Alternative Fuels

GRAND PRAIRIE INDEPENDENT SCHOOL DISTRICT SCHOOL BUS CASE STUDY

Texas Department of Transportation
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U.S. Department of Energy

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INTRODUCTION

Many fleet owners and operators will soon be required to operate alternative fueled vehicles. The use of alternative fuels is expected to save money, improve air quality and be beneficial for the Texas economy. The decision as to which alternative fuel to use has been difficult because of the limited amount of information available with respect to operating and maintenance costs as well as vehicle performance. This study examines these issues with respect to the use of compressed natural gas (CNG) and propane (LPG) as compared to gasoline in the operation of school buses. The results are based upon tests conducted by the Grand Prairie Independent School District (GPISD).

REQUIREMENTS UNDER TEXAS LAW

In the spring of 1989, Senate Bill 740 was passed into law in Texas. This law dramatically affects the fuel used to power vehicles operated by the school districts of Texas. Effective September 1, 1991, county or local school districts operating more than 50 motor vehicles used for the transporting of school children must 1) purchase only vehicles capable of operating on natural gas or another alternative fuel, and 2) achieve the following percentages of alternative fueled vehicles with respect to the total fleet:

a) 30% or greater by September 1, 1994;
b) 50% or greater by September 1, 1996;
c) 90% or greater by September 1, 1998 (subject to Texas Air Control Board review).

Requirements will be waived if:

a) central refueling is not possible because of infrastructure restraints and/or;
b) the purchase and use of alternative fueled vehicles is not cost effective.

All costs for the vehicle conversions are to be born by the school district. Annual reports must also be submitted by the school district on the progress of the alternative fuels program.

TEXAS ALTERNATIVE FUEL OVERVIEW

Senate Bill 740 charges the Texas Air Control Board (TACB) with determining which fuels will be considered alternative fuels in Texas. Five fuels are currently recognized as alternative fuels.[1] They are as follows:

- natural gas
- propane
- methanol
- electricity
- ethanol

Natural gas and propane are significant elements in the Texas economy. Texas produces 35% of the nations supply of propane (LPG) and 25% of the nation's supply of natural gas.[2] Conversion kits and/or original equipment are currently available for these fuels. A summary of the advantages and disadvantages of propane and natural gas is given below.

Propane

Propane is a colorless, odorless and non-toxic gas.[3] After gasoline and diesel, propane is the third most popular motor fuel in the world, with almost four million vehicles in use worldwide.[4] Propane is found in natural gas and crude oil. It is manufactured by separating it from natural gas, crude oil or oil refinery gases. Propane is used mainly as a heating and cooking fuel in homes and industry, as well as a chemical feedstock. For motor fuel, propane is liquefied under pressure (usually about 250 psi) and sold in tanks as liquefied petroleum gas (LPG).

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[1]Texas Air Control Board.

[2]Railroad Commission of Texas.

[3]Odor is added for gas presence identification.

[4]"Alternative Fuels Transportation Briefs", Governor's Energy Office, January, 1991.

Propane, chemical symbol C_3H_8, is a hydrocarbon of molecular weight 44.09 and has a boiling point of -42.1° C (43.8° F) at atmospheric pressure. Propane is a member of the alkane series of hydrocarbons. The net caloric value of propane is about 12,000 cal/g (21,600 BTU/lb). When used as a fuel, 23.8 m^3 of air are required for the combustion of 1 m^3 of propane gas, with the products of combustion being CO_2, H_2O and N_2. The ignition temperature is 466° C and a flame temperature of 1,970° C.[5]

Propane is a low hydrocarbon fuel (C_3H_8); therefore, it can provide a significant reduction in harmful engine exhaust emissions without expensive converters. With a simple, dependable, predictable molecular structure, quality is consistent. On buses with no emission control devices, propane can effectively reduce harmful emissions by 75-90%[6]; however, removal of emissions equipment from a vehicle and operation of that vehicle is a violation of Federal Anti-Tampering Law.

Among the by-products of burned propane are carbon dioxide (CO_2) and nitrous oxide (NO_x). Both of these chemicals are the gases which are said to be causing the "Greenhouse Effect," with nitrous oxide being one of the chemicals contained in acid rain. The CO_2 is present in relatively small amounts, about 93% below current U.S. standards, representing a minimal risk.

The propane fuel tank is a low pressure vessel (about 250 psi) generally constructed of heavy steel, tested to 1.5 times the maximum working pressure and can withstand 3-4 times (1,000 psi) greater pressure than any pressure to which it ordinarily would be subjected.

