# Nebraska Department of Roads

# Midwest Ethanol Demonstration Project

## Annual Report

## January 1, 1995 - December 31, 1995

Maintenance Division
Fleet Management Section

May 1996

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**History** - The Midwest Ethanol Truck program took roots in February 1992 at a meeting in Hennepin County, Hopkins, Minnesota. Four states were committed at that time to this project. Only Hennepin County and Nebraska Department of Roads continued with the E-99 ethanol truck program. About a year later under the direction of Mr. William Peerenboom of the American Trucking Association, the Department of Roads entered into a three year program to test the feasibility of ethanol powered trucks for maintenance operations and snow removal.

**Objective** - The overall objective of this program is to collect data from Original Equipment Manufacturer alternative fuel heavy duty trucks, along with comparable data from a similar configured diesel powered vehicle to establish emission, performance and durability data for alternative fuel technology. It is felt this project should provide useful information on the feasibility of ethanol in a region considered a primary source of ethanol feed stock as a viable source of fuel for heavy duty trucks used in a government operation.

**Service** - Nebraska operates two ethanol trucks from two locations, Lincoln and Grand Island. A fueling station has been set up at both locations. Dedicated drivers were selected and the District Mechanics at the two locations were put in charge of the program at each respective location. These trucks were put into service on September 7, 1994 after Nebraska's Governor Ben Nelson and Roads Director, Allan Abbott plus other representatives from the American Trucking Association, ethanol and agriculture groups held a press conference to introduce these trucks to the public.

**Truck Specifications** - The two trucks are Navistar International Model F-5070 powered by Detroit Diesel 6V92 engines that have been converted to operate on E-95-99 percent blend of alcohol and remainder unleaded gasoline.

**American Trucking Association (ATA)** - By contract, the Department of Roads truck operators are required to complete a "Vehicle Weekly Log Sheet" showing miles driven, fuel and oil consumption and general performance for each day used. These sheets are submitted monthly to ATA for forwarding to the National Renewable Energy Laboratory for comparison of all trucks in the program. This information is made public and can be accessed through the "Internet" system. At the end of the contract period, a final report is to be made by ATA with findings and recommendations.

**Cost** - The initial projected cooperative costs with American Trucking Association and other sponsors are as followings.

| Item | Total Cost | State's Participation | ATA's Participation | Sponsor's Participation |
|---|---|---|---|---|
| Truck Chassis | $135.418 | $77,378 | $ 0 | $ 58,040 |
| Truck Body/Plows | 69.790 | 70,988 | 0 | - 1,198 |
| Engines | | | | |
| Ethanol Engine | 70.682 | | | |
| Parts/Wiring | 38.734 | | | |
| Repower Service | 11.020 | | | |
| Consumables | 12,484 | | | |
| Less Trade-in engine | -16.000 | | | |
| Total | 124,920 | | 124,920 | 0 |
| Repowered Engines | 37.916 | 37,916 | 0 | 0 |
| Support/Testing | 18.349 | | 18.349 | |
| Fuel/Lub (Est) | 85.415 | 7,500 | | 77.915 (1) |
| Totals | 471.808 | 193,782 | 143,269 | 134,757 |

(1) 7.500 Nebr Corn Board
58.434 Various Grain Boards
11.981 Dept of Roads

**Trucks Uses** - During the time frame of this report, the two trucks were used for various maintenance activities. Table 2 below shows the maintenance activities the two truck were used during this report period as compared to a Department's control truck from Kearney that operates on diesel fuel.

| | Activity | --- Ethanol Trucks --- No of Times Used 23790 | 23791 | Percent of Total (Both Trucks) | ---Control Truck - Kearney --- No of Times Used (24764) | Percent of Total |
|---|---|---|---|---|---|---|
| 1 | Snow Plowing | 20 | 25 | 51 | 30 | 40 |
| 2 | Armor Coating | | 9 | 10 | 6 | 8 |
| 3 | Machine Patching | | 8 | 9 | 16 | 21 |
| 4 | Unspecified Rwy./Shldr Work | 8 | | 9 | 1 | 1.5 |
| 5 | Rebuilding Unpaved Shoulders | 5 | | 9 | 1 | 1.5 |
| 6 | Other Operations | 7 | 7 | 15 | 21 | 28 |
| | Total | 40 | 49 | 100% | 75 | 100% |

