

# MICROFILM DIVIDER

OMB/RECORDS MANAGEMENT DIVISION  
SFN 2053 (2/85) 5M



ROLL NUMBER

DESCRIPTION

24454

2001 SENATE FINANCE AND TAXATION

SB 2454

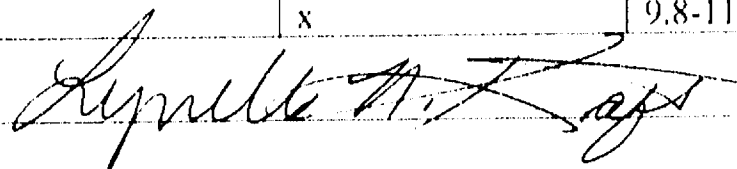
# 2001 SENATE STANDING COMMITTEE MINUTES

## BILL/RESOLUTION NO. 2454

Senate Finance and Taxation Committee

☐ Conference Committee

Hearing Date 2/6/01

Tape Number	Side A	Side B	Meter #
2	x		12-end
		x	0-1.4
2/7/01 - 3	x		12.4-13.4
2/12/01 - 1	x		33.7-50.2
		x	9.8-11.9
Committee Clerk Signature 			

Minutes:

Senator Urlacher: Opened the hearing on SB 2454, relating to the definition of biodiesel fuel; special fuels tax reduction for sales of diesel fuel blended with biodeisel fuels.

Senator Terry Wanzek: Co-sponsored the bill, testified in support. It's an approach to helping the soybean growers.

Senator Wardner: Do you need a new plant for processing?

Senator Terry Wanzek: There are plants in other states that can do this.

Senator Wardner: So the idea would be that eventually we'd have a plant in the state of ND?

Senator Terry Wanzek: This would be a tool to help soybean farmers to build the market.

Representative Dave Monson: Co-sponsored the bill, testified in support. This bill is in the right direction. Whatever we can do in this state to promote Ag, I'm all for it.

Representative Mike Brandenburg: Co-sponsored the bill, testified in support. This might be a jump-start to encourage biodeisel to be used.

Senator Kroeplin: Co-sponsored the bill, testified in support.

Roger Johnson: State Ag Commissioner, testified in support. Written testimony attached.

Senator Nichols: There are no mandates in this bill?

Roger Johnson: Right.

Senator Christmann: Could I be breaking warrantee requirements by using biodeisel fuel?

Roger Johnson: I don't know. Others that will testify with more expertise.

Terry Buerger: ND Soybean Council, testified in support. Biodeisel is cost effective. Utilizing this oil is economically positive, environmentally friendly, and benefits ND's economy & agriculture. There is a possibility of a plant being available in ND. John Deere does have a warranty statement out.

Senator Stenchjem: People can mix this fuel without having to pay a tax on it.

Senator Wardner: What's the price comparison?

Terry Buerger: There would be a \$.03 savings on the taxable side.

Joan Galster: State Tax Dept., testified neutrally. Appeared to answer any questions.

Shannon Sauer: Dept. Of Transportation, to answer questions.

Senator Nichols: How did you arrive at the fiscal note?

Shannon Sauer: The number is based on the assumption that 10% of diesel-based fuel sales would be biodeisel. It's based on past figures.

LeRoy Ernst: ND Motor Carriers Assoc., testified in opposition. This is discriminating against the trucking industry.

Senator Kroeplin: Wouldn't this bill make diesel cheaper for the truckers?

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Senate Finance and Taxation Committee  
Bill/Resolution Number 2454  
Hearing Date 2/6/01

LeRoy Ernst: It may, but it's also going to decrease the amount of taxes collected.

Senator Wardner: Would the truckers have a problem with using biodiesel fuel?

LeRoy Ernst: The ones I've talked to would.

L.P. Weist: Weist Trucking in Jamestown, testified in opposition.

Senator Terry Wanzek: Restated that this is not a mandate.

Senator Stenehjem: Makes a comment again that people can mix this fuel already.

Others signed the roster in support & opposition.

Senator Urlacher: Closed the hearing. Action delayed.

Discussion held 2/7/01. Meter number 12.4-13.4.

Discussion held 2/12/01. Meter number 33.7-50.2, Side A & 9.8-11.9.

Senator Stenehjem, Seconded by Senator Wardner, made a motion for a DO NOT PASS, the motion failed.

Rick Clayburgh: State Tax Commissioner, appeared to explain fiscal impact. Needs to look into it.

Senator Nichols: Stated that he reviewed his position.

COMMITTEE ACTION: 2/12/01

Motion made by Senator Nichols for a DO NOT PASS, Seconded by Senator Wardner.

Vote was 4 yeas, 2 nays, 0 absent and not voting. Bill carrier was Senator Wardner.

## FISCAL NOTE

Requested by Legislative Council

04/04/2001

Bill/Resolution No.:

Amendment to: SB 2454

**1A. State fiscal effect:** *Identify the state fiscal effect and the fiscal effect on agency appropriations compared to funding levels and appropriations anticipated under current law.*

	1999-2001 Biennium		2001-2003 Biennium		2003-2005 Biennium	
	General Fund	Other Funds	General Fund	Other Funds	General Fund	Other Funds
Revenues				(\$358,000)		
Expenditures						
Appropriations						

**1B. County, city, and school district fiscal effect:** *Identify the fiscal effect on the appropriate political subdivision.*

1999-2001 Biennium			2001-2003 Biennium			2003-2005 Biennium		
Counties	Cities	School Districts	Counties	Cities	School Districts	Counties	Cities	School Districts

**2. Narrative:** *Identify the aspects of the measure which cause fiscal impact and include any comments relevant to your analysis.*

**3. State fiscal effect detail:** *For information shown under state fiscal effect in 1A, please:*

**A. Revenues:** *Explain the revenue amounts. Provide detail, when appropriate, for each revenue type and fund affected and any amounts included in the executive budget.*

SB 2454 with House Amendments is expected to reduce highway distribution fund revenues by \$358,000 during the 01-03 biennium. This assumes that a refining facility of the required capacity is operational in this state in the 01-03 biennium.

**B. Expenditures:** *Explain the expenditure amounts. Provide detail, when appropriate, for each agency, line item, and fund affected and the number of FTE positions affected.*

**C. Appropriations:** *Explain the appropriation amounts. Provide detail, when appropriate, of the effect on the biennial appropriation for each agency and fund affected and any amounts included in the executive budget. Indicate the relationship between the amounts shown for expenditures and appropriations.*

Name:	Kathryn L. Strombeck	Agency:	Tax Department
Phone Number:	328-3402	Date Prepared:	04/05/2001

**FISCAL NOTE**  
Requested by Legislative Council  
03/29/2001

Bill/Resolution No.:

Amendment to: SB 2454

**1A. State fiscal effect:** *Identify the state fiscal effect and the fiscal effect on agency appropriations compared to funding levels and appropriations anticipated under current law.*

	1999-2001 Biennium		2001-2003 Biennium		2003-2005 Biennium	
	General Fund	Other Funds	General Fund	Other Funds	General Fund	Other Funds
Revenues				(\$358,000)		
Expenditures						
Appropriations						

**1B. County, city, and school district fiscal effect:** *Identify the fiscal effect on the appropriate political subdivision.*

1999-2001 Biennium			2001-2003 Biennium			2003-2005 Biennium		
Counties	Cities	School Districts	Counties	Cities	School Districts	Counties	Cities	School Districts

**2. Narrative:** *Identify the aspects of the measure which cause fiscal impact and include any comments relevant to your analysis.*

**3. State fiscal effect detail:** *For information shown under state fiscal effect in 1A, please:*

**A. Revenues:** *Explain the revenue amounts. Provide detail, when appropriate, for each revenue type and fund affected and any amounts included in the executive budget.*

SB 2454 with House Amendments is expected to reduce highway distribution fund revenues by \$358,000 during the 01-03 biennium.

**B. Expenditures:** *Explain the expenditure amounts. Provide detail, when appropriate, for each agency, line item, and fund affected and the number of FTE positions affected.*

**C. Appropriations:** *Explain the appropriation amounts. Provide detail, when appropriate, of the effect on the biennial appropriation for each agency and fund affected and any amounts included in the executive budget. Indicate the relationship between the amounts shown for expenditures and appropriations.*

Name:	Kathryn L. Strombeck	Agency:	Tax Department
Phone Number:	328-3402	Date Prepared:	03/30/2001

## FISCAL NOTE

Requested by Legislative Council

01/30/2001

Bill/Resolution No.: SB 2454

Amendment to:

**1A. State fiscal effect:** *Identify the state fiscal effect and the fiscal effect on agency appropriations compared to funding levels and appropriations anticipated under current law.*

	1999-2001 Biennium		2001-2003 Biennium		2003-2005 Biennium	
	General Fund	Other Funds	General Fund	Other Funds	General Fund	Other Funds
Revenues				(\$715,000)		
Expenditures						
Appropriations						

**1B. County, city, and school district fiscal effect:** *Identify the fiscal effect on the appropriate political subdivision.*

1999-2001 Biennium			2001-2003 Biennium			2003-2005 Biennium		
Counties	Cities	School Districts	Counties	Cities	School Districts	Counties	Cities	School Districts

**2. Narrative:** *Identify the aspects of the measure which cause fiscal impact and include any comments relevant to your analysis.*

SB 2454 is expected to reduce highway distribution fund revenues by \$715,000 in the 01-03 biennium.