Propane has been used as an engine fuel for more than 50 years. It is estimated that over 500,000 off road engines currently operate on LPG.[7] A recent California study indicates that over 750,000 vehicles have been converted to LPG in the past 10 years.[8]

In Texas, the largest user of propane-fueled buses in school bus applications is Northside Independent School District in San Antonio. Of 324 buses in the fleet,

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[5]Academic American Encyclopedia, Vol. P, 1990, Pg. 56

[6]Suburban Propane/Petrolane, "Some Straight Talk About Gaseous Fuels," 1989, Pg. 3.

[7]Fleet Equipment Magazine, April 1991, Pg. 29.

[8]Ibid.

275, or 85%, operate on propane. Table 1 summarizes the initial cost of the Northside Independent School District program.[9] While this table indicates only one storage tank and refueling facility, Northside ISD operates three separate facilities, with a total storage capacity of 32,000 gallons.

TABLE 1
Propane School Bus Program
Initial Cost - Northside ISD

Item	Number of Units	Cost per Unit	Initial Cost
Land	1	$10,000	$10,000
Electric Power to Facility	1	$3,000	$3,000
Site Preparation	1	$15,000	$15,000
Storage Tanks	1	$32,000	$32,000
Refueling Facility (2 meters, 2 pumps, 2 hoses)	1	$45,000	$45,000
Conversion Kits	275	$600	$165,000
Vehicle Fuel Tanks	275	$500	$137,500
Mechanic Training	18	$50	$900
Driver Training	300	$10	$3,000
Conversion Labor	1	$85,000	$85,000
Total	---	---	$496,400 ($1,805/bus)

Gasoline bus engine conversion to propane is estimated to cost from $1,400 to $2,000 each, including all tanks and miscellaneous costs.[10]

[9]Mike McClung, Director of Transportation, Northside Independent School District, March, 1993.

[10]Suburban Propane/Petrolane, P.O. Box 337, McKinney, Texas 75069, (800) 252-2661.

Fuel facilities can be provided for as little as $45,000, which includes an 18,000 gallon storage tank with two separate pumps and meters.[11]

LPG is available in nearly every community in the state of Texas. A vehicle can be fueled in about the same amount of time as is now needed to refuel with gasoline.

The price of LPG is dependent on world market supply and demand. Since it is a by-product of crude oil refining (both domestic and foreign) and natural gas production, it would seem reasonable that if foreign crude oil supplies were curtailed while more propane was demanded, the price may increase. The past record for the propane industry has been good despite the fact that LPG is a by-product of oil and gas refining; however, the price is subject to market swings.

Projections by the California Energy Commission indicate that 1993 California retail pump prices for a gallon of gasoline in 1988 (equivalent) dollars are expected to be $.75 for natural gas, $.88 for propane, $1.07 for regular unleaded gasoline and $1.21 for 91 octane unleaded gasoline.[12] Table 2 summarizes the U.S. average prices for gasoline, natural gas and propane from 1980 through 1991.[13] Although propane is less expensive than gasoline, it is more expensive than natural gas on a gallon equivalent basis. Figure 1 illustrates the price comparisons.

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[11]Ibid.

[12]Governor's Energy Management Center, State of Texas, Pg. 16.

[13]Dickinson, Robert D., "Natural Gas as a Vehicle Fuel...Vision Becomes Reality," Natural Gas Fuels,p. 24, March 1993.

TABLE 2
U.S. Average Fuel Prices
(Gasoline, Natural Gas & Propane)

