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# Motor Fuel Quality Program Annual Report

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Prepared by

**Washington State Department of Agriculture**

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January 2008



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AGR PUB 945-212 (N/1/08)

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**Background**

The Washington State Department of Agriculture (WSDA) is responsible for administering the state’s Motor Fuel Quality Program. Statutory authority for the program is provided in Chapter 19.112 RCW. The program, carried out by the department’s Weights and Measures Program, inspects businesses marketing motor fuel at the retail, distributor and production level.

The Motor Fuel Quality Program was first implemented in 1991. Legislation enacted in 2006 (ESSB 6508) expanded the program’s scope to include biofuels, including biodiesel, biodiesel blends and ethanol blends.

Until 2006, funding for the Motor Fuel Quality Program came exclusively from the Motor Vehicle Account appropriated in the state Transportation Budget. With the expansion into biofuels, funding for the program has increased significantly and now includes funding in the Operating Budget from the state general fund for a biofuels standards coordinator and, in the 2007-2009 biennium, an additional \$1.5 million in the Transportation Budget to implement biofuels quality testing. The expanded program is to inspect biofuels manufacturing and distribution facilities, conduct field fuel tests, and collect fuel samples to be analyzed using a private laboratory. The expanded program assumes a high level of biofuels monitoring initially due to unproven industry quality and the importance of quality to the overall success of the state’s bioenergy initiative.

The total Motor Fuel Quality Program budget increased from \$430,000 and 2.5 FTEs in the 2005-07 biennium to \$2.05 million and 5.3 FTEs for the 2007-09 biennium, including a one-time appropriation from the Energy Freedom Account.

**Table 1. Motor Fuel Quality Program Biennial Budget**

<b>Program Budget by Funding Source</b>	<b>2005-07</b>	<b>2007-09</b>
General Fund-State	\$ 101,000	\$ 202,000
Motor Vehicle Account *	329,000	1,358,000
Energy Freedom Account	--	<u>500,000</u>
<b>Total</b>	<b>\$430,000</b>	<b>\$2,050,000</b>
<b>FTEs</b>	<b>2.5</b>	<b>5.3</b>

\*Includes full appropriation from the Motor Vehicle Account

**Motor Fuel Quality Program**

Inspections of gasoline and diesel fuel are conducted across the state on a random basis or in response to complaints. They are accomplished on-site by using portable octane analyzers and by collecting samples for detailed laboratory analysis. The department uses five portable octane/blend analyzers to test whether the motor fuel dispensed meets the octane/blend number posted on dispenser. The department contracts with Saybolt, Inc., a laboratory located in

Tukwila, to conduct the detailed fuel sample analysis on gasoline and diesel fuel that fails the on-site testing. The laboratory analysis determines product compliance with motor fuel specifications of the American Society for Testing and Materials (ASTM). WSDA uses the nationally approved ASTM tolerance limits to determine if a sample has passed or failed.

In 2007, WSDA was able to conduct a higher number of laboratory analyses of gasoline and diesel fuel and expanded the analyses to include water and sediment testing. A total of 996 samples were analyzed in the field. Of those, 580 were sent for laboratory analysis. Compliance across all grades of gasoline, for both octane and other factors, was at least 94%. One of the six diesel samples was out of compliance. The use of diesel as a motor fuel has increased. To address this increased use, WSDA initiated diesel sampling in 2007 and plans to increase sampling of diesel used in cars and light duty trucks to 25 samples in 2008.

**Table 2: Gasoline and Diesel Fuel Analyses by Grade, 2007**

Product	Total Samples Analyzed	Laboratory Analyses				
		Number of Samples	Octane		Water / Sediment	
			Number Out of Compliance	Compliance Rate	Number Out of Compliance	Compliance Rate
Unleaded Regular	227	87	5	94%	4	95%
Unleaded Midgrade	418	302	14	95%	4	99%
Unleaded Premium	315	185	11	94%	5	97%
Diesel	6	6	na	na	1	84%
<b>Totals</b>	<b>966</b>	<b>580</b>	<b>33</b>	<b>94%</b>	<b>14</b>	<b>98%</b>

### **Biofuel Quality Assurance Program**

On July 1, 2007, the Motor Fuel Quality Program began implementation of a Biofuel Quality Assurance Program to monitor and sample biofuels used as motor fuels in the state. Biofuels, such as ethanol blends above 10%, biodiesel, and biodiesel blends, are new to the Washington marketplace and present quality and testing challenges. Biofuels have different properties than petroleum fuels, require particular handling protocols, and deteriorate more easily when handled improperly. Studies conducted by the National Renewable Energy Laboratory as well as experiences in trials by Washington State and others indicate possible quality problems with biofuels.