**3. State fiscal effect detail:** *For information shown under state fiscal effect in 1A, please:*

**A. Revenues:** *Explain the revenue amounts. Provide detail, when appropriate, for each revenue type and fund affected and any amounts included in the executive budget.*

**B. Expenditures:** *Explain the expenditure amounts. Provide detail, when appropriate, for each agency, line item, and fund affected and the number of FTE positions affected.*

**C. Appropriations:** *Explain the appropriation amounts. Provide detail, when appropriate, of the effect on the biennial appropriation for each agency and fund affected and any amounts included in the executive budget. Indicate the relationship between the amounts shown for expenditures and appropriations.*

Name:	Kathryn L. Strombeck	Agency:	Tax Department
Phone Number:	328-3402	Date Prepared:	02/05/2001



Date: 2/2/01  
Roll Call Vote #: 1

2001 SENATE STANDING COMMITTEE ROLL CALL VOTES  
BILL/RESOLUTION NO. 2454

Senate Finance and Taxation Committee

☐ Subcommittee on \_\_\_\_\_

or

☐ Conference Committee

Legislative Council Amendment Number \_\_\_\_\_

Action Taken Do Not Pass

Motion Made By Stenehjem Seconded By Wardner

Senators	Yes	No	Senators	Yes	No
Senator Urlacher-Chairman	✓				
Senator Wardner-Vice Chairman	✓				
Senator Christmann		✓			
Senator Stenehjem	✓				
Senator Kroeplin		✓			
Senator Nichols		✓			

Total (Yes) 3 No 3

Absent 0

Floor Assignment \_\_\_\_\_

If the vote is on an amendment, briefly indicate intent:

Date: 2/12/01  
Roll Call Vote #: 8

2001 SENATE STANDING COMMITTEE ROLL CALL VOTES  
BILL/RESOLUTION NO. 2454

enate Finance and Taxation Committee

☐ Subcommittee on \_\_\_\_\_  
or  
☐ Conference Committee

Legislative Council Amendment Number \_\_\_\_\_

Action Taken DO NOT PASS

Motion Made By Nichols Seconded By Wardner

Senators	Yes	No	Senators	Yes	No
Senator Urlacher-Chairman	✓				
Senator Wardner-Vice Chairman	✓				
Senator Christmann		✓			
Senator Stenehjem	✓				
Senator Kroeplin		✓			
Senator Nichols	✓				

Total (Yes) 4 No 2

Absent 0

Floor Assignment Wardner

If the vote is on an amendment, briefly indicate intent:

**REPORT OF STANDING COMMITTEE (410)**  
**February 12, 2001 11:47 a.m.**

**Module No: SR-25-3033**

**Carrier: Wardner**

**Insert LC: . Title: .**

**REPORT OF STANDING COMMITTEE**

**SB 2454: Finance and Taxation Committee (Sen. Urlacher, Chairman) recommends DO NOT PASS (4 YEAS, 2 NAYS, 0 ABSENT AND NOT VOTING). SB 2454 was placed on the Eleventh order on the calendar.**

2001 HOUSE FINANCE AND TAXATION

SB 2454

2001 HOUSE STANDING COMMITTEE MINUTES

BILL/RESOLUTION NO. SB 2454

House Finance and Taxation Committee

☐ Conference Committee

Hearing Date March 5, 2001

Tape Number	Side A	Side B	Meter #
2	X		1,289
Committee Clerk Signature <i>Janice Stein</i>			

Minutes:

**REP. AL CARLSON, CHAIRMAN** Opened the hearing and read the fiscal note.

**SEN. TERRY WANZEK, DIST. 29,** Introduced the bill as the prime sponsor. The bill reduces the fuel tax by ten percent for any diesel admissions that contain a blend of at least two percent biodiesel. He submitted a handout received from the National Biodiesel Association relating to biodiesel: A blending component for enhanced fuel lubricity in diesel fuel. His feelings are that we provide tax incentives instead of mandates. I know there is a lot of concern about how this may impact the Highway Distribution Fund. That is a sensitivity that I share, however, I happen to have a record of the fuel tax I actually paid on our farm last year. The only reason I provide this is to make a point about how a vibrant economy does contribute to the Highway Distribution Fund. On our farm, we have a number of different vehicles, semi, two tandoms, single axed truck, pickup, four-wheeler, trailers, semi vans, with the registrations fees off of those. with the gas that was actually purchased on our farm, when you get down to it, they are not all miles on

the highway, this is a fuel burned across a stubble field, and with the diesel state tax which we paid for our semi and diesel truck, and the excise tax on diesel for our tractors, this is just from the farm. This does not include people I have hired. I contributed four thousand four hundred fifty nine dollars last year, to the Highway Distribution Fund from our farm. Now, if you add our personal vehicle registrations for three vehicles, roughly, we put on about sixty thousand miles. I myself, contributed over five thousand dollars into that Highway Distribution Fund. The point I am trying to make, is a vibrant, healthy, ag economy does contribute quite consistently to the Highway Distribution Fund. In addition, Sen. Solberg gave me approval to say this, in the Senate, after the bill had passed, they had discussed some amendments to reduce the fiscal impact to the Highway Distribution Fund. He is preparing amendments. In the Governor's Budget, there is some money designated for ethanol.

Related to the handout, stating there was a lot of interest nationally, to this idea.

**REP. CARLSON** I am assuming these two sections of the bill, deal with off-the-road use?

**SEN. WANZEK** The one section deals with any blend of biodiesel, would receive a ten percent fuel tax credit. There is also an excise tax credit as well. My initial intention was to only allow for that portion of the biodiesel to be tax exempt. John Walstad of the Legislative Council, said it would be hard to enforce. The ten percent was a shot in the dark, maybe five percent to make it more fiscally friendly.

**REP. CARLSON** We did turn the biodiesel bill which came before us, we turned it into a study. There were concerns from petroleum producers to manufactured engines and the availability, because we currently, are not producing any in the state.

**SEN. WANZEK** You were right to have concerns, that is why I was reluctant to endorse a mandate. According to the national biodiesel, there are two different individuals looking at production plants in North Dakota. That is the hope, that we can provide some incentive or encouragement for them to follow through with that.

**REP. CARLSON** How do you deal with the availability issue?

**SEN. WANZEK** It has always been my belief that anytime you develop a new product or a new business, you have to develop your market. It is the thing I encourage of my farmer friends.

**REP. CARLSON** Do you, as a farmer, use it in your vehicles?

**SEN. WANZEK** I use ethanol. Anybody that doubts my figures ....

**REP. CARLSON** Do you use biodiesel?

**SEN. WANZEK** No, but a number of farmers in the eastern side of the state are beginning to use it. I belong to a marketing club in Jamestown, and we have twenty five members in the club, and we are looking into the possibility of trying to secure some supplies, to send a message that we are willing to utilize our products.

**REP. CARLSON** Where would you buy it today?

**SEN. WANZEK** Some of the people who have purchased some, were unable to come here today.

**REP. CARLSON** We have heard from that group before, but it is available to you if you want to buy it and have it delivered to your farm?

**SEN. WANZEK** That is what I am told, but I haven't had the opportunity to purchase it, I have been a little preoccupied lately!!

**REP. MIKE BRANDENBURG, DIST. 26,** Testified in support of the bill. This bill is a way to position North Dakota to be attractive to work toward biodiesel and positioning and selling to encourage the production of biodiesel.

**ROGER JOHNSON, STATE AGRICULTURE COMMISSIONER,** Testified in support of the bill. See attached written testimony.

**REP. LLOYD** I have read recently, with regard to some of the major cities, especially in California, and in England, they are using different mechanisms for their buses, in looking forward, I would expect their main cause his pollution, without a doubt. I suspect, this would reduce pollution somewhat, but not at the same level as these new buses, I would suspect most of the cities would use the new system rather than continue to use diesel, as in motor fuel, my question is: in trying to look forward, where do we go to develop a new product which may be totally obsolete in twenty years?

**ROGER JOHNSON** I am not aware that these new buses would not allow the use of biodiesel. I can tell you that this is an industry that is going. We are seeing more and more use around the country. Environmental concerns are driving part of that. It is not dissimilar to what is happening with respect to ethanol. Around ten years ago, I was at a meeting in Rapid City, SD, and on a tour bus, that was one hundred percent biodiesel powered, there was no petroleum used at all. The other thing I can tell you, I think as this bill is drafted, it also provides for animal fat. Interestingly, there is a requirement in Hawaii, they are using fryer fat, from french fries and country fried chicken. There are a lot of different sources.

**WALLIE HARDIE, SOYBEAN GROWER,** Testified in support of the bill. All of you should have received a handout relating to biodiesel and an update on warranty information and



coal flow information about biodiesel. As a corn farmer and soybean farmer, we are anxious to use this product. I heard they are offering it in Hankinson. The two percent biodiesel, to me, even if you mandate it, is two percent of something, really something? That is the question you need to ask, we are not asking for the world here. We are asking for two percent of a product to be agriculturally based. There is tremendous advantages to this thing. The government is going to remove sulphur from our farm diesel, very soon, and we are going to lose lubricity. This biodiesel can replace that. You should also know that the corn growers and the soybean growers are locking arms, in terms of our whole energy policy.

**REP. CARLSON** As a tax committee, obviously, we hear very few bills that don't have some type of exemption on them. It is our responsibility to weigh out the benefits of that exemption, and whether or not the use of this would happen without the exemption. If we had a biodiesel plant that was producing this in North Dakota tomorrow, and you were able to sell your beans for an extra ten cents per bushel because of the market, would you need that two and half cents or one and a half cents to make it work?

**WALLIE HARDIE** As has been mentioned, this is just a way to get things started. That little exemption might cause a plant to come here which might otherwise go to Nebraska.

**REP. CARLSON** What about if the plant comes here first and then we give an exemption? This is just a thought, we have to make a seven hundred and fifteen thousand dollar decision. Will it encourage the use, will it bring a plant to North Dakota.

**CURT PETERSON, NORTH DAKOTA ASSOCIATION OF GENERAL**

**CONTRACTORS**, Testified in opposition of the bill. I am almost a little hesitant to say this, but I heard on the radio this morning that Minnesota is looking at biodiesel in their legislature,

and one of these proposals is making biodiesel out of chicken droppings. That might be another idea. We are opposed to this legislation, obviously, because it takes money out of our highway fund, which was mentioned. In regard to getting a plant of some kind started, I believe we did that twenty years ago, and we are still subsidizing the ethanol. I don't know that it ever goes away. With the number of bills, this session, for this to be paid for and that to be paid for out of the highway fund, I am not sure that we should look at some alternate dollars for highways. I think it is time that we stop and take a deep breath, if these are viable plants that are being built, encourage the people to invest money, and do just that. I think we have a fairly decent highway system in North Dakota. If we are going to start peeling away session after session, on exemptions, we are not going to have it. We can't continue robbing Peter to pay Paul, so to speak.

**REP. KROEBER** How much of the highway funds have we not matched so far?

**CURT PETERSON** We have matched every dime.

**REP. KROEBER** So to this point, we have matched them all?

**CURT PETERSON** Yes, that is correct, and in order to do that, we have raised license fees and we have raised gasoline tax to enable us to do that.