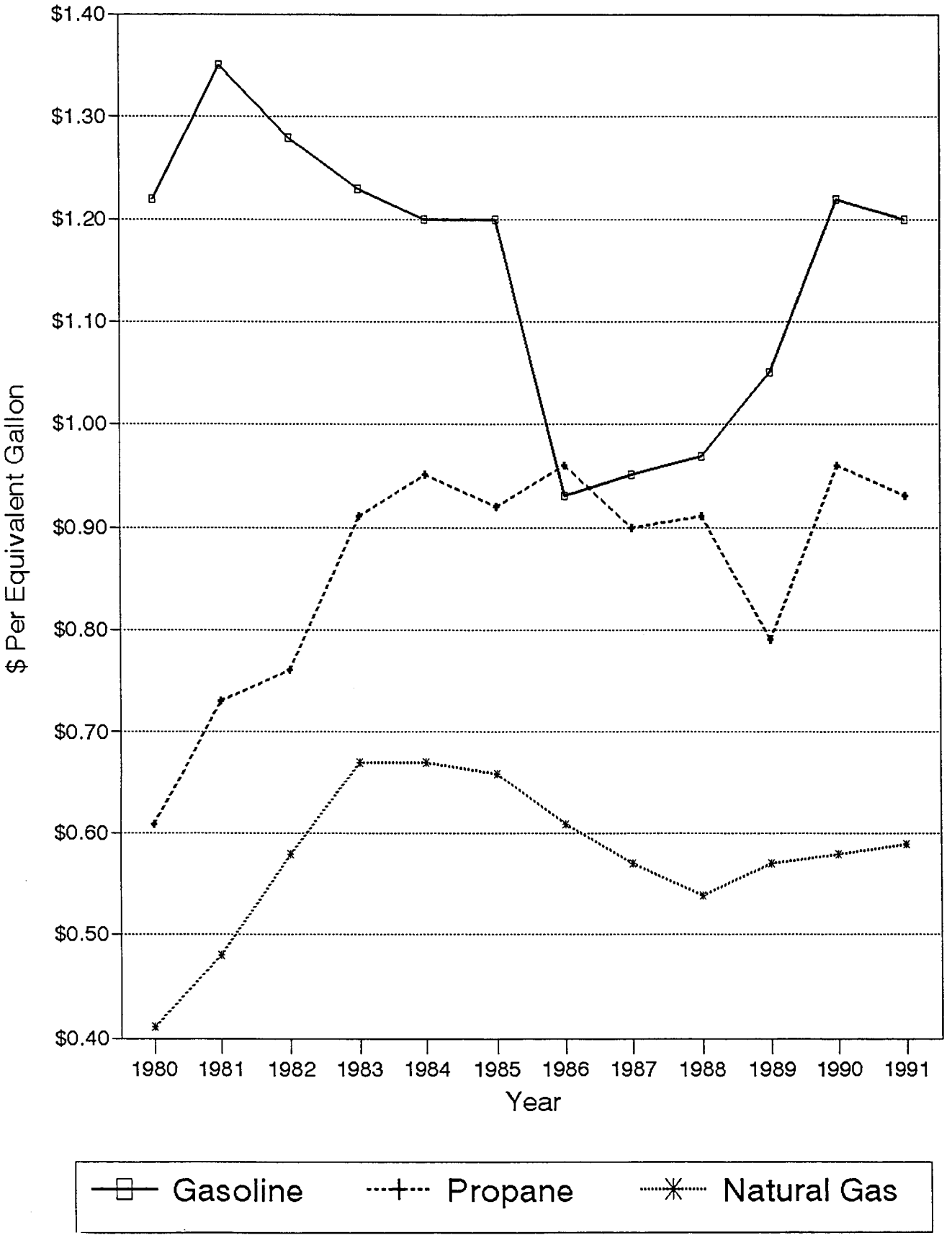
Year	Gasoline ($/gallon)	Natural Gas ($/equiv. gal)	Propane ($/equiv. gal)
1980	1.22	0.41	0.61
1981	1.35	0.48	0.73
1982	1.28	0.58	0.76
1983	1.23	0.67	0.91
1984	1.20	0.67	0.95
1985	1.20	0.66	0.92
1986	0.93	0.61	0.96
1987	0.95	0.57	0.90
1988	0.97	0.54	0.91
1989	1.05	0.57	0.79
1990	1.22	0.58	0.96
1991	1.20	0.59	0.93

Gasoline - U.S. average retail price for leaded regular, unleaded regular and unleaded premium. Includes taxes.
Natural Gas - U.S. average for commercial customer class, excluding motor fuel tax.
Propane - U.S. average for consumer grade, excluding motor fuel tax. A gallon of propane contains about 75% of the BTUs of a gallon of gasoline. Price has been adjusted to account for this loss in BTUs.

Safety is also a concern when using LPG as a motor fuel. In the event of an accident or rupture of the system, LPG pools on the ground because it is heavier than air. Garage ventilation also becomes a concern because of the potential fire hazard.

An additional expense of using LPG is the training needed to meet State requirements. State licensed service people are required to service and install LPG equipment.

FIGURE 1
U.S. Average Fuel Price Comparison



Natural Gas

Natural gas is a hydrocarbon fuel consisting mostly (88 - 95%) of methane (CH_4). It usually contains other hydrocarbons higher in the methane series including 3-8% ethane (C_2H_6), 0.7-2% propane (C_3H_8), 0.2-0.7% butane (C_4H_{10}), 0.03-0.5% pentane (C_5H_{12}). Carbon dioxide, nitrogen and helium (also found in natural gas) detract slightly from the heating value of natural gas.