Table 2 - Summarized Equipment Usage by Activity

Table 4 shows the fuel cost between diesel and ethanol and performance on MPG. Truck 24764 is used as the control truck for comparative purposes.

| Truck | Miles Reported | Fuel (Gallons) | Unit Cost | MPG | Total Cost of Fuel |
|---|---|---|---|---|---|
| 24764 | 9101 | 2186.0 | .8614 | 4.16 | $2084.41 |
| 23790* | 6370 | 2707.5 | 1.5277 | 2.35 | $4136.25 |
| 23791* | 7142 | 3257.1 | 1.5277 | 2.19 | $4975.87 |

Table 4 - Comparative Cost of Fuel *Ethanol Trucks

**Repair History**- Other than the normal scheduled maintenance, repairs and unscheduled maintenance items were repaired under warranty for this report period. The major problem with these trucks is the fuel filter that continue to plug up and stall the units without warning. This causes a great deal of mistrust in using these units.

Equipment 23791 - Lincoln

| | | |
|---|---|---|
| 1-3-95 | Coolant Leak | Repaired under warranty |
| 3-7-95 | Changed Fuel Filters | |
| 3-13-95 | Power Steering and Exhaust Leak | Repaired under warranty |
| 3-21-95 | Rear Spring Pin - Grease | Repaired under warranty |
| 5-18-95 | Battery Dead | Replaced under warranty |
| 11-1-95 | Replaced Glow Plugs | Replaced under warranty |

Equipment 23790 - Grand Island

| | | |
|---|---|---|
| 1-9-95 | Replaced Solenoid | Replaced under warranty |
| 2-11-95 | Truck in shop due to accident | Repaired with State Funds |
| 4-17-95 | Fuel Pump Failed | Used override switch to operate |
| 6-19-95 | Stalled at light | Changed Fuel Filters |
| 8-8-95 | Replaced Flex Exhaust pipe from turbo | |
| 9-12-95 | Dead Battery | Charged |
| 9-20-95 | Dead Battery | Charged |

**Publicity**- The trucks were on display at several public parades and show during this report period. In June, Truck 23791 (Lincoln) was on display at the Midwestern Biomass Conference in Nebraska City. It also participated in parades in Beatrice, Bennet and Palmyra. In July, the truck was in a parade at Seward.

Truck 23790 (Grand Island) was on display at the Cornhusker Harvest Days in Grand Island

**Vehicle Emissions** - According to the ATA contract, the two trucks were programed to have emission tests performed by the West Virginia University Transportation Heavy Duty Vehicle Emission Testing Laboratory. According to ATA, these checks will be completed during 1996.

**Comments from Operators:**

1.. Some of the reasons given for not wanting to operate the trucks are operators feel the trucks are not reliable for winter operations. Operators are fearful they will be stranded while plowing snow which is a safety factor. The fuel filter continue to plug and causes the trucks to stall. The truck have been taken to the dealers for evaluation and there is nothing they can do about it except change filters frequently.

2. These trucks have a 126 gallon fuel capacity and at 2.2 MPG, operators are reluctant to go too far from a fueling station with these trucks for fear of running out of fuel leaving them stranded.

**Summary:**

This interim report for calendar year 1995 is based on findings for this period only. The following facts are submitted for your consideration:

1. The trucks are adequate for the tasks assigned.

2. Trucks are not used to their fullest.

3. The major repair items on these trucks are the fuel filters which seem to plug prematurely.

4. Dependability of these trucks for winter operations is a great concern for operators.

FM
5-8-96