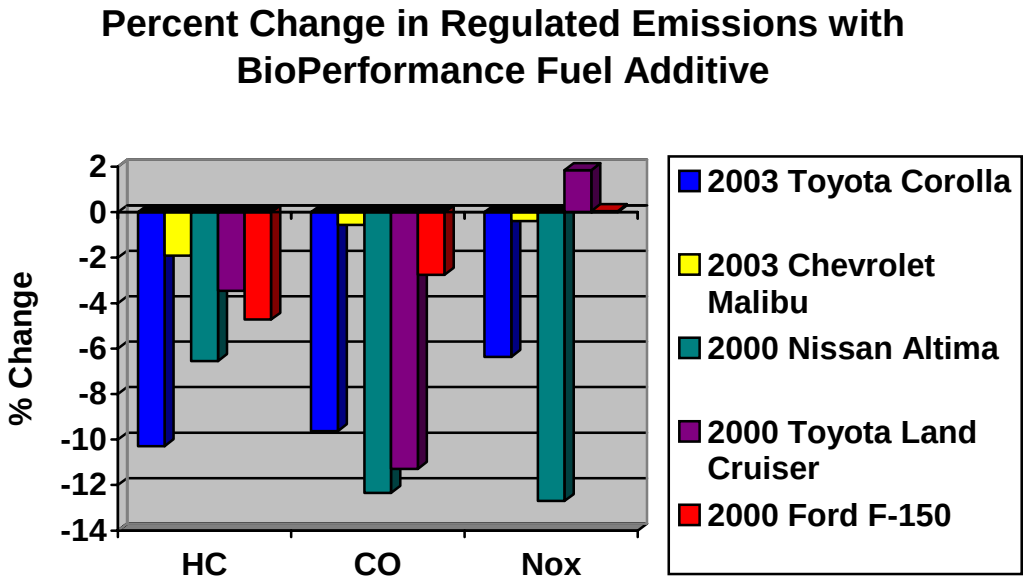

Table 3 shows the average effect on emissions over all vehicles.

Table 3. **Average Effect of BioPerformance Fuel Additive on Regulated Emissions**

HC	CO	NO_x
-5.387 %	-7.315 %	-3.513 %

FTP and HFET

The FTP and HFET calculates fuel economy and is based on the carbon balance method. Table 4 provides an overview of the effect of the addition of the additive on fuel economy.

Table 4. Effect of BioPerformance Fuel Additive on Fuel Economy

Vehicle	FTP fuel economy	HFET fuel economy
2003 Toyota Corolla	5.144 %	3.425%
2003 Chevrolet Malibu	1.353 %	2.592 %
2000 Nissan Altima	10.833 %	4.580 %
2000 Toyota Land Cruiser	1.815 %	1.145 %
2000 Ford F-150	-1.545%*	2.181%

*A negative value indicates a decrease in fuel economy.

The 2000 Nissan Altima had the greatest increase in fuel economy, both as measured by the FTP and HFET methods. A graphical representation of the fuel economy measurement results can be found in Chart 2, on the following page.

Chart 2. Percent Change in Fuel Economy with BioPerformance Fuel Additive

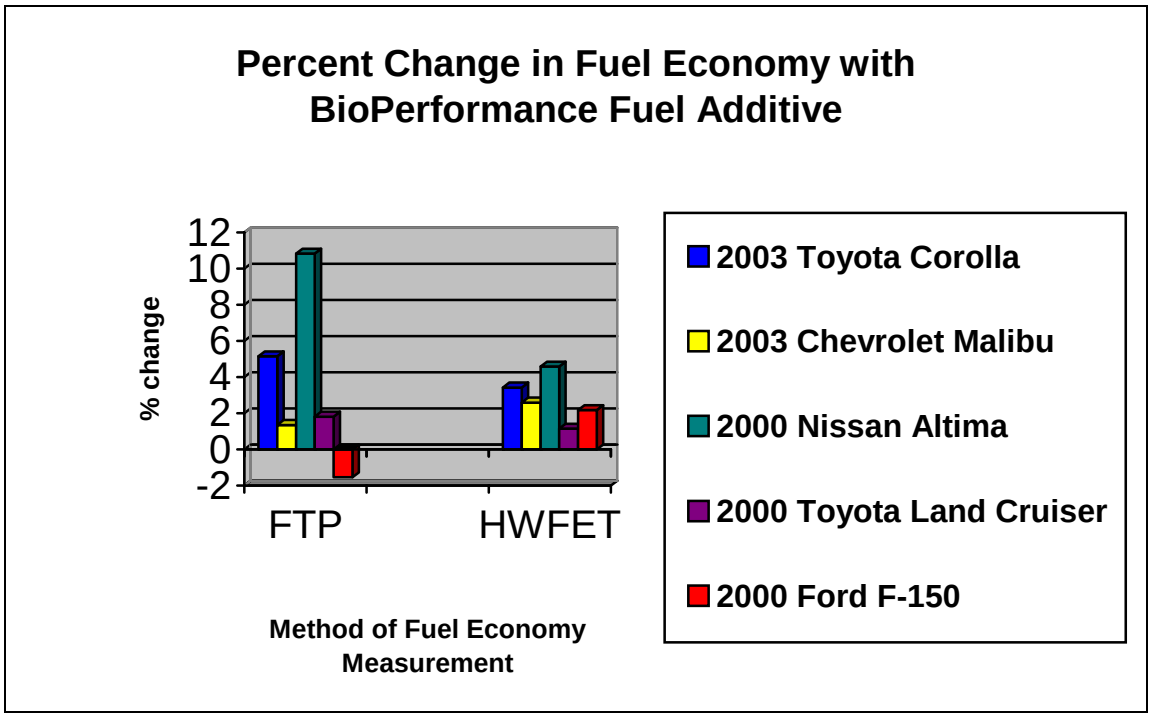

Table 5 shows the average effect on fuel economy over all vehicles.

Table 5. Average Effect of BioPerformance Fuel Additive on Fuel Economy

FTP fuel economy	HFET fuel economy
3.520 %	2.785 %

CONCLUSION

Using the EPA's criteria for the evaluation of fuel additives, the FTP and HFET tests conducted by this laboratory provide a reasonable degree of confidence that the product causes a real improvement in fuel economy and reduction in emissions. The emissions tested were Hydrocarbons (HC) which showed an average reduction of 5.387%, Carbon Monoxide (CO) which showed an average reduction of 7.315%, and Nitrous Oxide (NOx) which showed an average reduction of 3.513%. Fuel economy was increased by 3.52% for the FTP test, and 2.785% for the HFET test, yielding an average of 3.2% increase in fuel economy.

Based on the results generated from the testing plan described within this report the BioPerformance Fuel Additive causes a real improvement in fuel economy and a reduction in measured exhaust emissions.