The most efficient, least costly means of transporting natural gas is via pipeline. The United States has nearly 2 million miles of natural gas pipelines. Natural gas may also be transported in pressurized tanks as compressed or liquefied natural gas. Compressed natural gas (CNG) is transported under high pressures (usually over 3,000 psi). Liquified natural gas (LNG) is transported at low pressures (under 70 psi) and at temperatures under -260° F. LNG requires slightly less than one-half of the storage requirements of CNG.

LNG is routinely stored and carried in fully insulated vacuum containers at low pressures. In bulk storage tanks it is held at 2 psi. LNG fuel tanks have been designed to operate at pressures up to 350 psi to prevent venting the boiled off vapor.

Natural gas fueled engines generally have very low emissions of reactive hydrocarbons, carbon monoxide and particulate matter. The principal pollutant from natural gas fueled vehicles is unburned methane. However, the methane emission is much less reactive than hydrocarbon emissions from gasoline fueled engines. The California Air Resources Board (CARB) does not consider methane in the measurement of vehicle emissions. CARB designates hydrocarbon emissions as non-methane hydrocarbons only. Natural gas vehicles can experience minor NOx emission problems. These potentially high NOx emission outputs can be lowered through the use of exhaust gas recycling (EGR) systems.[14]

The excess air associated with lean burn operation, used to maximize energy efficiency, may reduce NO_x emissions to meet future limitations. The lean burn operation lowers the ability of the catalysts to further reduce NO_x emissions due to low exhaust temperature and the lack of a sufficient reducing agent (carbon monoxide) in the exhaust. This problem may tend to push natural gas fueled vehicles toward the use of stoichiometric combustion, for which a typical three-way catalyst

[14]Mike Rasins, GPISD, 1992.

in combination with air/fuel ratio feedback and exhaust gas recirculation (EGR) can be used to control NO_x. However, carbon monoxide emissions will be higher with this technology. Excellent emissions performance (exceeding 1994 emissions requirements for heavy duty engines) have been demonstrated on engines employing these technologies.

The methane, nitrous oxide and the hydrocarbons all have a negative impact on the "Greenhouse Effect." The NO_x is a principal ingredient in our "Acid Rain." Carbon monoxide is a further danger. All of these elements can be produced within federal guidelines in natural gas fueled vehicles. Therefore, the use of natural gas in place of gasoline or diesel can significantly reduce current air pollution levels.

There is at least a 200-year worldwide and a 50-year U.S. supply of natural gas. It is not anticipated that increasing transportation uses of natural gas will greatly affect the price.[15] In the lower 48 states, there are 800 trillion cubic feet (Tcf) of technically recoverable natural gas. In addition, there are 259 Tcf of unconventionally technically recoverable natural gas in coal beds, shale and low permeability reservoirs. [16] Much of the 800 Tcf of natural gas is a Texas resource.

Natural gas is used in some 700,000 vehicles worldwide and has been established as a transportation fuel.[17]

Natural gas is lighter than air. In case of an accident or rupture of the system, the gas will rise. When the air/fuel mixture is within proper range, if ignited, it will flash burn uncompressed in the air. However, under normal outdoor conditions, natural gas will dissipate without igniting.

Natural gas is composed of primarily methane (CH_4) with measurable and variable amounts of ethane (C_2H_6), propane (C_3H_8), pentane (C_5H_{12}), carbon dioxide (CO_2), nitrogen (N_2), and helium (He). The pure methane is a simple, dependable, uncomplicated fuel component. However, natural gas varies in its amount of these constituents. As a result, the BTU rating, flash point, and temperature will vary. This variable could be a source of problems in a fleet operation.

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[15]Governor's Energy Management Center, State of Texas, pg. 18.

[16]Putting Together the Pieces, Texas Land Commission, 1989.

[17]ibid

An additional expense of using natural gas is the training needed to meet State requirements. State licensed service personnel are required for installing and servicing natural gas systems.

The low density of natural gas poses a unique problem: it is very difficult to store enough natural gas onboard a bus to provide a driving range of more than 100-150 miles. The CNG tanks are available that will operate at 5,000 psi, but the tanks used on most vehicles operate at 2,400-3,000 psi. A wide variety of DOT approved tanks are available for use at the lower pressures. Many of these tanks are constructed using steel or aluminum with fiberglass or Kevlar over-wraps to minimize weight. In spite of these measures, most conversions are made to provide limited cruising range for fleet vehicles that do not require a greater travel range between refueling.

Another disadvantage of natural gas is the cost of on-board storage tanks. In 1991, on-board storage tanks cost from $800 to $1,000 each.[18] A standard school bus can require up to five of these tanks, which adds significantly to the cost of conversions and total weight of the vehicle. The added weight reduces the passenger load of the bus. Storage under the bus can also become a problem due to the size of the on-board storage tanks.