**LEROY ERNST, NORTH DAKOTA MOTOR CARRIER'S ASSOCIATION**, Testified in opposition of the bill. Our industry is a big user of diesel fuel. Fuel costs are second only to labor costs when it comes to our industry. Over the last twelve months, we have seen an increase in diesel fuel prices of over fifty percent. This is a substantial cost to us. Highway user fees, which include registration, fuel tax, etc., our industry contributes over one hundred million dollars in state and federal highway user tax and fees a year. This equates out to approximately to

million dollars per week, which this industry pays to North Dakota in highway taxes. I am not here to debate the merits of a particular product you are considering. I am here to offer three proposals. If the committee decides that, perhaps, you should decide to look at this bill, consider these three proposals. Taking into consideration, there is almost three quarters of a million dollars on the fuel tax collection within the gasoline, diesel fuel tax collections in the state. First proposal would be that you roll SB 2454 into HB 1309 and include that into the study which is being proposed under HB 1309. At that time, the merits of any tax credits whatsoever could also be included in that particular study. Secondly, I would ask that you look at the possibility of a funding mechanism which is contained within the ethanol industry, that being a check off on ag refunds which are now being used to fund the ethanol industry, which is up to six cents per gallon. Lastly, I would ask that you look at a proposal that, in your judgment, we should be incorporating this program out of the general fund.

**RON NESS NORTH DAKOTA PETROLEUM COUNCIL** Testified in opposition of the bill. Submitted a handout relating to biodiesel fact sheet study. He stated we will see more and more of these types of products on the market in the near future. At this point, we virtually know nothing about biodiesel. I think the study you passed is a good opportunity to consider more options. I am concerned about providing a tax break at the pump for an experimental fuel. I would contemplate what will happen with SB 2386 which provides for ethanol incentives, we are looking at the biodiesel plants, will they want to be included in that incentive package as well. And, of course, SB 2019, which provides direct incentives for ethanol, which is 2.5 million dollars for the next biennium.

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House Finance and Taxation Committee  
Bill/Resolution Number SB 2454  
Hearing Date March 5, 2001

**RUSS HANSON, NORTH DAKOTA PETROLEUM MARKETERS**, Testified in

opposition of the bill. He stated the matching funds are what concerns them.

With no further testimony, the hearing was closed.

**COMMITTEE ACTION, 3-27-01, TAPE #1, SIDE A, METER #0**

**REP. CARLSON** Reviewed the bill with committee members. He explained amendment #10736.0103. This amendments reduces the \$750,000 fiscal note in half.

Also explained Amendment #10736.0102 which deals with page 1 and page 2.

**REP. BRANDENBURG** Made a motion to adopt amendment #10736.0102 as presented.

**REP. WINRICH** Second the motion. **MOTION CARRIED BY VOICE VOTE**

**REP. RENNER** Made a motion to adopt amendment #10736.0103 as presented.

**REP. NICHOLAS** Second the motion. **MOTION CARRIED BY VOICE VOTE.**

**REP. NICHOLAS** Made a motion for a **DO PASS AS AMENDED**

**REP. RENNER** Second the motion. **MOTION CARRIED**

11 YES      3 NO      1 ABSENT

**REP. BRANDENBURG** Was given the floor assignment.

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House Finance and Taxation Committee

Bill/Resolution Number SB 2454

Hearing Date ~~March 5, 2001~~

4-9-01

**COMMITTEE ACTION 4-9-01, TAPE #1, SIDE A, METER #50**

**REP. DROVDAL** Made a motion to reconsider the action by which SB 2454 was passed out of committee.

**REP. CLARK** Second the motion. **MOTION CARRIED**

**REP. CARLSON** Presented amendment #10736.0105

**REP. CLARK** Made a motion to adopt the amendment as presented.

**REP. SCHMIDT** Second the motion. **MOTION CARRIED BY VOICE VOTE.**

**REP. DROVDAL** Made a motion for a **DO PASS AS AMENDED**

**REP. LLOYD** Second the motion. **MOTION CARRIED**

12 YES      2 NO      1 ABSENT

**REP. BRANDENBURG** Was given the floor assignment.

Date: 3-27-01  
Roll Call Vote #: 1

2001 HOUSE STANDING COMMITTEE ROLL CALL VOTES  
BILL/RESOLUTION NO. SB 2454

House FINANCE & TAXATION

Committee

- ☐ Subcommittee on \_\_\_\_\_  
or  
☐ Conference Committee

*Reconsidered*

Legislative Council Amendment Number 10736.0108

Action Taken Do Pass as amended

Motion Made By Rep. Nicholas Seconded By Rep. Renner

Representatives	Yes	No	Representatives	Yes	No
CARLSON, AL, CHAIRMAN	✓		NICHOLAS, EUGENE	✓	
DROVDAL, DAVID, V-CHAIR	✓		RENNER, DENNIS	✓	
BRANDENBURG, MICHAEL	✓		RENNERFELDT, EARL		✓
CLARK, BYRON		✓	SCHMIDT, ARLO	✓	
GROSZ, MICHAEL	✓		WIKENHEISER, RAY	✓	
HERBEL, GIL	✓		WINRICH, LONNY	✓	
KELSH, SCOT	✓				
KROEBER, JOE		✓			
LLOYD, EDWARD	A				

Total (Yes) 11 No 3

Absent 1

Floor Assignment Rep. Brandenburg

If the vote is on an amendment, briefly indicate intent:

Date: 4-2-01  
Roll Call Vote #: 2

2001 HOUSE STANDING COMMITTEE ROLL CALL VOTES  
BILL/RESOLUTION NO.

House FINANCE & TAXATION Committee

☐ Subcommittee on \_\_\_\_\_  
or  
☐ Conference Committee

Legislative Council Amendment Number 10736. 0105

Action Taken Do Pass as amended

Motion Made By Rep. Drovda Seconded By Rep. Lloyd

Representatives	Yes	No	Representatives	Yes	No
CARLSON, AL, CHAIRMAN	✓		NICHOLAS, EUGENE	A	
DROVDAL, DAVID, V-CHAIR	✓		RENNER, DENNIS	✓	
BRANDENBURG, MICHAEL	✓		RENNERFELDT, EARL		✓
CLARK, BYRON		✓	SCHMIDT, ARLO	✓	
GROSZ, MICHAEL	✓		WIKENHEISER, RAY	✓	
HERBEL, GIL	✓		WINRICH, LONNY	✓	
KELSH, SCOT	✓				
KROEBER, JOE	✓				
LLOYD, EDWARD	✓				

Total (Yes) 12 No 2

Absent 1

Floor Assignment Rep. Brandenburg

If the vote is on an amendment, briefly indicate intent:

**REPORT OF STANDING COMMITTEE**

**SB 2454: Finance and Taxation Committee (Rep. Carlson, Chairman) recommends AMENDMENTS AS FOLLOWS** and when so amended, recommends **DC PASS** (12 YEAS, 2 NAYS, 1 ABSENT AND NOT VOTING). SB 2454 was placed on the Sixth order on the calendar.

In lieu of the amendments adopted by the House as printed on pages 1154 and 1155 of the House Journal, Senate Bill No. 2454 is amended as follows:

Page 1, line 5, remove "and" and after "date" insert "; and to provide an expiration date"

Page 2, line 8, replace "two and one-tenth" with "one and five-hundredths"

Page 2, line 16, replace "eight-tenths" with "nine-tenths"

Page 2, line 18, replace "is effective for taxable events occurring after" with "becomes effective on the first day of the first month after the tax commissioner certifies to the governor and the office of the legislative council that a refining facility is operational in this state which has a production capacity of at least ten million gallons [37854000 liters] of biodiesel per year."

**SECTION 6. EXPIRATION DATE.** This Act is for taxable events occurring from the effective date of this Act under section 5 of this Act through June 30, 2003, and is thereafter ineffective."

Page 2, remove line 19

Renumber accordingly



2001 TESTIMONY

SB 2454

COMMISSIONER OF AGRICULTURE  
ROGER JOHNSON



PHONE (701) 328-2231  
(800) 242-7535  
FAX (701) 328-4567

DEPARTMENT OF AGRICULTURE  
State of North Dakota  
600 E. Boulevard Ave. Dept. 602  
Bismarck, ND 58505-0020

**Testimony of Roger Johnson  
Agriculture Commissioner  
Senate Bill 2454  
Senate Finance and Taxation Committee  
Lewis & Clark Room  
February 6, 2001**

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Chairman Urlacher and members of the Finance and Taxation Committee, I am Agriculture Commissioner Roger Johnson. I am here today in support of SB 2454, which will lower the tax rate on all sales of diesel fuel that contain at least 2 percent biodiesel.

As you are probably aware, we are facing a time when prices for agricultural commodities are at record lows, and fuel prices are escalating. Using biodiesel fuels provides a new market opportunity to our state's agriculture producers, in particular our soybean growers. The suggested 2 percent biodiesel requirement would mean the use of more than two million bushels of North Dakota soybeans. According to USDA estimates, if the country sustained an annual market of 100 million gallons of biodiesel, it would contribute a minimum of \$.07 to the price of each bushel of soybeans. For North Dakota, that translates into an economic impact of approximately \$5 million to our agricultural sector. Support for the use of biodiesel in our state can have a significant impact on our state's economy. I believe SB 2454 entices consumers to use biodiesel as an alternative to conventional fuels.

In addition, North Dakota uses more than 160,000,000 gallons of diesel each year. At current diesel prices, that amounts to over \$245 million dollars in annual spending for diesel fuel.

Agriculture producers are responsible for a large part of the annual consumption of diesel fuel.

The proposed tax incentive provides a needed reduction in input costs for them.

Chairman Urlacher and committee members, I urge a do pass on SB 2454. I would be happy to answer any questions you may have.

COMMISSIONER OF AGRICULTURE  
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**Testimony of Roger Johnson  
Agriculture Commissioner  
Senate Bill 2454  
House Finance and Taxation Committee  
Fort Totten Room  
March 5, 2001**

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Chairman Carlson and members of the Finance and Taxation Committee, I am Agriculture Commissioner Roger Johnson. I am here today in support of SB 2454, which will lower the tax rate on all sales of diesel fuel that contain at least 2 percent biodiesel.

As you are probably aware, we are facing a time when prices for agricultural commodities are at record lows, and fuel prices are escalating. Using biodiesel fuels provides a new market opportunity to our state's agriculture producers, in particular our soybean growers. The suggested 2 percent biodiesel requirement would mean the use of more than two million bushels of North Dakota soybeans. According to USDA estimates, if the country sustained an annual market of 100 million gallons of biodiesel, it would contribute a minimum of \$.07 to the price of each bushel of soybeans. For North Dakota, that translates into an economic impact of approximately \$5 million to our agricultural sector. Support for the use of biodiesel in our state can have a significant impact on our state's economy. I believe SB 2454 entices consumers to use biodiesel as an alternative to conventional fuels.

