MINNESOTA DEPARTMENT OF AGRICULTURE

Report to the Legislature

Annual Report on Biodiesel

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Executive Summary

In 2002, Minnesota passed legislation mandating the use of biodiesel in the state. The law was implemented in 2005 when Minnesota began blending biodiesel into its fuel supply at a level of 2 percent—commonly referred to as B2. In 2007, Governor Pawlenty unveiled a plan for increasing the state's biodiesel requirement from 2 percent to 20 percent by 2015. According to subsequent legislation (Minnesota Statutes §239.77, subd. 2), as of May of 2009, all diesel sold or offered for sale in Minnesota must contain 5 percent biodiesel (B5), increasing to 10 percent (B10) in 2012 and 20 percent (B20) in 2015.[1],[2]

Governor Pawlenty formed the Biodiesel Task Force in 2003—comprised of appointees from industry, academia, and various associations—to advise the Commissioner of Agriculture on implementing the original B2 blend requirement and building the state's biodiesel production capacity. Since then, the Task Force has helped promote the industry and educate biodiesel developers, marketers, consumers and manufacturers about biodiesel and related issues in Minnesota.

Pursuant to Laws of Minnesota for 2008 Ch. 297, Article 1, Sec. 68, in 2008 the Commissioners of Agriculture and Commerce convened the Technical Cold Weather Issues Team of the Biodiesel Task Force to discuss issues to be addressed in anticipation of the use of higher biodiesel blends. On the recommendations of team members, three technical subcommittees were established to address specific implementation issues related to production/distribution, blending and handling of biodiesel and petroleum diesel fuels. A progress report on the evaluation of cold weather issues by these subcommittees was released on February 15, 2009.[3] In addition, the Handling Subcommittee issued "A Biodiesel Blend Handling Guide" in the spring of 2009 designed to help diesel fuel users avoid potential cold weather problems.[4]

Experience has shown that biodiesel blends can perform well in cold weather, and tests by the Minnesota Department of Commerce indicate that the cold weather properties of B5 blends are similar to those of B2. Since the implementation of B5 in May of 2009, diesel fuel users in Minnesota have reported some problems potentially associated with the use of higher blends of biodiesel.[5] In January of 2010 the Minnesota Department of Commerce issued a temporary waiver for the B5 requirement in #1 diesel in response to concerns from the Minnesota Biodiesel Council and the Minnesota Petroleum

[1] By law, the 10 and 20 percent minimum content levels would be effective from April 1st through October 31st only. According to MS §239.77, subd. 2a, "The minimum content for the remainder of the year is five percent. However, if the commissioners of agriculture, commerce, and pollution control determine, after consultation with the biodiesel task force and other technical experts, that an American Society for Testing and Materials (ASTM) specification or equivalent federal standard exists for the specified biodiesel blend level in those clauses that adequately addresses technical issues associated with Minnesota's cold weather and publish a notice in the State Register to that effect, the commissioners may allow the specified biodiesel blend level in those clauses to be effective year-round."

[2] According to MS §239.77, subd. 2b, the 10 and 20 percent minimum content levels "become effective on the date specified only if the commissioners of agriculture, commerce, and pollution control publish notice in the State Register and provide written notice to the chairs of the House of Representatives and Senate committees with jurisdiction over agriculture, commerce, and transportation policy and finance, at least 270 days prior to the date of each scheduled increase, that certain conditions have been met (e.g., ASTM specifications exists, adequate supply is available, etc.) and the state is prepared to move to the next scheduled minimum content level."

[3] The report can be found on the Minnesota Department of Agriculture website at http://www.mda.state.mn.us/news/publications/renewable/biodiesel/biodieselcoldissues.pdf.

[4] The guide can be found on the Minnesota Department of Agriculture website at http://www.mda.state.mn.us/news/publications/renewable/biodiesel/biodieselblendguide.pdf.

[5] At the time that this report was published, data on complaint calls received were available through November of 2009.

Marketers Association that the mix of 5 percent biodiesel with #1 diesel fuel could lead to clogged filters in extreme cold weather.