Gasoline bus engines can be converted to operate on natural gas for approximately $3600 to $4,500 per vehicle. Converted gasoline engines can provide the ability to operate on natural gas or gasoline; however, power losses of approximately 10% can be expected because the engine cannot be optimized to operate on both fuels. Dedicated natural gas engines can be purchased and installed for approximately $7,800 - $12,000 per vehicle.[19]

The Tulsa Public Schools in Tulsa, Oklahoma operates a large fleet of compressed natural gas school buses. The total fleet of 280 buses includes 67 dual fuel buses (natural gas and gasoline) and 53 dedicated engine (natural gas only) buses. Almost 45% of the fleet currently operates on compressed natural gas. Table 3 summarizes the initial costs for the Tulsa Public Schools alternative fuels program.[20]

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[18]Mike Rasins, GPISD, 1992.

[19]Telephone conversation with Mike Rasins, GPISD, 1993.

[20]Mr. Bob Haddox, Director of Transportation, Tulsa Public Schools, April 1993.

TABLE 3
Compressed Natural Gas School Bus Program
Initial Cost - Tulsa Public Schools

Item	Number of Units	Cost per Unit	Initial Cost
Compressor - 1 twin 50 cfm with 20 bottle cascade	1	$57,846	$57,846
Compressor - 2 twin 50 cfm without cascade	1	$85,900	$85,900
Compressor - training & installation	1	$2,100	$2,100
Three additional compressors	1	$149,846	$149,846
Conversion Costs (includes kits and cylinders)	67	$3,600*	$241,200
Dedicated CNG Bus Premium Cost**	53	$11,561	$612,733
Total	---	---	$1,149,625 ($9,580/bus)

* Estimated cost
** Compared to diesel bus costs

It can take up to 6 hours to fully fuel one bus on CNG using the slow fill method. Fast-fill systems are also available. These will refuel much quicker, about 80% of the speed of filling with gasoline.

THE GRAND PRAIRIE INDEPENDENT SCHOOL DISTRICT PROJECT

This project, undertaken with the aid and cooperation of the Director of Transportation and Warehousing of the Grand Prairie Independent School District (GPISD), monitored and evaluated the cost, fuel economy and performance of various engine/fuel combinations in otherwise identical school buses in operation.

At the time of the study GPISD operated almost 150 vehicles, including buses and maintenance trucks.

Eight buses were included in the study. All eight buses were 1986 GMC conventional 71-passenger school buses modified to meet Texas specifications. The engine/fuel combinations included in the study are as follows:

- 366 CI GMC gasoline engine/gasoline (5 control vehicles)

- GTA 5.6 natural gas engine/dedicated to CNG (prototype)

  - Conversion equipment -

Fuel Filler	HPR402 Impco
1st Stage Regulator	HPR501 Meco
2nd Stage Regulator	TEPV-1 Impco
Mixer	200 Impco
Cylinder (5 total)	13 x 54 Press Steel (each)

- 366 CI GMC gasoline engine/converted to CNG

  - Conversion equipment -

Fuel Filler	HPR402 Impco
1st Stage Regulator	HPR501 Meco
2nd Stage Regulator	PEV-1 Impco
Mixer	CA425 Impco
Cylinder (4 total)	15 x 54 Press Steel (each)

- 366 CI GMC gasoline engine/converted to LPG

  - Conversion equipment -

Mixer	CA425M Impco
EB Converter	VFF-30-2
Vacuum Lock-Off	
Fuel Tank	Manchester 80 gallon (64 gal net)

Suburban Propane[21] provided an LPG tank and converted a bus to operate exclusively on propane. Both the conversion and LPG tanks were approved for use by the Railroad Commission of Texas. Based on GPISD's current facilities performance, the propane equipment and facility was approved in less than 1/3 the time involved for compressed natural gas. The LPG pump facility had a series of

[21]Suburban Propane/Petrolane, P.O. Box 337, McKinney, Texas 75069, (800) 252-2661.

leaks at the beginning of the project, but were corrected. No other leaks were detected during the project.

The CNG conversion was installed by Dallas Fleet Maintenance, Inc.[22] It cost GPISD $3,047.47 to have bus #131 converted to CNG without the cost of tanks. The on-board storage tanks were supplied by Lone Star Gas at no charge. The conversion allowed the operation of the bus on either CNG or gasoline. This conversion was approved for use by the Railroad Commission of Texas.

The dedicated CNG bus operated using a Hercules engine designed to operate on natural gas. This prototype engine was installed by Hercules and approved for use by the Railroad Commission of Texas.