In addition, North Dakota uses more than 160,000,000 gallons of diesel each year. At current diesel prices, that amounts to over \$245 million dollars in annual spending for diesel fuel. Agriculture producers are responsible for a large part of the annual consumption of diesel fuel. The proposed tax incentive provides a needed reduction in input costs for them.

At a recent meeting of the National Association of State Departments of Agriculture (NASDA), I was informed about what other states across the nation are doing to address the issue of biodiesel fuel. I can tell you that in relation to these other states, North Dakota is trailing behind in supporting the development of these alternative fuels. As a large agriculture state, we should be more progressive in our approach to finding new uses for our state's commodities.

Chairman Carlson and committee members, I urge a do pass on SB 2454. I would be happy to answer any questions you may have.

## Senate Bill 2454 – Biodiesel Tax Reduction

### BIODIESEL FACT SHEET

#### Biodiesel

- Where is it produced?      What will it cost?
- What impact will it have on my engine?
- Does this tax break really help farmers? (.02% of the price on off-road diesel)
- Biodiesel will add a minimum of one cent per gallon of diesel fuel for every percent of the product added (ex. five cents for five percent blend) This does not include other blending, storage, transportation, and vehicle maintenance costs.

#### Biodiesel can cause operational problems in diesel engines

- Loss in engine performance
- Increased filter plugging
- Decreased ability to flow without "gelling" at cold temperatures
- Degradation of engine gaskets and seals
- Increased oxidation in fuel leading to microbial growth and reduced shelf life
- Considered an "experimental" fuel by Engine Manufacturer's Association

#### Engine warranties

- Detroit Diesel, Cummins, and Caterpillar have indicated that the use of biodiesel may place engine warranties at risk

#### A 1996 study of biodiesel by the Iowa Department of Transportation found:

##### Operational Problems

- **Fuel Gelling** – trucks needed to have tank heaters installed
- **Loss of Power** – operators reported dissatisfaction with power
- **Poor Fuel Economy** – trucks experienced a 7% increase in fuel consumption
- **Material Deterioration** – gasket failures occurred when using tank heaters
- **Particulate Matter** – black soot was discharged when starting the vehicles
- **Surface Protection** – biodiesel is a solvent that will remove surface paint
- **Costs** – in winter months it may cost 2.5 times more than conventional diesel

**Summary:** Biodiesel might be an energy source of the future but clearly there are some issues to resolve – with the problems mentioned above consumers may consider use risky.

**Passing this bill will cost the highway fund at least \$715,000**

## **Biodiesel: A Blending Component for Enhanced Fuel Lubricity in Diesel Fuel**

### **Frequently Asked Questions**

#### **What is biodiesel?**

Biodiesel is a clean burning fuel for diesel engines made from domestically produced, renewable fats and oils such as soybean oil. Biodiesel has no sulfur or aromatic compounds and already meets the new Environmental Protection Agency (EPA) ultra low sulfur diesel fuel mandated for introduction in 2006. Biodiesel can be used in existing diesel engines without modification. Biodiesel burns substantially cleaner than petroleum based diesel fuel. It is a powerful option for improving our environment while reducing dependence on foreign oil, stretching our fossil fuel reserves, and providing value-added markets for agricultural products.

#### **Is biodiesel a legal fuel?**

Yes. Biodiesel is registered with the EPA as a fuel and as a fuel additive. It has complied with Tier 1 and Tier 2 health effects testing required by Section 211(b) of the Clean Air Act Amendments of 1990. It is the only alternative fuel to have supplied this rigorous \$2.2 million dollar testing regimen to the EPA.

#### **What is the industry doing to ensure biodiesel quality?**

The biodiesel industry considers quality of the utmost importance. It has fully embraced the setting in industry consensus standards through the premier

fuel standards setting body in the US—the American Society of Testing and Materials (ASTM). ASTM PS 121, the biodiesel standard in use today, was approved in 1998. EPA has adopted the ASTM standard as many states have incorporated PS 121 into their local statutes.

The National Biodiesel Board (NBB), the industry trade association, has also initiated a Biodiesel Quality Accreditation Program—a 'Good Housekeeping Seal of Approval' for biodiesel marketing companies. Look for the National Biodiesel Accreditation Program (NBAP) seal when purchasing biodiesel.

#### **How is biodiesel used today?**

In the United States, biodiesel is used as both a pure fuel (B100) and as a blend with conventional petroleum-based diesel fuel (petrodiesel). There are three primary biodiesel applications today, each of a differing concentration of biodiesel and for different purposes.

The most common use is as a 20% blend with petrodiesel (B20) in order to comply with the Energy Policy Act (EPACT). Another primary use is as a pure fuel (B100) in environmentally sensitive areas (wetlands, national parks) or enclosed areas (warehouses, underground mines). A third use is as a blending stock (levels are 5% or below) as a lubricity-enhancing component of a premium diesel formulation.

Biodiesel is a new fuel and can be used anywhere conventional diesel fuel is used. As the word on biodiesel spreads, new applications are springing up every day.

## Is biodiesel safe?

Yes. Biodiesel is the safest liquid fuel available on the market today. B100 is biodegradable, non-toxic, and has a flash point more than 300 degrees Fahrenheit.

## What are the benefits of using biodiesel as a blending component in diesel fuel?

Using biodiesel as a blending component for diesel fuel has environmental benefits, technical benefits and economic benefits to US agriculture and the nation as a whole. Incorporating just 2% biodiesel in the 35 billion gallons of diesel fuel used in the US every year will have the benefits outlined below.

### Environmental Benefits:

Burning just a 2% biodiesel blend in on-road diesel fuel will curtail harmful tailpipe emissions. It will:

- Reduce poisonous Carbon Monoxide emissions by more than 35 million pounds annually
- Reduce ozone forming Hydrocarbon emissions by almost 4 million pounds annually
- Reduce hazardous Diesel Particulate emissions by almost 3 million pounds annually
- Reduce acid rain-causing Sulfur Dioxide emissions by more than 3 million pounds annually

According to the EPA, diesel fuel exhaust contains harmful polycyclic organic matter (POM) that can affect the reproductive, developmental, immunological and endocrine (hormone) systems in humans and in wildlife. Compared to the 700 million gallons of

diesel fuel that would otherwise be used, the 2% biodiesel would reduce harmful and cancerous POM impacts to streams, wildlife and humans by more than 80%.

Biodiesel is produced from renewable sources grown and harvested each year, such as soybeans, in what experts call a closed loop carbon cycle. Biodiesel has appropriately been called "solar power, only more feasible." Use of 2% biodiesel each year in the US would:

- Reducing Life Cycle Carbon Dioxide emissions more than 11 billion pounds annually.
- Extend the fossil diesel supply almost four-fold for every gallon of diesel replaced by biodiesel.
- Biodiesel has been appropriately characterized as "Liquid solar energy."

### Technical Benefits

Biodiesel provides superior fuel lubricity, even at very low blend levels. Sufficient fuel lubricity is necessary to reduce equipment wear and premature breakdown. Bench scale testing has shown that 1% biodiesel can improve the lubricity of diesel fuel 65%, which improves further as more biodiesel is added, although exact results will vary depending on the base diesel fuel stock. Based on this and other testing, Stanadyne--one of largest diesel fuel injection companies in the world--has stated:

- "Incorporation of 2% biodiesel into conventional fuel will eliminate the concerns we have with fuel lubricity."
- "Since biodiesel is a fuel, and not just an additive, incorporation of 2% biodiesel ensures adequate fuel lubricity while eliminating over-dosing concerns present with other additives."



Pure biodiesel, B100, also has high natural cetane (above 50), similar BTU content and provides similar fuel economy to petroleum based diesel fuel, so incorporation at levels below 5% will be transparent to the driver of the vehicle.

Since biodiesel contains no sulfur or aromatic compounds, it can also be used to blend down these levels in petrodiesel, which may become extremely important over time.

#### Economic Benefits:

Inclusion of biodiesel in on-road diesel fuel at a level of 1% for lubricity purposes would result in the following:

- 350 million gallons of biodiesel demand.
- Utilization of the oil from 250 million bushels of soybeans (over 2.5 billion pounds of soybean oil).
- Add a minimum of 35¢ to the value of a bushel of soybeans, based on economic analyses conducted by USDA.
- Add more than \$900 million to gross farm income while decreasing federal outlays under the soybean marketing loan program in similar amounts.
- Potentially reduce fleet operating costs through increased equipment life.

Additional economic impacts, such as increased employment; increased level of economic activity and corresponding state and local tax revenue; and other indirect and induced economic impacts will also occur.

#### Where is biodiesel used today as a fuel lubricity additive?

A total of seven companies have released premium additive packages containing biodiesel, in which biodiesel is

a major marketing aspect of the products. In the summer of 1999, Koch - the second largest privately owned company in the US behind Cargill - launched a new premium diesel fuel product called US Soyfield Diesel. It is now sold in more than 20 terminals in the Midwest and is expanding. Also in 1999, Country Energy (the Farmland/Cenex petroleum joint venture) launched SoyMaster, its proprietary premium diesel containing biodiesel, in four terminals in the Midwest.

#### How will this concept fit in with EPA's recently passed regulation that limits sulfur content in diesel fuel?

EPA has finalized rules that will require a reduction in the sulfur content of highway diesel fuel of more than 95% from its current level of 500 ppm. Biodiesel already meets EPA's new low sulfur diesel requirements, and can play an important role as a blending stock for the entire US diesel motor pool. Biodiesel has no sulfur or aromatics and increases fuel lubricity significantly when blended with petroleum diesel fuel-even at very low levels. Future diesel fuel will require the addition of a lubricity additive. Biodiesel could be included as a low level blending component in diesel fuel as a means to improve fuel lubricity while providing environmental, economic, and energy security benefits to diesel users and the US public at the same time.

#### Will the biodiesel industry be able to produce enough fuel to meet the demand?

Yes. For every 1% of biodiesel blended with the national on-road diesel fuel market, approximately 350 million gallons

of biodiesel would be required. There are presently 13 companies that have invested millions of private dollars into the development of the biodiesel manufacturing plants and are actively marketing biodiesel. Based on existing dedicated biodiesel processing capacity and long-term production agreements, more than 200 million gallons of biodiesel capacity currently exists and many dedicated biodiesel processing facilities are capable of doubling their production capacity within 18 months.