Significant progress has been made in providing new industry specifications that establish and improve quality guidelines for biodiesel, biodiesel blends, and diesel fuel oil. The American Society for Testing and Materials (ASTM) introduced additions to existing standards that incorporated biodiesel blends up to B5 into the diesel fuel standard (D975), added a cold soak filtration test for B100 to the biodiesel specification (D6751), and established a new specification (D7467) for blends of biodiesel from B6 through B20.

The price of biodiesel fuel has experienced volatility along with diesel fuel prices. Over the past several years, the net price of pure biodiesel (B100) has been at times lower and higher than the commensurate wholesale cost of diesel fuel.[6] From 2006 to 2009 the average net wholesale cost of B100 was about 29 cents per gallon higher than the price of diesel (see price discussion on page 8). The supply of biodiesel fuel to Minnesota terminals has generally been constant. Few if any B5 outages occurred at terminals because biodiesel fuel was not available; instead, common reasons for B5 outages include local diesel fuel outages and a lack of winter blending equipment at certain out-of-state terminals. Plans for the installation of new winter blending equipment at a terminal in Sioux Falls, South Dakota could alleviate some issues related to winter blending in the future.

Minnesota's B2 and B5 mandates have provided an important incentive leading to the establishment of the state's existing biodiesel production capacity of 65 million gallons. The state's existing capacity can provide all the biodiesel necessary for B5, approximately 80 percent of the product needed for B10, and about 40 percent required for future statewide B20 requirements. A new biodiesel plant in Minnesota will likely provide additional capacity over the next few years.

Feedstocks used in biodiesel production at Minnesota plants are generally determined by the price and availability of the oil or fat used in the process. Given the large soybean oil crushing capacity in Minnesota, much of the soy oil used in Minnesota biodiesel plants is likely to be sourced from Minnesota oil producers.

Comments on this report from the Minnesota Biodiesel Task Force can be found in Appendix A.

[6] The net price is the price of biodiesel at the rack (wholesale) minus the $1.00 federal tax credit to the blender.

Introduction

This report is submitted pursuant to Minnesota Statutes §239.77, subd. 5:

> *Beginning in 2009, the commissioner of agriculture must report by January 15 of each year to the chairs and ranking minority members of the legislative committees and divisions with jurisdiction over agriculture policy and finance regarding the implementation of the minimum content requirements in subdivision 2, including information about the price and supply of biodiesel fuel. The report shall include information about the impacts of the biodiesel mandate on the development of biodiesel production capacity in the state, and on the use of feedstock grown or raised in the state for biodiesel production. The report must include any written comments received from members of the biodiesel fuel task force by January 1 of that year designated by them for inclusion in the report.*

Biodiesel Task Force/Technical Cold Weather Issues Team

The Biodiesel Task Force Technical Cold Weather Issues Team decided that cold weather issues and concerns should be addressed by subcommittees comprised of technical experts in the specific areas of: 1) production/blending, 2) distribution and 3) handling of biodiesel, biodiesel blends and diesel fuel.

Three subcommittees—Production/distribution, Blending, and Handling—were established and assigned topics from the team. Results of subcommittee activities on fuel sampling and analysis, product availability and recommendations on best practices are included in the 2009 legislative report, "Petroleum Diesel Fuel and Biodiesel Technical Cold Weather Issues."[7] In addition, in the spring of 2009 the Handling Subcommittee issued "A Biodiesel Blend Handling Guide" to help diesel fuel users avoid potential cold weather problems.[8]

Due to the recent developments, the Technical Cold Weather Issues Team will be meeting at the end January 2010 to discuss concerns with filter plugging in cold weather.

B5 Implementation

On May 1, 2009, in accordance with state law, Minnesota increased the amount of biodiesel blended into its fuel supply from 2 percent (B2) to 5 percent (B5).[9] The increase to B5 represents part of Governor Pawlenty's plan for taking the state's biodiesel requirement to B20 by 2015. Specifically, state law requires that all diesel fuel sold or offered for sale in Minnesota contain 10 percent biodiesel in 2012 and 20 percent in 2015. To implement these minimum content requirements, several issues must first be addressed regarding biodiesel's cold weather functionality, the establishment of industry specifications for B10 and B20, and the price and supply of diesel and biodiesel. The state will only move to the next scheduled minimum content level in statute if certain conditions based on consideration of these issues are met.[10] By law, the 10 percent and 20 percent minimum content levels would be effective for the summer months only (from April 1 through October 31), unless it is determined that adequate federal standards or specifications exist for those level blends to be effective year-round.[11]

[7] The report can be found on the Minnesota Department of Agriculture website at https://www.mda.state.mn.us/news/publications/news/govrelations/biodieselcoldissues.pdf.