One of the first steps in implementing the program was to compile a comprehensive list of facilities that produce, distribute and sell biofuels in Washington. This list is updated quarterly and is used by WSDA as the basis for the sampling and monitoring program. As of December 31, 2007, 111 biofuel facilities had been identified. Most of these facilities are distributors or retailers. Since July 1, sampling or monitoring has been done at each of the identified locations. The program plans to sample or monitor these locations quarterly through July 1, 2008. After that date, WSDA plans to determine sampling intervals for each facility based on its history of compliance with product specifications.

The state’s biofuels industry encompasses a variety of facilities across the state and includes producers/distributors, carriers and retailers of both biodiesel and ethanol-blended motor fuels. Biofuels quality inspections are accomplished on-site by pulling samples from storage tanks, delivery trucks, and railroad tank cars and at retail pumps. In this first year of the program, on-site field tests were used to check water content, sediments, microbial growth, glycerin and percent of biofuel blend. Octane levels were checked on ethanol blends. Samples were collected for laboratory analysis to verify field tests and to conduct detailed analysis of the sampled fuel.

Two in-state laboratories were used for analyzing biofuels in 2007. The laboratory analysis determines product compliance with motor fuel specifications of the American Society for Testing and Materials (ASTM) and product labeling requirements. Each biofuels sample was tested for 20 quality factors.

Of the 133 biofuels samples tested, 32 percent did not meet established tolerances for one or more quality factors. Reasons for failing tolerance limits varied, however, the most common problem was blend percentage. In many cases the blend stated on the product label (typically B5 or B20) was not the blend of the sampled product. This problem often proved to be related to the method of blending. Most biofuel blends are produced using the splash blending method. This method has some drawbacks as the fuels may become layered in storage tanks, which makes the exact percent of blends hard to achieve. Some distributors are now moving toward injection blending which provides much more accurate blend percentages. Of the 33 samples that failed the blend tolerance, 17 were close to being within tolerance. To be in compliance, B5 has to be between 4.5% and 5.5 % biodiesel; B20 must be between 19% and 21% biodiesel.

Two other common problem areas were water content and sediments, with 14 (11%) of the samples found to be out of compliance with the standard. Water contamination is an issue in biofuels due to our climate and the effect of temperature change on biofuels while being transported by rail car to our state. WSDA has taken a proactive approach on this issue by checking rail cars, storage tanks and biofuel samples for water contamination. Sediments can also be an issue. When introduced into the distribution system, biofuels can have a solvent effect on tanks and dispensing equipment. WSDA is working to provide information to consumers, fleet owners and state agencies on transitioning to biofuels, including what steps can be taken to reduce sediments in biofuels.

**Table 3: Biofuel Analyses, 2007**

Biodiesel (Includes B2-B100 blends)	Number of Samples	Samples that failed tolerance limits	
		Number	Percent
Distributor/Producer	38	8	21%
Carrier	5	1	20%
Retailer	92	34	37%
<b>Total</b>	<b>133</b>	<b>43</b>	<b>32%</b>

**Table 4: Reason for Biofuel Samples not meeting Tolerances**

Quality Factor Tested	Samples Not Meeting Tolerance	
	Number	% of total samples (N=133)
Blend Percent	33	25%
Flash Point	2	2%
Total Glycerin	4	3%
Free Glycerin	3	2%
Water & Sediment	14	11%
Water Suspended	9	7%
Microbial Growth	6	5%
Total Sulfur	3	2%
Acid Number	1	1%
Phosphorus	4	3%

All analyses and testing results are being shared with the fuel's owner, and WSDA staff is following up with facilities that have out-of-tolerance fuels to help them address problems. In one extreme case, where there was a high level of water in the fuel, WSDA issued a stop sale order and required the problem to be corrected before any more fuel could be sold.

In addition to monitoring and sampling biofuels, the program has identified and worked with state and local agencies, port districts and school districts that are using or considering using biofuels to help them develop internal quality assurance policies and procedures. WSDA has and will be sampling biofuels that are being stored and used by public agencies. In addition to sampling and analyzing the biofuels used by these entities, the program is also serving as a resource for questions on storage, vehicle maintenance, and quality assurance procedures.

### **Biofuel Usage by Public Agencies**

Major users of biofuels in our state are local transit authorities and port districts. Both the Port of Seattle and the Port of Tacoma are using biodiesel in their dockside vehicles. In December 2007, WSDA contacted 24 of the state's transit agencies. Ten reported a total of 1,865 transit vehicles using biofuels (B5-B20). This total includes the following.