**Are there any warranty implications associated with the use of biodiesel as a low level blending component in diesel fuel?**

No—as long as the biodiesel meets ASTM standards. In fact, the Fuel Injection Equipment industry considers biodiesel an option to solve the lubricity problem with petrodiesel. Stanadyne Automotive Corp., the leading independent US manufacturer of diesel fuel injection equipment, supports the inclusion of low levels of biodiesel in diesel fuel for two reasons. First, it would eliminate the inherent variability associated with the use of other additives and whether sufficient additive was used to make the fuel fully lubricious. Second, Stanadyne considers biodiesel a fuel or a fuel component – not an additive. It is possible to burn pure biodiesel in conventional diesel engines. Thus, if more biodiesel is added than required to increase lubricity, there will not be the adverse consequences that might be seen if other lubricity additives are dosed at too high a level.

**Can the lubricity benefits be gained through other sources?**

Yes, replenishing the lost lubricity that will be apparent in future diesel fuel can be accomplished with conventional lubricity additives either on the market today or in the process of being formulated.

**What is the cost of biodiesel compared to other petroleum based lubricity additives?**

Economically, these products are the same or less expensive than biodiesel. Petroleum based additives, however, do not have the same conservation, energy security, environmental, and economic benefits. All of these factors need to be weighed fully.

**The press has reported that for some alternative fuels it takes as much energy to process the fuel as the fuel contains. What is the energy balance of biodiesel?**

For every one unit of energy needed to produce biodiesel, 3.24 units of energy are gained. This is the best energy balance of any liquid fuel available.

**Will 5% biodiesel affect the cold flow properties of the blend?**

There are minimal differences between the 5% blend and pure petrodiesel.

## **North Dakota Biodiesel Program Biodiesel Standards and Engine Warranties**

### Engine Warranties

All diesel engine companies warranty the product they make—engines. They warranty their engines for 'materials and workmanship'. If there is a problem with an engine part or with engine operation due to an error in manufacturing or assembly within the prescribed warranty period, the problem will be covered by the engine company. Typically, an engine company will define what fuel the engine was designed for and will recommend the use of that fuel to their customers in their owners manual.

Engine companies do not manufacture fuel or fuel components. Therefore, engine companies do not warranty fuel—whether that fuel is biodiesel or diesel fuel. Engine companies warranty the materials and workmanship of their engines. If there are problems caused by the fuel (again, whether that fuel is diesel fuel or biodiesel fuel) that is not related to the materials or workmanship of the engine, they are the responsibility of the fuel supplier not the engine manufacturer. Each fuel supplier—biodiesel, petrodiesel, or a blend of the two—should stand behind their fuel and cover any such problems should they occur.

Therefore, the most important aspect regarding engine warranties and biodiesel is whether the engine manufacturer will void their parts and workmanship warranty when biodiesel is used, and whether the fuel manufacturer will stand behind their fuel should problems occur.

Most major engine companies have stated formally that the use of blends up to B20 will not void their parts and workmanship warranty. This includes blends below 20% biodiesel such as 2% biodiesel that are beginning to become more common. Several statements from the engine companies are attached. Some engine companies have already specified that the biodiesel must meet ASTM PS 121 as a condition, while others are still in the process of adopting PS 121 within their company or have their own set of guidelines for biodiesel use that were developed prior to the approval of PS 121. It is anticipated that the entire industry will incorporate the ASTM biodiesel standard into their owner manuals over time.

The National Biodiesel Board, the trade association for the biodiesel industry, has formed the National Biodiesel Accreditation Commission that audits fuel producers and marketers and issues a 'Certified Biodiesel Marketer' seal of approval. This seal of approval will provide added assurance to customer and engine manufacturers that the biodiesel marketed by these companies meets the ASTM standards for biodiesel and that the fuel supplier will stand behind their product.

With biodiesel meeting PS 121 specification, there have been over 30 million miles of successful, problem-free, real world operation with B20 blends in a wide variety of engines, climates, and applications. The steps taken by the biodiesel industry to work with the engine companies and to insure that fuel meets the newly accepted ASTM standards provides confidence to users and engine manufacturers that biodiesel use will be trouble-free.

## **North Dakota Biodiesel Program Biodiesel Standards and Engine Warranties**

### **Background—Standards**

All engines are designed and manufactured for a fuel that has certain characteristics. In the US the industry consensus organization that defines the fuel is the American Society for Testing and Materials—ASTM. In the case of diesel fuel (and biodiesel), the responsibility for setting standards lies within ASTM Committee D02 on Petroleum Products and Lubricants. In order to assure that the standards are rigorous and robust, ASTM committee D02 is comprised of fuel producers, engine interests, and third party interests (users, government agencies, consultants). ASTM also uses a complicated ballot process where one negative vote is enough to defeat a ballot—a true consensus organization. An ASTM standard is not an easy thing to achieve. Some standards can take over 10 years to gain agreement and be issued by ASTM. This rigorous, time consuming process is why ASTM standards are recognized and adopted by others world wide.

These ASTM fuel standards are the minimum accepted values for properties of the fuel to provide adequate customer satisfaction and/or protection. For diesel fuel, the ASTM standard is ASTM D 975. All engine and fuel injection manufacturers design their engines around ASTM D 975. In cooperative discussions with the engine community early in the industry's recent development, engine manufacturers strongly encouraged the biodiesel industry to develop an ASTM standard for biodiesel fuel which would then allow them to provide their customers with a more definitive judgment on how the fuel would affect engine and fuel system operation compared to fuel that which the engine was designed for—ASTM D 975.

In June of 1994, a task force was formed within Subcommittee E on Burner, Diesel, Non-Aviation Gas Turbine, and Marine Fuels of ASTM Committee D02 with the expressed objective of developing an ASTM standard for biodiesel. The biodiesel standard, ASTM PS 121, was approved by Subcommittee E, and subsequently issued by ASTM in June of 1999 (for copies, see the ASTM web site, [www.astm.org](http://www.astm.org)). The standard covers the pure biodiesel, B100, for blending with petrodiesel in levels up to 20% by volume. Higher levels of biodiesel are allowed on a case-by-case basis after discussion with the individual engine company, since most of the experience in the US thus far has been with B20 blends.

The approval of this standard, and the discussions and technical review necessary to secure its approval, has provided both the engine community and customers with the information needed to assure trouble free operation with biodiesel blends.

## National Low-Blend Level Biodiesel Program Environmental Impacts

Biodiesel is a clean burning fuel for diesel engines made from domestically produced, renewable fats and oils such as soybean oil or recycled cooking oils. Biodiesel has no sulfur or aromatic compounds and already meets the new Environmental Protection Agency (EPA) ultra low sulfur diesel fuel proposed for introduction in 2006. Biodiesel can be used without modification in existing diesel engines. Biodiesel burns substantially cleaner than petroleum based diesel fuel, and is a powerful option for improving our environment.

Biodiesel can also be blended with diesel fuel as a fuel additive or extender. Burning 2% biodiesel in the 35 billion gallons of diesel fuel used on road in the US each year will have significant positive environmental impacts.

Burning just a 2% biodiesel blend in on-road diesel fuel will curtail harmful tailpipe emissions. It will:

- Reduce poisonous Carbon Monoxide emissions by more than 35 million pounds annually
- Reduce ozone forming Hydrocarbon emissions by almost 4 million pounds annually
- Reduce hazardous Diesel Particulate emissions by almost 3 million pounds annually
- Reduce acid rain-causing Sulfur Dioxide emissions by more than 3 million pounds annually

In its recently released low-sulfur diesel ruling for 2006 and beyond, EPA also states that certain compounds in diesel exhaust called polycyclic organic matter (POM) can have significant negative effects on reproductive, developmental, immunological and endocrine (hormone) systems in both humans and wildlife. These POMs are found in diesel exhaust as gases as well as in deposits on particulate matter. EPA states that reducing particulate matter would reduce the health effects of harmful POM that ends up in lakes and streams—natural resources that are extremely important to the US. Not only does biodiesel reduce particulate matter as stated above, but burning just 2% biodiesel in on road diesel would have the following additional impact on the 700million gallons of diesel fuel it would replace:

- Reduce harmful and cancerous POM impacts to streams, wildlife and humans by more than 80% compared to diesel fuel.

Biodiesel is produced from renewable sources grown and harvested each year such as soybeans in what experts call a closed loop carbon cycle—carbon dioxide is taken up by soybeans as they grow and is released back into the air when biodiesel is burned. In a joint study, the US Departments of Energy and Agriculture found biodiesel reduces Carbon Dioxide 78% over its entire life cycle compared to petrodiesel and has a positive energy balance of 3.2 to 1 (3.2 units of energy are produced for every one unit of energy needed for biodiesel production, while diesel is 0.63 to 1). Therefore, burning 2% biodiesel in on-road diesel would result in:

- Reducing Life Cycle Carbon Dioxide emissions more than 11 billion pounds annually.
- Extend the fossil diesel supply almost four-fold for every gallon of diesel replaced by biodiesel.
- Biodiesel has been appropriately characterized as "Liquid solar energy."

## Minnesota Low Blend Level Biodiesel Program Economic Impacts

### Background:

A 1998 biodiesel lifecycle study jointly sponsored by the U. S. Department of Energy and the U.S. Department of Agriculture concluded that increased use of biodiesel would benefit our national economy. Inclusion of biodiesel, even at very low levels, would supplement our nation's current energy security programs at little or no cost to the taxpayer. Increased biodiesel production would also result in significant economic benefits to state economies such as Minnesota's as well as agricultural producers.