[8] The guide can be found on the Minnesota Department of Agriculture website at http://www.mda.state.mn.us/news/publications/renewable/biodiesel/biodieselblendguide.pdf.

[9] MS §239.77.

[10] According to MS §239.77, subd. 2b, the 10 and 20 percent minimum content levels "become effective on the date specified only if the commissioners of agriculture, commerce, and pollution control publish notice in the State Register and provide written notice to the chairs of the House of Representatives and Senate committees with jurisdiction over agriculture, commerce, and transportation policy and finance, at least 270 days prior to the date of each scheduled increase, that certain conditions have been met (e.g., ASTM specifications exists, adequate supply is available, etc.) and the state is prepared to move to the next scheduled minimum content level."

[11] According to MS §239.77, subd. 2a: "The minimum content for the remainder of the year is five percent. However, if the commissioners of agriculture, commerce, and pollution control determine, after consultation with the biodiesel task force and other technical experts, that an American Society for Testing and Materials (ASTM) specification or equivalent federal standard exists for the specified biodiesel blend level in those clauses that adequately addresses technical issues associated with Minnesota's cold weather and publish a notice in the State Register to that effect, the commissioners may allow the specified biodiesel blend level in those clauses to be effective year-round."

Based on past experience and testing by the Minnesota Department of Commerce, state and industry experts did not anticipate any difference between the cold weather performance characteristics of B2 blends and the B5 blends introduced in 2009. Moreover, as discussed in subsequent sections, industry specification includes B5 as "standard diesel fuel"—which means it is safe for use in trucks, emergency and maintenance equipment and all diesel equipment. Throughout the early part of this winter (2009/2010), a number of concerns were expressed by diesel fuel users indicating a variety of potential problems. However, it has been difficult for the state to determine the extent of the problems. This is because the complaints have been spotty and/or specific to certain locations and applications, and thus samples collected have not allowed the state to adequately discern if the problems can be attributed to biodiesel. The Minnesota Department of Commerce's Weights and Measures Division recently developed technology that should allow them to discern a filter plugged by biodiesel components as compared to more conventional causes. This, along with better supporting information, should allow the state to more accurately determine the source of any potential biodiesel problems that are detected.

In January of 2010, a group of Minnesota diesel fuel suppliers requested that Minnesota waive the requirement that #1 diesel fuel be blended with 5 percent biodiesel. On January 15, the Minnesota Department of Commerce responded by issuing such a waiver through March 31, 2010. The waiver was granted in order to allow the biodiesel industry and petroleum producing and distributing industries time to identify the root cause of problems, and/or remove any product that may be out of specification from the distribution system.

The decision to grant a B5 waiver for #1 diesel fuels only was made to accommodate certain diesel fuel consumers who use straight #1 diesel fuel in the winter months. #1 diesel fuel has better cold flow characteristics in the winter, but is more expensive and yields less energy content (and therefore less mileage) than #2 diesel fuel. The cold flow characteristics of straight #1 diesel fuels seem to be impacted by 5 percent biodiesel to a greater degree than #2 diesel or blends of #1 and #2 diesel fuel. (Common #1/#2 diesel fuel blends can be 50 percent #1 and 50 percent #2 diesel, or any other variation to meet the expected temperature ranges for the season.) In addition, cold flow additives can be added to #2 diesel fuel or to blends of #1 and #2 diesel fuel to further improve product cold flow properties. Most state diesel fuel users have been well served by blends of #1 and #2 diesel, thereby benefiting from better mileage, lower fuel costs and better cold weather performance with biodiesel blends.