- > King County Metro Transit is running its entire fleet of 1,269 vehicles on biofuel.
- > Kitsap Transit is running 218 of its vehicles on biofuel.
- > Everett Transit is running 150 of its vehicles on biofuel.
- > Intercity Transit (Thurston County) is running 90 of its vehicles on biofuel.
- > Six other transit systems run a total of 138 of their vehicles on biofuel.

WSDA also contacted school districts through the Office of the Superintendent of Public Instruction in December 2007. Fourteen of 299 districts responded and reported using biofuels.

The Washington State Department of Transportation (WSDOT) operates 131 fuel supply sites statewide, including assimilated Washington State Patrol fuel sites. Forty of these fuel sites have biodiesel (B10) available. WSDOT plans on expanding biodiesel supply when biodiesel is more widely available. These fuel supply sites are available to state agencies and convenience use for

higher education and co-op members, which includes city, county, school districts and some non-profit organizations throughout Washington. WSDOT has the fueling sites posted on the webpage at <http://www.wsdot.wa.gov/publications/manuals/fulltext/M53-55/FuelStations.pdf>. The Department of General Administration reports quarterly on biofuels use by state agencies.

In 2007, WSDA attended several consumer and business group meetings to present information related to biofuels quality and labeling. The program continues to work closely with the National Biodiesel Board, the National Conference of Weights and Measures, and its Biofuels Technical Work Group to compare sampling data and to review the latest proposals related to quality standards and testing procedures. The Biofuels Technical Work Group, made up of consumers, producers, distributors and retailers of biofuels, was established in 2006 to assist the program in the development of biofuel quality standards, test methods and addressing concerns related to biofuels.

***Biodiesel Success Story***

A pilot project initiated in 2007 by Jane Stephens, a bus driver for the La Conner school district, resulted in a successful switch from diesel to biodiesel for district’s buses. District mechanics were aware of potential issues with clogged fuel filters and proactively changed the filters after every 3rd or 4th time Jane’s bus filled up with biodiesel for the first few months. One discovery made in the pilot project was that the district’s Blue Bird buses have two separate fuel filters. Once both filters were changed, Jane’s bus ran great with B20 biodiesel and set the stage for other buses to make the switch.



*Jane Stephens with her Blue Bird School Bus.  
Photo courtesy of WholeEnergy.*

**Complaints**

The Motor Fuel Quality Program also responds to and investigates consumer complaints involving fuel quality, fuel labeling and quantity. In 2007, WSDA investigated 352 fuel complaints involving fuel quality, meter accuracy and other concerns. The majority of complaints received are complaints on meter accuracy. Table 4 provides the number of complaints by year and by type of complaint.

**Table 5: Comparison of Types of Complaints per Year**

Types of Complaint	2005	2006	2007
Fuel Quality	20	16	26*
Meter Accuracy	282	252	301
Prices/Signage/Other	13	14	25
<b>Total Complaints</b>	<b>315</b>	<b>282</b>	<b>352</b>
Total Valid Complaints	26	10	12
<b>Percent Valid Complaints</b>	<b>8%</b>	<b>4%</b>	<b>3%</b>

*\* Of the 26 fuel quality complaints, 4 were related to biofuels, 1 to diesel, and 21 to gasoline.*

## **Conclusion**

The Motor Fuel Quality Program provides regulatory oversight to the approximately 4 billion gallons of gasoline, taxable diesel and biofuels sold to Washington motorists at more than 3,500 business locations. The program continues to act as a deterrent for those who would attempt to sell low quality fuel, or misrepresent fuel and fuel prices to Washington motorists. When the program was implemented in 1991 compliance rates were as low as 72 percent; the rates have consistently exceeded 94 percent since 1994.

**Table 6: Gallons of Fuel sold in Washington State, 2006**

Type of Fuel	Number of gallons sold
Gasoline	1.2 billion
Taxable Diesel	2.7 billion
Biodiesel**	250 million

*\*\* National Biodiesel Board figure.*

Biofuels are a new and emerging market for motor fuels. The WSDA Motor Fuel Quality Program is working to support and encourage the successful use of biofuels through a high level of testing, monitoring and technical assistance activities. Results of testing during the first six months of the new biofuels quality assurance program underscore the need for these activities. Identifying quality problems as quickly as possible will minimize adverse impacts on public safety and consumer confidence, and encourage industry improvement through immediate guidance.