### Discussion Points:

- In May 2000, EPA proposed a limit on sulfur of 15 ppm maximum for on-highway diesel fuel by 2007. This is a reduction of over 95% from the current limit of 500 ppm. Removing the sulfur from diesel fuel will reduce fuel lubricity, harming engine life. Biodiesel improves lubricity at very low percentages. **Biodiesel could be included as a low level blending component in diesel fuel as a means to improve fuel lubricity while meeting other Minnesota economic development objectives.**
- Stanadyne Automotive Corp., the leading independent US manufacturer of diesel fuel injection equipment, supports the inclusion of low levels of biodiesel in diesel fuel for two reasons. First, it would eliminate the inherent variability associated with the use of other additives and whether sufficient additive was used to make the fuel fully lubricious. Second, Stanadyne considers biodiesel a fuel or a fuel component - not an additive. It is possible to burn pure biodiesel in conventional diesel engines. Thus, if more biodiesel is added than required to increase lubricity, there will not be the adverse consequences that might be seen if other lubricity additives are added at too high a level.
- The Energy Information Administration reports that the Minnesota diesel fuel market is more than 500 million gallons.
- According to economic modeling conducted by the Food and Agricultural Policy Research Institute, (FAPRI), 70 million gallons of annual demand for biodiesel could add from \$0.10 to \$0.18 per bushel to the price of soybeans.
- An analysis conducted by the USDA Economic Research Service estimates that 100 million gallons of biodiesel demand would increase soybean oil prices, by 14%.
- USDA forecasts that ending stocks of soybean oil in 2000-01 will be 1.85 billion pounds. Soybean meal demand is forecasted to increase more than soybean oil demand.
- Inclusion of biodiesel in on-road diesel fuel at a level of 5% for lubricity purposes would result in the following:
  - ⇒ More than 25 million gallons of biodiesel demand.
  - ⇒ Utilization of the oil from 18 million bushels of soybeans (more than 200 million pounds of soybean oil).
  - ⇒ Add a minimum of 2.5¢ to the value of a bushel of US soybeans, based on economic analyses conducted by USDA-ERS and FAPRI.
  - ⇒ Add more than \$7 million to gross farm income in Minnesota alone and decrease federal outlays under the soybean marketing loan program in similar amounts.
  - ⇒ Potentially reduce fleet operating costs through increased equipment life.
- Additional economic impacts such as increased employment, increased level of economic activity and corresponding state and local tax revenue, and other indirect and induced economic impacts is being quantified by a macroeconomic study conducted by the Minnesota Department of Agriculture.

## Minnesota Biodiesel Program Cold Flow Impacts

### Background:

Diesel fuel is typically produced through a refining and distillation process from crude petroleum oils. Crude petroleum oils contain the entire range of fuel components—from methane and propane, to gasoline, to diesel fuel, to asphalt and other heavier components. The refining process separates the crude oil into mixtures of its constituents, based primarily on their volatility. Diesel fuels are on the heavy end of a barrel of crude oil. This gives diesel fuel its high BTU content and power, but also causes problems with diesel vehicle operation in cold weather when this conventional diesel fuel can gel. This is not an issue for gasoline vehicles.

A tremendous amount of effort has been spent over the years to understand how to deal with the cold flow properties—or the low temperature operability—of existing petroleum based diesel fuel. The low temperature operability of diesel fuel is commonly characterized by the cloud point, and the cold filter plugging point (CFPP) or the low temperature filterability test (LTFT). They are defined below, and the test methods used are generally accurate to plus or minus 3 to 5 °F.

**Cloud Point:** The temperature at which small solid crystals are first visually observed as the fuel is cooled. This is the most conservative measurement of cold flow properties.

**Cold Filter Plugging Point (CFPP) (or LTFT):** The temperature at which a fuel will cause a fuel filter to plug due to fuel components which have begun to crystallize or gel. The CFPP is less conservative than the cloud point, and is considered by some to be the true indication of low temperature operability.

In general, Number 2 diesel fuel will develop low temperature problems sooner than will Number 1 diesel fuel. Number 1 diesel fuel is sometimes referred to as kerosene. The gelling of diesel fuel in cold climates is a commonly known phenomenon and diesel fuel suppliers, as well as customers and diesel engine designers, have learned over time to manage the cold flow problems associated with Number 2 diesel fuel in the winter time. The leading options to handle cold weather with diesel fuel are:

- Blending with kerosene
- Utilization of an additive that enhances cold flow properties
- Utilization of fuel tank, fuel filter or fuel line heaters
- Storage of the vehicles in or near a building when not in use

In most diesel engine systems today, excess diesel fuel is brought to the engine and warm fuel that has come close to the engine is recycled back to the fuel tank. This assists in keeping the fuel from gelling in cold weather. This is, in part, why diesel engines are kept running overnight at truck stops in cold climates. In addition, many of the trucks used in cold climates today are already outfitted with fuel tank and fuel filter heaters.

The cold flow properties of diesel fuel vary considerably through out the year and geographical region—depending on what is needed for satisfactory operation. In general, petroleum companies and distributors manage their fuel inventory and additive treatment rates based on a history of cold weather experience so that the right blends of kerosene and Number 2 or the right amount of additives are present to eliminate cold flow problems. A recent study conducted by U.S. Army TARDEC Fuels and Lubricants Research Facility (SwRI)<sup>1</sup> of diesel fuels used in military facilities in the U.S. showed cloud points of convention diesel fuel and kerosene in actual field use varied from 34 °F to -100 °F.

In Minnesota, the cold flow temperatures of diesel fuel needed to operate without freezing can vary from 25 °F in October to - 25 °F in January and February, while temperatures in Missouri range from 35 °F to 5 °F and those in Louisiana range from 40 °F to 25 °F (October to February).

#### Biodiesel and Cold Flow Properties.

Over the last seven years, the cold flow properties of biodiesel and biodiesel blends have been thoroughly tested with a variety of diesel fuel, both with and without cold flow enhancing additives. Biodiesel blends (primarily B20) have also been used in a variety of climates—including some of the coldest weather on record—without cold flow problems.

The attached chart shows CFPP results for biodiesel and Number 2 diesel fuel at various concentrations. The fuel blends were prepared by the University of Missouri and analyzed at Cleveland Technical Center in Kansas City. It can be seen from this data that the fuel mixture starts to gel sooner as the concentration of biodiesel is increased. As can be seen from the chart, high concentrations of biodiesel (i.e. blends over 20% biodiesel) may not be appropriate for use in cold climates. In this particular case, the data showed a small improvement in the CFPP of the B20 blend compared to pure petrodiesel. However, most of the data shows there is a 3 to 5 °F increase in the cold flow properties of B20 blends. More than likely, the small improvement seen in this particular set of data is just a manifestation of the inherent test variability in cold flow analysis and is not real.

The study performed by Dunn and Bagby, Oil Chemical Researchers at the USDA laboratory in Peoria, Illinois below<sup>2</sup> are representative of the majority of the cold flow results with biodiesel

Biodiesel (soy methyl esters) Concentration (vol. %)*	Cloud Point Degrees F
0	3
10	5
20	7
30	14
50	18
100	32

\* Blended with Number 2 diesel fuel



One can see from the attached chart and the table above that as the concentration of the biodiesel is decreased below 20% biodiesel the impact on the cold flow properties of the blend become indistinguishable from that of the diesel fuel with which it has been blended. This was verified recently by testing performed at System Lab Services, a division of Williams Pipeline, of fuel provided to by the Agricultural Utilization and Research Institute in Mankato, Minnesota:

<u>Fuel Blend</u>	<u>CFPP (°F)</u>
50 % #1, 50% #2	-22
2% biodiesel with above	-20
5% biodiesel with above	-28

This data shows that there is no real difference in the CFPP of any of these blends (even though the 5% biodiesel blend had the lowest CFPP, i.e. the best, all these results are within the repeatability of the test method and can therefore be considered the same).

In most cases, the small increase in the temperature at which B20 starts to freeze compared to petrodiesel goes un-noticed and users take no additional pre-cautions. This was the case in Cedar Rapids, Iowa where Five Seasons Transportation used B20 for over 1.4 million miles of operation in their bus fleet during one of the coldest winters on record (temperatures were below -20 °F for almost a week). They made no changes to their operation, other than to incorporate 20% biodiesel into their existing diesel fuel. Mr. Bill Hoekstra of Five Seasons wrote:

"As you well know, this demonstration started out during the coldest winter we have had in years. Even with this obstacle, the program continued without any particular problem showing up that could be attributed to Biodiesel."

This was also the case in Ft. McCoy, Wisconsin where B20 was used in two buses and conventional diesel fuel was used in eight of their buses. Department of Logistics Energy Officer Terry Nolan wrote the following:

"All buses had been parked outside. The weekend temperatures averaged below zero with above average winds. The temperature the morning of the 27<sup>th</sup> (...of December) was approximately -3 degrees. The winds were approx. 15 miles per hour making for a wind chill factor of approx. -25 degrees (...Fahrenheit). The two (2) Soy/Diesel buses started up without any problems. Two (2) of the eight (8) regular, Diesel powered buses would not start and had to be serviced."

If it is desired to reduce the cold flow properties of B20 blends (or lower blends of biodiesel with petrodiesel), users implement the same solutions as they would with Number 2 diesel fuel--blend with kerosene, use cold flow enhancing additives, turn on fuel filter or fuel line heaters, or store vehicles in or near a building. For example, Lubrizol provided the results below with biodiesel mixtures and a cold flow additive. With the incorporation of additives, the cold filter plugging point of the B20 and the B10 mixtures were both better than that of the base diesel fuel alone.

<u>Fuel</u>	<u>Additive</u>	<u>Treat Rate (ppm)</u>	<u>CFPP (°F)</u>
Base Diesel		-----	+ 4
B20	LZ7670	1000	-12
B10	LZ7670	1000	-22

#### Conclusions:

- Number 2 diesel fuel can experience significant cold flow problems in cold weather.
- The diesel industry has solved the problems with Number 2 diesel through a variety of means that are in common practice today.
- These same solutions should be used with biodiesel blends to assure satisfactory cold weather performance.
- B20 has been used successfully in fleets experiencing extremely cold weather without any additional precautions.
- When using blends of B20 or lower, the cold weather performance of the blend is mostly determined by the diesel fuel portion.
- Incorporation of blends less than 20% biodiesel (i.e. B5 or B2) into existing diesel fuel has little or no affect on the cold flow properties of the finished blend.

#### References:

- 1 "Survey of Diesel Fuels and Aviation Kerosenes From U.S. Military Installations", Paper by Steven R. Westbrook (SWRI) and Maurice E. LePera (US Army TARDEC), Presented at the 6th International Conference on Stability and Handling of Liquid Fuels, October 13-17, 1997, Vancouver, B.C., Canada.
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## Minnesota Biodiesel Program Lubricity Impacts

### Background:

All diesel fuel injection equipment has some reliance on diesel fuel as a lubricant. The lubricating properties of diesel fuel are important, especially for rotary and distributor type fuel injection pumps. In these pumps, moving parts are lubricated by the fuel itself as it moves through the pump—not by the engine oil. Other diesel fuel systems—which include unit injectors, injectors, unit pumps, and in-line pumps are partially fuel lubricated. In these systems the mechanism typically consists of a plunger or needle operating in a sleeve or bore, where the fuel is used to lubricate the walls between the reciprocating piece and its container. The lubricity of the fuel is an indication of the amount of wear or scarring that occurs between two metal parts covered with the fuel as they come in contact with each other. Low lubricity fuel may cause high wear and scarring and high lubricity fuel may provide reduced wear and longer component life.