ASTM Specifications

ASTM is the premier international industry association that designates quality specifications for a wide variety of industrial products including fuels and lubricants. New additions were made in 2008 to the existing ASTM "Standard Specification for Diesel Fuel Oils D975," incorporating biodiesel blends up to 5 percent. The specification D975-09 was not adapted into Minnesota Statute, however, because of objections from some members of the petroleum industry who believed that adding 5 percent biodiesel into #1 diesel fuel would not allow that fuel to meet required distillation properties. An ASTM committee is currently working to resolve this issue.

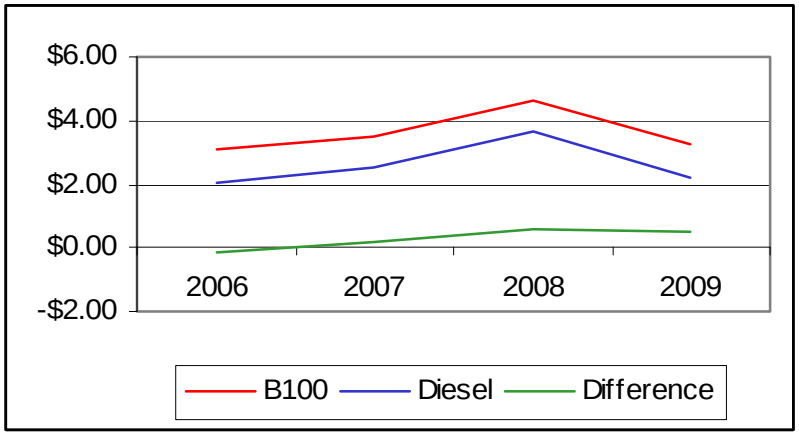
The existing ASTM "Standard Specification for Biodiesel Fuel Blend Stocks for Middle Distillate Fuels D6751" was amended in 2008 to include the cold flow filtration test into the recommended test parameters to address cold flow issues. The federal government also established a penalty for trading biodiesel not passing the cold flow filtration test that would be sold, transported or used after September 1, 2009. This stipulation reduces the chances of finding off-spec biodiesel in the marketplace.

A new ASTM "Standard Specification for Diesel Fuel Oil Blend (B6 to B20)" was approved in 2008 as D7467. The new standard establishes specifications for biodiesel blends including B10 and B20, which are proposed for general usage in Minnesota in 2012 and 2015, respectively.

Price and Supply

The price of biodiesel fuel has experienced volatility along with diesel fuel prices. A graph of the net average wholesale prices—adjusted to illustrate after-tax costs compared to the wholesale cost of diesel for these products at major Minneapolis/St. Paul terminal locations—can be seen in Figure 1.

Figure 1. Diesel[12] and Biodiesel[13] Price Trends, 2006-2009.[14]



From 2006 to 2009, the net after-tax cost of B100 to the blender has been at times lower and higher than the commensurate cost of diesel fuel. The impact of the cost of B100 on the cost of a biodiesel blend such as B5 can be described as follows:

> If the net cost of B100 is $1.00 higher than diesel, the computed net cost of the blend over the base diesel is $0.01 per gallon for each percent of biodiesel in the blend. Therefore the computed cost of B5 made with B100 that is a full dollar per gallon more in net cost than diesel, would be 5 cents more than the diesel fuel alone. The average net wholesale cost of B100 over the past 3 years has been $2.61, or about 29 cents higher per gallon than the price of diesel. Thus, the mean of the average price difference between diesel and biodiesel from 2006 through 2009 would contribute about $.0058 to the cost of one gallon of B2 and $0.0144 to the cost of one gallon of B5.[15] Thus, accounting for the switch from a B2 to a B5 blend in May of 2009, the mean of the average price difference between diesel and biodiesel contributed about $0.0093 to the cost of one gallon of the mandated biodiesel blend in Minnesota from 2006 to 2009 (B2 from 2006 through May 1, 2009 and B5 since May 1, 2009).

[12] Price of diesel at the rack (wholesale).
[13] Price of biodiesel at the rack (wholesale), after $1.00 federal tax credit is applied.
[14] From March 24, 2008 to May 2, 2008, data on the price of biodiesel was not available through the Axxis pricing service. After a review of data in May, Axxis determined that the increase in price was not an error, but actually reflected market conditions. Axxiss reestablished B100 prices effective May 2, 2008. To avoid the appearance of understating the price of biodiesel during that period, the average price of the last day of available data (March 28) and the first day of data (May 2) was inserted for the month of April.
[15] At the time of this report, data for 2009 was available and analyzed through November 30, 2009.