Each vehicle was initially standardized using the following criteria:

1. Rear tires were changed to tires of the same diameter;

2. Engines were completely tuned up;

3. The oil was changed. Samples of the oil were taken from each bus and analyzed by Pennz-Test to insure against internal engine damage or excessive wear;

4. Wheel bearings and all other miscellaneous performance parts were brought up to proper specifications;

5. Tires were checked weekly and maintained at 75 psi;

6. Compression tests were conducted at the start of the project.

Bus routes for the project were chosen based on their similarity to each other. Each bus changed routes every two weeks. The drivers remained on the same route.

Fuel Economy and Operating Costs

Mileage and fuel usage were recorded every day for each bus during the project. The project ran from August 21, 1991 through April 25, 1992. The dedicated CNG

[22]Dallas Fleet Maintenance, Inc., 4201 Willow Street, Dallas, Texas 75226, (214) 823-3531.

bus was not available until November 25, 1991 and was removed from the project on February 24, 1992. The converted CNG bus began operations on September 9, 1991 and was removed from the project on March 2, 1992. The LPG converted bus began the project on August 21, 1991 and was removed from the project on April 5, 1992. Table 4 illustrates the time periods during which the buses were examined.

TABLE 4
Timetable of Bus Operations

Bus/Fuel Type	8/91	9/91	10/91	11/91	12/91	1/92	2/92	3/92	4/92
Bus 125-129 Gasoline									
Bus 130 Dedicated CNG									
Bus 131 Converted CNG									
Bus 132 Converted LPG									

Two time periods were examined due to the delay in receiving the dedicated CNG bus. The first time period extended from August 28, 1991 through March 12, 1992. This time period included all buses except the dedicated CNG bus. The second time period, from December 16, 1991 through February 24, 1992, included all eight buses in the project.

Table 5 compares the mileage accumulated by each bus for the two time periods, as well as the average daily miles traveled by each bus. The buses averaged about 40 miles per day. Bus 127 registered low mileage both on a daily basis and overall. Because none of the buses were out of service for more than a day, these low readings may be due to a faulty speedometer cable or other factor.

TABLE 5
Average Daily Mileage

Bus Number	Fuel Type	8/28/91 - 3/12/92		12/16/91 - 2/24/92	
		Average Daily Miles Traveled	Total Miles Traveled	Average Daily Miles Traveled	Total Miles Traveled
125	Gasoline	37.5	4,735	45.6	1,641
126	Gasoline	37.8	4,982	35.4	1,274
127	Gasoline	36.4	4,297	28.7	977
128	Gasoline	39.1	5,028	35.1	1,299
129	Gasoline	44.4	5,566	43.8	1,655
Avg. Gasoline Bus		39.0	4,922	37.7	1,369
130	Dedicated CNG	-	-	40.9	1,451
131	Converted CNG	38.1	4,580	39.2	1,377
132	Converted LPG	38.5	4,707	42.9	1,599

Fuel costs were calculated using average fuel costs during the period examined and the calculated miles per gallon. Gasoline and propane were both purchased on a per gallon basis. The gallons of gasoline and propane used by each bus were recorded for every refueling. The data gathered on the refueling process with respect to compressed natural gas included the pressure of the fuel in the on-board storage tanks before the tanks were filled and the pressure of the fuel upon the completion of the refueling process. Ambient air temperatures were also recorded.

In order to compare the fuel usage of the CNG-fueled buses to the other buses included in the project, the volume of CNG must be converted to equivalent gallons of fuel (compared to gasoline). A computer program developed by the American Gas Association (A.G.A.) was used to convert pressures and temperatures to equivalent gallons. This program, entitled the "Natural Gas Vehicle Program", was designed to allow users to keep track of fuel consumption and mileage for each vehicle operating on natural gas. The program incorporates the A.G.A. 8 equation-

of-state to calculate the number of cubic feet of gas in each vehicle's cylinders from pressure and temperature measurements. The cubic feet of gas is then converted into equivalent gallons. The program uses cylinder pressures and cylinder temperatures to calculate fuel usage. For this project, only ambient temperatures were recorded. According to A.G.A., using ambient temperature instead of cylinder temperatures will result in a slight error in the final results.

Table 6 summarizes the results. It should be noted that the gasoline costs include a 0.0035¢ per gallon charge for Superfund requirements and a 0.006¢ per gallon loading fee. GPISD is not required to pay state or federal gasoline taxes. In Texas, all users of natural gas are required to purchase a sticker to offset the loss of state gasoline tax revenue, except for school districts and county governments. School districts and county governments are exempt; therefore, the sticker cost is not included in the cost of compressed natural gas.