Lubricity has sometimes been mistakenly compared to the viscosity, or thickness of a fuel. The following statement from Lucas<sup>1</sup> (the leading fuel injection equipment manufacturer in England, who was recently purchased by Delphi) explains it well:

"The lubrication of the fuel is not directly provided by the viscosity of the fuel, but by other components in the fuel which prevent wear on contacting metal surfaces."

For many years, the lubricity of diesel fuel was sufficient to provide the protection needed to maintain adequate performance. Recent changes (1993 and beyond) in the composition of diesel fuel, primarily the need to reduce fuel sulfur and aromatic levels, and the common chemical process used to accomplish these changes (called hydro-treating) have inadvertently caused the removal of some of the compounds that provide lubricity to the fuel. According to Mr. Paul Henderson, Quality Systems Manager for Standadyne Automotive Corp (the leading independent US manufacturer of diesel fuel injection equipment) in comments provided to the Chairman of the Kansas House Environment Committee March 8, 2000:

"There have numerous examples from the field where lack of lubricity in the fuel has caused premature equipment breakdowns and in some cases, catastrophic failures. This problem will be more dramatic as EPA moves to further reduce the sulfur levels in petrodiesel fuel."

The lubricity of diesel fuel can vary dramatically. It is dependent on a wide variety of factors which include the crude oil source from which the fuel was produced, the refining processes used to produce the fuel, how the fuel has been handled throughout the distribution chain, and the inclusion of lubricity enhancing additives whether alone or in a package with other performance enhancing additives. Typically, Number 1 diesel fuel (commonly referred to as kerosene) which is used in colder climates has poorer lubricity than Number 2 diesel fuel.

## Minnesota Biodiesel Program Lubricity Impacts

A 1998 review paper on fuel lubricity world wide<sup>2</sup> showed that diesel fuel in the US and Canada is some of the poorest lubricity fuel found in the entire world (see Figure 1 attached). Of the 27 countries surveyed, only Canada, Switzerland, Poland and Taiwan had poorer lubricity fuel than the US. With a mean fuel lubricity of just under the recommended specification of an HFRR wear scar diameter of 460 microns, fully 50% of the US fuel was found to be above that recommended by equipment manufacturers.

These US data are with diesel fuel refined to meet the current EPA restriction of 500 ppm maximum sulfur specification. The severe hydrotreating required to reduce fuel sulfur to the new EPA 2006 specification of 15 ppm sulfur maximum will cause a further reduction in fuel lubricity compared to today's diesel fuel, and is of concern to engine and fuel injection equipment manufacturers.

### Discussion:

The addition of biodiesel, even in very small quantities, has been shown to provide increases in fuel lubricity using a variety of bench scale test methods. A diagram of the various testing apparatus can be seen in chart provided by Lucas (attached). The two most popular bench test methods for lubricity are the Ball on Cylinder Lubricity Evaluator (BOCLE), and the High Frequency Reciprocating Rig (HFRR). The BOCLE is commonly used to evaluate the lubricity of fuels or fuel blends but does a poor job of characterizing the lubricity of fuels containing lubricity additives, while the HFRR is commonly used for both the neat fuels and with fuels containing small amounts of lubricity enhancing additives.

The Fuel Injection Equipment (FIE) manufacturers have adopted the use of the HFRR (ISO 12156-2:1998), and recommend that all diesel fuel meet a limit of 460 micron maximum Wear Scar Diameter (WSD)<sup>3</sup>. For the HFRR, a lower wear scar indicates better lubricity.

Biodiesel has been tested at varying concentrations with a poor lubricity Number 2 and Number 1 diesel fuels representative of that on the market after 1993 (i.e. fuel refined to meet a 500 ppm maximum sulfur content). The results are illustrated in the table below.

Percent Biodiesel	HFRR Scar (mm)*	
	Number 2	Number 1
0.0	536	671
0.4	481	649
1.0	321	500
2.0	322	355
20.0	314	318
100.0	314	314

\*Results provided by Stanadyne Automotive Corp.

## Minnesota Biodiesel Program Lubricity Impacts

For the Number 2 diesel fuel, 1% biodiesel was sufficient to achieve the desired increase in lubricity, while the Number 1 diesel fuel took almost 2%. In addition, the data show that most of the lubricity benefits of the biodiesel were achieved by adding only 2% biodiesel to either Number 1 or Number 2 diesel.

Based on the HFRR testing run by Stanadyne, and testing from other laboratories showing similar results, Stanadyne Automotive has stated:

"...we have tested biodiesel at Stanadyne and results indicate that **the inclusion of 2% biodiesel into any conventional diesel fuel will be sufficient to address the lubricity concerns that we have with these existing diesel fuels.** From our standpoint, inclusion of biodiesel is desirable for two reasons. First it would eliminate the inherent variability associated with the use of other additives and whether sufficient additive was used to make the fuel fully lubricious. Second, we consider biodiesel a fuel or fuel component—not an additive.... Thus if more biodiesel is added than required to increase lubricity, there will not be the adverse consequences that might be seen if other lubricity additives are dosed at too high a rate."

The reasoning behind Stanadyne's support of 2% biodiesel makes biodiesel an ideal solution to the existing lubricity problem with diesel fuel—while supporting other environmental, energy security, and economic development initiatives. As EPA forces the further removal of sulfur from diesel fuel in 2006, which will undoubtedly worsen fuel lubricity, the concentration of biodiesel can be raised to that necessary to fully protect this future fuel as well.

Additional lubricity testing has been performed on biodiesel at Southwest Research Institute<sup>4</sup> (see figure 11 attached) using an updated BOCLE apparatus (Scuffing Load BOCLE), on CARB fuel, EPA fuel, as well as Jet A-1 fuel. Jet A-1 fuel is similar to Number 1 diesel fuel or kerosene. For the Scuffing Load BOCLE, a higher load capacity indicates better lubricity, and the recommended specification is 3000 grams load capacity minimum.

These test results also showed a significant improvement in lubricity when adding biodiesel to all three of these fuels, although the EPA and CARB fuel chosen for these tests were already above the required lubricity level. In fact, biodiesel tested higher in lubricity than any other diesel fuel tested at the Institute. The conclusions drawn by the researchers from Southwest Research Institute were:

"Biodiesel fuels consisting of methyl esters of soybean oil had excellent scuffing and adhesive wear resistance that exceeds those of the best conventional diesel fuels."

## **Minnesota Biodiesel Program Lubricity Impacts**

### **References:**

- 1 "Reformulated Diesel Fuels and Fuel Injection Equipment, Paper by Hugh C. Grigg, Lucan Powertrain Systems, Presented at the New Fuels and Vehicles for Cleaner Air Conference, January 11-12, 1994, Phoenix, Arizona.
- 2 "Fuel Lubricity Reviewed", Paul Lacey, South West Research Institute, Steve Howell, MARC-IV Consulting, Inc., SAE paper number 982567, International Fall Fuels and Lubricants Meeting and Exposition, October 19-22, 1998, San Francisco, California.
- 3 "Fuels for Diesel Engines—Diesel Fuel Injection Equipment Manufacturers Common Position Statement", Signed by Delphi Diesel Systems, Stanadyne Automotive Corp., Denso Corporation, and Robert Bosch GmbH, issued June, 2000.
- 4 "Diesel Fuel Lubricity", Paul Lacey and Steve Westbrook, Southwest Research Institute, SAE paper 950248, International Congress and Exposition, Detroit, Michigan, February 27-March 2, 1995

## **National Biodiesel Board Biodiesel Standards and Engine Warranties**

### Background on Standards

All engines are designed and manufactured for a fuel that has certain characteristics. In the U.S., the industry organization that defines the consensus on fuels is the American Society for Testing and Materials (ASTM). In the case of diesel fuel (including biodiesel), the responsibility for setting standards lies within ASTM Committee D02 on Petroleum Products and Lubricants. In order to assure that the standards are rigorous and robust, ASTM committee D02 is comprised of fuel producers, engine equipment manufacturers, and third party interests (users, government agencies, consultants). ASTM also uses a complicated ballot process in which a single negative vote is enough to defeat a ballot, so this is a true consensus organization. An ASTM standard is not easily achieved. Some standards can take over 10 years to gain agreement and be issued by ASTM. This rigorous, time-consuming process is why ASTM standards are recognized and adopted by others worldwide.

ASTM fuel standards are the minimum accepted values for properties of the fuel to provide adequate customer satisfaction and/or protection. For diesel fuel, the ASTM standard is ASTM D 975. All engine and fuel injection manufacturers design their engines around ASTM D 975. In cooperative discussions with the engine community early in the biodiesel industry's recent development, engine manufacturers strongly encouraged the biodiesel industry to develop an ASTM standard for biodiesel fuel which would allow them to provide their customers with a more definitive judgment on how the fuel would affect engine and fuel system operation compared to ASTM D 957 fuel for which an engine was designed.

In June of 1994, a task force was formed within ASTM Subcommittee E on Burner, Diesel, Non-Aviation Gas Turbine, and Marine Fuels of ASTM Committee D02, with the expressed objective of developing an ASTM standard for biodiesel. The biodiesel standard, ASTM PS 121, was approved by Subcommittee E, and subsequently issued by ASTM in June of 1999 (for copies, see the ASTM web site, [www.astm.org](http://www.astm.org)). This standard covers pure biodiesel (B100), for blending with petrodiesel in levels up to 20% by volume. Higher levels of biodiesel are allowed on a case-by-case basis after discussion with the individual engine company, since most of the experience in the US thus far has been with B20 blends.

The approval of this biodiesel standard, and the discussions and technical reviews necessary to secure its approval, has provided both the engine community and customers with the information needed to assure trouble free operation with biodiesel blends.

## **National Biodiesel Board Biodiesel Standards and Engine Warranties**

### **Engine Warranties**

All diesel engine companies warranty the product they make - engines. They warranty their engines for 'materials and workmanship'. If there is a problem with an engine part or with engine operation due to an error in manufacturing or assembly within the prescribed warranty period, the problem will be covered by the engine company. Typically, an engine company will define what fuel the engine was designed for and will recommend the use of that fuel to their customers in their owner's manuals.