The actual difference between the net wholesale prices of biodiesel blends and diesel fuel includes the additional impact of the timing and length of marketing contracts between producer and marketer, the marketing strategies of petroleum refiners, pipeline operators and position holders (marketers) and the amortization of the cost of blending equipment installed at refiners and terminals.

The supply of biodiesel fuel to Minnesota terminals has generally been constant. Few, if any, B2 outages occurred because B100 was not available. More common reasons for blend outages were the lack of diesel fuel at terminals or the lack of winter blending equipment at some out-of-state terminals. In November of 2009, Magellan Mainstream Partners announced their decision to install wintertime biodiesel blending equipment in their Sioux Falls, South Dakota terminal. This terminal will now be able to provide biodiesel fuel blends to consumers in the southwestern region of Minnesota during the winter.

Impact of Minnesota's Biodiesel Requirements

Production Capacity

Minnesota's biodiesel mandate was an important incentive leading to the establishment of the state's existing biodiesel production capacity of 65 million gallons. The requirement to further increase the minimum biodiesel content to B10 and B20 will no doubt be an important driver of additional state biodiesel production capacity. It is estimated that the B5 mandate would require 40 million gallons, the B10 mandate would require 80 million, and the B20 mandate would require 160 million gallons of biodiesel to meet state blending requirements (assuming 800 million gallons of annual state diesel fuel use). The state's existing 65 million gallons of production capacity could therefore provide all the biodiesel necessary for B5, approximately 80 percent of the product needed for B10, and about 40 percent of that required for B20. Differences in the actual rate of state diesel fuel usage and gallons of state production will increase or decrease the percentage of biodiesel available from state producers.

The prospect for new and increased biodiesel production capacity will depend on developing markets and the relative price of organic fats and oils compared to diesel fuel. On September 28, 2009 the EverCat Fuels biodiesel plant opened in Isanti with 3 million gallons of production capacity. The plant also announced plans to expand capacity to 30 million gallons in the near future. If that expansion occurs, the state would have at least 93 million gallons of capacity, which would provide sufficient biodiesel for a statewide B10 blend and more than 50 percent of a B20 blend.

Progress in the rulemaking and implementation of components of federal Renewable Fuels Standard (RFS) legislation is likely to have a significant impact on any increased production that occurs in the State of Minnesota and elsewhere around the country. The various features of the RFS are in the process of clarification by the U.S. Environmental Protection Agency and U.S. Department of Energy. Moreover, a bill to extend the federal tax credit for biodiesel (which sunset as of December 31, 2009) passed the U.S. House of Representatives in December of 2009 and is expected to be addressed by the U.S. Senate in early 2010. Although Congress may ultimately reestablish the tax credit retroactively, the fact that it was allowed to sunset may nonetheless create hardship for some small biodiesel producers.

Feedstocks

The origin of feedstocks used in biodiesel production at biodiesel plants is generally determined by the price and availability of the oil or fat to be used in the process. Minnesota Soybean Processors (MnSP) in Brewster will use oil from their own soybean crushing plant. The SoyMor plant in Glenville buys oil from various soybean oil producers; however, the plant has been inactive and is in the process of remodeling their 30 million gallon operation to allow for the processing of a wide variety of fats and oils to improve the properties of their biodiesel. FUMPA in Redwood Falls is likely to use fats from their own recycling operation or from other oil suppliers, but also has the potential to process soybean oil and a wide variety of feedstocks including spent cooking oil and animal fat. The EverCat fuels plant in Isanti reportedly has the capacity to produce biodiesel out of plant and animal fat, spent cooking oil, or even fatty acid materials from various industrial sources.

Although various lipid feedstocks can be used, the large soybean oil crushing capacity in Minnesota suggests that much of the feedstock used in Minnesota's biodiesel plants will likely be sourced from Minnesota soybean oil producers. The most current Minnesota Department of Agriculture report (2006)

on soybean and biodiesel production is available at:
http://www.mda.state.mn.us/news/publications/renewable/soyecoimpactsummary.pdf.