TABLE 6
Average Fuel Costs

Bus Number	Fuel Type	8/28/91 - 3/12/92			12/16/91 - 2/24/92		
		MPG	Avg.¢/ Gallon	Avg.¢/ Mile	MPG	Avg.¢/ Gallon	Avg.¢/ Mile
125	Gasoline	3.63	74.3	20.5	4.04	74.3	18.4
126	Gasoline	3.59	74.3	20.7	3.43	74.3	21.7
127	Gasoline	3.76	74.3	19.8	3.84	74.3	19.3
128	Gasoline	4.19	74.3	17.7	4.30	74.3	17.3
129	Gasoline	4.04	74.3	18.4	4.12	74.3	18.0
Avg. Gasoline Bus		3.84	74.3	19.3	3.94	74.3	18.9
130	Dedicated CNG	-	-	-	5.32	42.8*	8.0
131	Converted CNG	5.46	42.8*	7.8	4.63	42.8*	9.2
132	Converted LPG	3.27	78.0	24.0	2.89	83.0	29.0

* Average ¢/gallon for CNG includes an average compression cost = 10.8 ¢/gallon equivalent.

During both time periods, the buses operating on CNG experienced the best fuel economy and the lowest cost per mile to operate. (Does not include maintenance costs.) The bus operating on LPG incurred the highest fuel cost per mile and the worst fuel economy.

Maintenance costs were considered and found insignificant. Only the converted CNG bus, Bus 131, required more than normal maintenance. This bus had continuous operational problems including lack of power and stalling. Dallas Fleet Maintenance, Inc. replaced the regulator to attempt to solve the problem. Lone Star Energy replaced a portion of the conversion kit and the regulator, and later adjusted and changed out additional parts relating to the fuel system. Because maintenance on the bus was conducted at no cost to GPISD, actual costs could not be calculated. It should be noted the operational problems were not solved during the study, and upon completion of the project, the bus was converted back to a gasoline-powered vehicle.

With respect to standard maintenance costs, both the CNG and LPG buses performed well. None of the alternative fueled buses required oil, oil filter or spark plug changes during the study. The gasoline buses required normal oil, oil filter and spark plug changes.

Vehicle Performance

Various tests were conducted to compare the performance of the buses within the study. Tests were conducted on acceleration, emissions and oil samples. A driveability survey was also conducted to determine the operations of each bus from a driver's point of view.

Acceleration Test

Each bus was tested to determine acceleration from a stop to 45 miles per hour. Tests were conducted twice on each bus at random times during the test period. One test was conducted near the beginning of the study and the second test on each bus was conducted near the end of the test period. As shown in Table 7, the dedicated CNG bus had the best acceleration; however, the converted CNG bus had the worst acceleration. The LPG bus accelerated more quickly than the average gasoline-powered bus.

TABLE 7
Results of Acceleration Test
(0 mph - 45 mph)

Bus Type	Time	Difference Compared to Gasoline	Ranking
Gasoline (Average)	32.0 seconds	0 seconds	3rd
Converted CNG	34.5 seconds	2.5 seconds slower	4th
Dedicated CNG	30.5 seconds	1.5 seconds faster	1st
LPG	31.3 seconds	0.7 seconds faster	2nd