Engine companies do not manufacture fuel or fuel components. Therefore, engine companies do not warranty fuel - whether that fuel is biodiesel or petrodiesel fuel. Since engine manufacturers warranty the materials and workmanship of their engines, they do not warranty fuel of any kind. If there are engine problems caused by a fuel (again, whether that fuel is petrodiesel fuel or biodiesel fuel) these problems are not related to the materials or workmanship of the engine, but the responsibility of the fuel supplier and not the engine manufacturer. Any reputable fuel supplier (biodiesel, petrodiesel, or a blend of both) should stand behind its products and cover any fuel quality problems if they occur.

Therefore, the most important aspect regarding engine warranties and biodiesel is whether an engine manufacturer will void its parts and workmanship warranty when biodiesel is used, and whether the fuel producer or marketer will stand behind its fuels should problems occur.

Most major engine companies have stated formally that the use of blends up to B20 will not void their parts and workmanship warranties. This includes blends below 20% biodiesel, such as the 2% biodiesel blends that are becoming more and more common. Several statements from the engine companies are attached. Some engine companies have already specified that the biodiesel must meet ASTM PS 121 as a condition, while others are still in the process of adopting PS 121 within their company or have their own set of guidelines for biodiesel use that were developed prior to the approval of PS 121. It is anticipated that the entire industry will incorporate the ASTM biodiesel standard into their owner's manuals over time.

The National Biodiesel Board, the trade association for the biodiesel industry, has formed the National Biodiesel Accreditation Commission (NBAC) to audit fuel producers and marketers in order to enforce fuel quality standards in the US. NBAC issues a 'Certified Biodiesel Marketer' seal of approval for biodiesel marketers that have met all requirements of fuel accreditation audits. This seal of approval will provide added assurance to customers, as well as engine manufacturers, that the biodiesel marketed by these companies meets the ASTM standards for biodiesel and that the fuel supplier will stand behind its products.

With biodiesel that meets PS 121 specification, there have been over 45 million miles of successful, problem-free, real-world operation with B20 blends in a wide variety of engines, climates, and applications. The steps taken by the biodiesel industry to work with the engine companies and to insure that fuel meets the newly accepted ASTM standards provides confidence to users and engine manufacturers that their biodiesel experience will be positive and trouble-free.



## North Dakota Biodiesel Program Cold Flow Impacts

### Background:

Diesel fuel is typically produced through a refining and distillation process from crude petroleum oils. Crude petroleum oils contain the entire range of fuel components—from methane and propane, to gasoline, to diesel fuel, to asphalt and other heavier components. The refining process separates the crude oil into mixtures of its constituents, based primarily on their volatility. Diesel fuels are on the heavy end of a barrel of crude oil. This gives diesel fuel its high BTU content and power, but also causes problems with diesel vehicle operation in cold weather when this conventional diesel fuel can gel. This is not an issue for gasoline vehicles.

A tremendous amount of effort has been spent over the years to understand how to deal with the cold flow properties—or the low temperature operability—of existing petroleum based diesel fuel. The low temperature operability of diesel fuel is commonly characterized by the cloud point, and the cold filter plugging point (CFPP) or the low temperature filterability test (LTFT). They are defined below, and the test methods used are generally accurate to plus or minus 3 to 5 °F.

**Cloud Point:** The temperature at which small solid crystals are first visually observed as the fuel is cooled. This is the most conservative measurement of cold flow properties.

**Cold Filter Plugging Point (CFPP) (or LTFT):** The temperature at which a fuel will cause a fuel filter to plug due to fuel components which have begun to crystallize or gel. The CFPP is less conservative than the cloud point, and is considered by some to be the true indication of low temperature operability.

In general, Number 2 diesel fuel will develop low temperature problems sooner than will Number 1 diesel fuel. Number 1 diesel fuel is sometimes referred to as kerosene. The gelling of diesel fuel in cold climates is a commonly known phenomenon and diesel fuel suppliers, as well as customers and diesel engine designers, have learned over time to manage the cold flow problems associated with Number 2 diesel fuel in the wintertime. The leading options to handle cold weather with diesel fuel are:

- Blending with kerosene
- Utilization of an additive that enhances cold flow properties
- Utilization of fuel tank, fuel filter or fuel line heaters
- Storage of the vehicles in or near a building when not in use

In most diesel engine systems today, excess diesel fuel is brought to the engine and warm fuel that has come close to the engine is recycled back to the fuel tank. This assists in keeping the fuel from gelling in cold weather. This is, in part, why diesel engines are kept running overnight at truck stops in cold climates. In addition, many of the trucks used in cold climates today are already outfitted with fuel tank and fuel filter heaters.

The cold flow properties of diesel fuel vary considerably through out the year and geographical region—depending on what is needed for satisfactory operation. In general, petroleum companies and distributors manage their fuel inventory and additive treatment rates based on a history of cold weather experience so that the right blends of kerosene and Number 2 or the right amount of additives are present to eliminate cold flow problems. A recent study conducted by U.S. Army TARDEC Fuels and Lubricants Research Facility (SwRI)<sup>1</sup> of diesel fuels used in military facilities in the U.S. showed cloud points of convention diesel fuel and kerosene in actual field use varied from 34 °F to -100 °F.

In North Dakota, the cold flow temperatures of diesel fuel needed to operate without freezing can vary from 25 °F in October to -20 °F in January and February, while temperatures in Missouri range from 35 °F to 5 °F and those in Louisiana range from 40 °F to 25 °F (October to February).

### Biodiesel and Cold Flow Properties.

Over the last seven years, the cold flow properties of biodiesel and biodiesel blends have been thoroughly tested with a variety of diesel fuel, both with and without cold flow enhancing additives. Biodiesel blends (primarily B20) have also been used in a variety of climates—including some of the coldest weather on record—without cold flow problems.

The attached chart shows CFPP results for biodiesel and Number 2 diesel fuel at various concentrations. The fuel blends were prepared by the University of Missouri and analyzed at Cleveland Technical Center in Kansas City. It can be seen from this data that the fuel mixture starts to gel sooner as the concentration of biodiesel is increased. As can be seen from the chart, high concentrations of biodiesel (i.e. blends over 20% biodiesel) may not be appropriate for use in cold climates. In this particular case, the data showed a small improvement in the CFPP of the B20 blend compared to pure petrodiesel. However, most of the data shows there is a 3 to 5 °F increase in the cold flow properties of B20 blends. More than likely, the small improvement seen in this particular set of data is just a manifestation of the inherent test variability in cold flow analysis and is not real.

The study performed by Dunn and Bagby, Oil Chemical Researchers at the USDA laboratory in Peoria, Illinois below<sup>2</sup> are representative of the majority of the cold flow results with biodiesel

Biodiesel (soy methyl esters) <u>Concentration (vol. %)*</u>	Cloud Point <u>Degrees F</u>
0	3
10	5
20	7
30	14
50	18
100	32

\* Blended with Number 2 diesel fuel

One can see from the attached chart and the table above that as the concentration of the biodiesel is decreased below 20% biodiesel the impact on the cold flow properties of the blend become indistinguishable from that of the diesel fuel with which it has been blended. This was verified recently by testing performed at System Lab Services, a division of Williams Pipeline, of fuel provided to by the Agricultural Utilization and Research Institute in Mankato, Minnesota:

<u>Fuel Blend</u>	<u>CFPP (°F)</u>
50 % #1, 50% #2	-22
2% biodiesel with above	-20
5% biodiesel with above	-28

This data shows that there is no real difference in the CFPP of any of these blends (even though the 5% biodiesel blend had the lowest CFPP, i.e. the best, all these results are within the repeatability of the test method and can therefore be considered the same).

In most cases, the small increase in the temperature at which B20 starts to freeze compared to petrodiesel goes un-noticed and users take no additional pre-cautions. This was the case in Cedar Rapids, Iowa where Five Seasons Transportation used B20 for over 1.4 million miles of operation in their bus fleet during one of the coldest winters on record (temperatures were below -20 °F for almost a week). They made no changes to their operation, other than to incorporate 20% biodiesel into their existing diesel fuel. Mr. Bill Hoekstra of Five Seasons wrote:

"As you well know, this demonstration started out during the coldest winter we have had in years. Even with this obstacle, the program continued without any particular problem showing up that could be attributed to Biodiesel."

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#### Conclusions:

- Number 2 diesel fuel can experience significant cold flow problems in cold weather.
- The diesel industry has solved the problems with Number 2 diesel through a variety of means that are in common practice today.
- These same solutions should be used with biodiesel blends to assure satisfactory cold weather performance.
- B20 has been used successfully in fleets experiencing extremely cold weather without any additional precautions.
- When using blends of B20 or lower, the cold weather performance of the blend is mostly determined by the diesel fuel portion.
- Incorporation of blends less than 20% biodiesel (i.e. B5 or B2) into existing diesel fuel has little or no effect on the cold flow properties of the finished blend.

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## Senate Bill 2454 – Biodiesel Tax Reduction

### BIODIESEL FACT SHEET

#### Biodiesel

- Where is it produced?      What will it cost?
- What impact will it have on my engine?
- Does this tax break really help farmers? (.02% of the price on off-road diesel)
- Biodiesel will add a minimum of one cent per gallon of diesel fuel for every percent of the product added (ex. five cents for five percent blend) This does not include other blending, storage, transportation, and vehicle maintenance costs.

#### Biodiesel can cause operational problems in diesel engines

- Loss in engine performance
- Increased filter plugging
- Decreased ability to flow without "gelling" at cold temperatures
- Degradation of engine gaskets and seals
- Increased oxidation in fuel leading to microbial growth and reduced shelf life
- Considered an "experimental" fuel by Engine Manufacturer's Association

#### Engine warranties

- Detroit Diesel, Cummins, and Caterpillar have indicated that the use of biodiesel may place engine warranties at risk

#### A 1996 study of biodiesel by the Iowa Department of Transportation found:

##### Operational Problems

- **Fuel Gelling** – trucks needed to have tank heaters installed
- **Loss of Power** – operators reported dissatisfaction with power
- **Poor Fuel Economy** – trucks experienced a 7% increase in fuel consumption
- **Material Deterioration** – gasket failures occurred when using tank heaters
- **Particulate Matter** – black soot was discharged when starting the vehicles
- **Surface Protection** – biodiesel is a solvent that will remove surface paint
- **Costs** – in winter months it may cost 2.5 times more than conventional diesel

**Summary:** Biodiesel might be an energy source of the future but clearly there are some issues to resolve – with the problems mentioned above consumers may consider use risky.

**Passing this bill will cost the highway fund at least \$715,000**