Appendix A: Minnesota Biodiesel Task Force Member Comments

Comments from Flint Hills Resources:

Flint Hills Resources would to thank the Minnesota Biodiesel Task Force for its recent invitation to provide comments for the legislative report that will be submitted in January. As you're aware, our Pine Bend (Rosemount) refinery has more than five decades of operating experience in Minnesota and our company has been purchasing B100 Biodiesel since the inception of the Minnesota biodiesel mandate in September of 2005.

For your consideration, we provide the following summary comments and request that they be incorporated into the Legislative report submitted by the Minnesota Biodiesel Task Force.

Flint Hills Resources Summary Comments:
Winter operability remains a major concern with the mandated use of biodiesel at the B5 level in the Minnesota market. Flint Hills Resources continues to believe the Cold Weather Technical committee has not adequately addressed these Winter B5 operability concerns. Task Force data clearly show a marked degradation in cold temperature properties of the samples containing B5, which is troubling given Minnesota's harsh winter climate. To help achieve minimum operability confidence with B5 in the winter season, we believe the following items need continued investigation:

1) New operability testing methodologies which are more relevant to "real world" vehicle configurations and performance requirements need to be developed;
2) New additive solutions for biodiesel blends need to be developed, since historically utilized additives do not show the adequate cold flow response in the B5 environment;
3) New #1 fuel oil blending recommendations that account for historical Winter B2 performance due to the degradation in cold temperature properties as shown in the Task Force data, and provide assistance to the consumer operating in the B5 world.

In response to these concerns and as a result of proprietary testing conducted by our internal labs, Flint Hills Resources has introduced a new B100 winter specification for purchases of biodiesel into our proprietary B100 storage tanks. Our specification is more stringent than the current ASTM 6751 Specification for several key requirements.

In addition, Flint Hills Resources re-emphasizes our concern about the costs of blending biodiesel into diesel fuel. Blend economics continue to remain negative for the diesel user in Minnesota even with the federal blender's tax credit in place. These economics put the Minnesota diesel user at a disadvantage versus diesel users in surrounding states.

Flint Hills Resources appreciates the opportunity to participate on the Minnesota Biodiesel Task Force and looks forward to working with the other task force members in the future.

Sincerely,

Jeremy Bezdek
General Manager, Exchange and Marketing Supply
Flint Hills Resources, LP

Comments from the American Lung Association in Minnesota:

In addition to the economic and energy security benefits, use of B5 also brings important environmental benefits to the state. According to data from the National Biodiesel Board and U.S. Environmental Protection Agency, a 5% biodiesel blend prevents more than 238,000 pounds of particulate pollution and 668 million pounds of lifecycle greenhouse gases from entering our air each year – the equivalent of taking more than 55,000 cars off the road or the carbon sequestered by more than 66,000 acres of pine forest. These are important benefits to the environment and the health of Minnesotans throughout the state.

Comments from CHS:

December 15, 2009

CHS Inc. appreciates the opportunity to provide comments to the Minnesota State Legislature. The CHS business spans petroleum refining, petroleum fuel and renewable fuel marketing, soybean processing, and other agriculture related businesses.

In the spring 2009 report to the Minnesota Legislature, CHS expressed concern about the correlation of current test methodology used to evaluate biodiesel blends, to real world operability. Unfortunately this concern has manifested itself, as significant filter plugging has been experienced by diesel users in Minnesota, beginning in November 2009. Although the diesel fuel and B100 components that make up the B5 blend meet corresponding ASTM specifications, the resulting B5 product is failing in the operating environment. There are no reports of similar problems with filter plugging as result of diesel fuel used in bordering states.

These filter plugging instances are not isolated to CHS or its premium diesel fuel products. CHS is aware of numerous industry participants that are experiencing similar issues. CHS is collaborating with its biodiesel suppliers, third party pipelines, Minnesota State Lab, third party labs, and other entities in order to rapidly identify the issue.

Once this immediate issue is resolved, CHS recommends additional test methodology and research be performed prior to any further expansion of diesel fuel mandates requiring new blends, when there is uncertainty of performance across a variety of operating conditions.

Sincerely,

Dustin Haaland
Director, Renewable Fuels and Additives Supply
CHS Inc.