9. SUMMARY AND NEXT STEPS

This report concludes Phase 2 of a research project, requested by the Montana House of Representatives, examining the technical feasibility of using biodiesel on a broad-scale for on-highway use in Montana.

9.1. Summary of Research Findings

Phase 1 of the research project, as summarized in (2), reviewed a variety of literature related to previous experience – laboratory and on-road – with biodiesel. The report observed the following:

- Engine performance did not appreciably degrade through using biodiesel. Most studies which have shown a difference in fuel economy show biodiesel to have poorer fuel economy than diesel, although some studies have shown improved fuel economy. Recent studies have shown little if any reported power loss.

- In higher blends of biodiesel (B20 or higher), biodiesel may adversely affect the cold-temperature properties of the fuel; however, this is typically not an issue in formulations less than 20 percent, and is essentially not an issue in a B2 formulation[11].

- Biodiesel produces lower emissions (HC, CO, CO_2 and PM) than conventional diesel. It has been observed to produce higher emissions of NO_x; some studies have indicated that these increases in emissions could be mitigated.

- Engine damage may be a concern when high grades of biodiesel (over B20) are used in older engines which contain rubber components. It also may be an issue as biodiesel cleans out fuel tanks and lines and creates the need for more frequent filter changes on initial switchover to biodiesel blend. However, there is no documented literature which suggests engine performance is degraded through long-term use of biodiesel, and engine manufacturers are generally agreeable to its use in their engines.

Phase 2 of this project focused on a small-scale field test with MDT maintenance vehicles based in the Department's Havre and Lolo South maintenance shops. As was discussed in Chapter 4, there were no problems in the field test that could be conclusively linked to the use of biodiesel. The response from personnel who used the vehicles indicated no significant negative reactions to continued use of the fuel.

With the promising results of the field test, this report examined broader issues related to implementation of policies that would affect biodiesel usage and production in the state. First, issues related to microbial growth, engine technology change, and evasion of Montana fuel by long-distance truck drivers were discussed. The first two issues do not seem to cause significant

[11] Kelly Strebig of the University of Minnesota's Center for Diesel Research said that cold weather properties may be improved with B2 because of its enhanced lubricity (148).

concern for biodiesel. Evasion would likely be a concern only if the price differential between B2 and diesel is comparable to the difference in fuel tax rates between Montana and adjacent states. This is especially true since the trend among biodiesel users seems to indicate that increased usage leads to increased user acceptance.

This report reviewed characteristics related to the biodiesel market, as it is and might be in Montana. There are a variety of feedstocks that may be used, but it is unclear to what extent Montana feedstocks would be used in producing Montana biodiesel. The economics of biodiesel production were demonstrated to be fairly complicated. Demand for diesel fuel was also discussed, to highlight the potential nuances in defining which diesel uses could fall under a state mandate.

A review of policies at the Federal and state levels were used to develop a variety of policy alternatives for consideration; these were summarized in Table 8-1. These alternatives are all more or less sensitive to a variety of economic and non-economic factors.

9.2. Next Steps and Future Research

An extensive amount of research has been done on biodiesel over the last 20 years. As was demonstrated in Phase 1 of this report, the research has focused primarily on technical questions related to fuel properties, usage and demonstration. As the biodiesel industry has gained a significant part of the alternative fuels market, the focus on research has been shifted toward questions related to marketability.

Through the course of this project, several areas of promising research related to biodiesel have been identified. Some of these questions may be important for the Montana State Legislature to consider as they convene in 2005 to decide what biodiesel policy, if any, should be adopted.

- What is the public perception of biodiesel in Montana? How many people have heard of the fuel? Are their perceptions generally positive or negative? What willingness would the public have to use biodiesel, and at what additional cost?

- How would Montana farmers respond to a biodiesel mandate? Would they shift toward growing oilseeds like canola and rapeseed? Would this put more land into active production, or would there be a decrease in acreage of other crops?

- How would Montana fuel refiners respond to a biodiesel mandate? What would be the additional cost resulting from a mandate? How easy would it be for refiners to accommodate biodiesel in their terminal operations? How are Montana fuel refiners responding to the ultra-low sulfur diesel fuel rule?

- What is the availability of non-vegetable feedstocks (such as animal fats and yellow grease) for biodiesel production in Montana? How easy would it be, especially from the perspective of transportation costs, for these feedstocks to be incorporated into the biodiesel production process?

- How would the life-cycle costs of a vehicle fueled on B20 compare with those of a vehicle fueled using conventional diesel? Does B20 have any beneficial effects on vehicle longevity?

- What are the economic effects of the B2 mandate on Minnesota? Have farmers benefited? Have fuel costs increased more than in other states? Has it stimulated a biodiesel industry in the state? This could offer significant lessons to other states and the Federal government about the impact of state mandates on expansion of the alternative fuel industry.

Evaluation of Biodiesel Fuel

http://www.mdt.state.mt.us/research/projects/env/biodiesel.shtml

Phase I: Literature Review

Phase II: Field Test