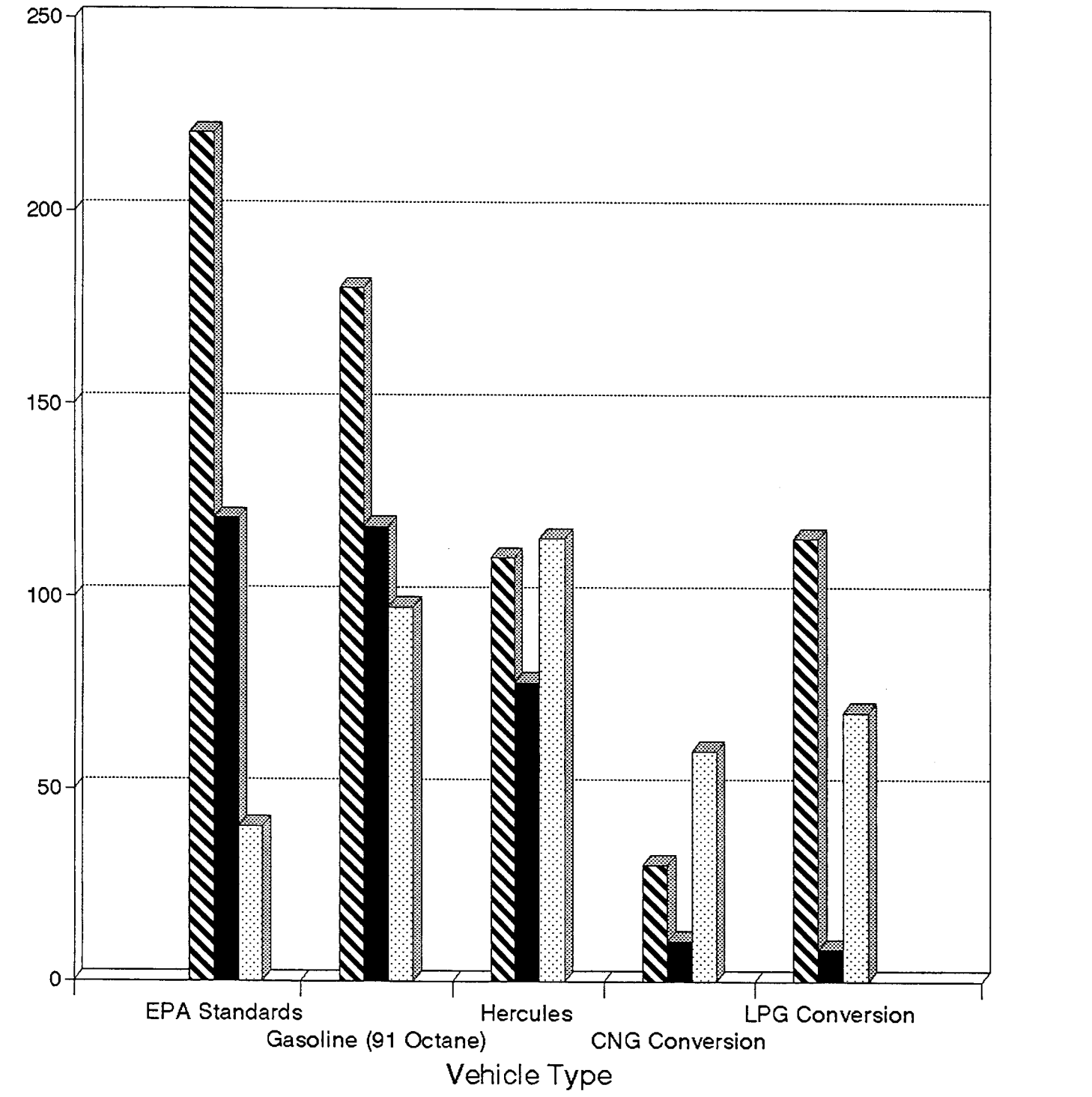
Emissions Test

Testing of exhaust pipe emissions was conducted by the City of Grand Prairie Equipment Maintenance Department. A three gas tailpipe sniffer, as mandated by the U.S. Environmental Protection Agency (EPA) for non-compliance areas in the State of Texas, was used to perform the test. Figure 2 summarizes the results. All of the buses in the study, including the gasoline buses operating on 91 octane fuel, operated below maximum allowable levels with respect to hydrocarbons and CO concentrations. All buses in the study exceeded the minimum allowable dilution CO-CO_2 standards. Therefore, all buses met or exceeded U.S. EPA emission requirements.

Oil Sample Test

Oil samples were taken after the first 1,000 miles and at six month intervals throughout the study period. All oil samples were tested by "Pennz-Test." No significant degeneration of the oil samples was detected in any of the buses included in the study. Metal shavings were detected in the dedicated CNG bus oil sample in the first oil sample at 1,000 miles. Although these metal shavings were attributed to the breaking in of the new engine, the oil was drained and replaced as a precaution. Further testing revealed no additional metal shavings throughout the study.

FIGURE 2
Tailpipe Emissions Summary



Compression Test

Compression tests were conducted at the start of the project on each bus. Table 8 summarizes the results. The dedicated CNG bus, Bus 130, was not available at the time the tests were conducted. Because the oil samples and emissions tests conducted upon the completion of the project indicated no significant problems with respect to engine wear, the compression tests were not conducted upon the completion of the project.

Driveability Survey

A driveability survey was also conducted as part of the study. Drivers were asked to comment on various aspects of vehicle operations, including starting problems, idle roughness and acceleration problems. Written comments were also examined to determine any other unforeseen problems that were related to the engine operations or fuel. The questionnaire was completed each day by the driver. Twenty-eight drivers participated in the study. Seven drivers operated all of the buses except Bus 124. Bus 124, a gasoline powered bus, was surveyed for only eleven days during the study. Figure 3 illustrates the questionnaire used in the study. The appendix contains a summary of the responses for each bus for each day of operation.

The questionnaires were closely examined to determine the operation of each bus from the driver's point of view. Twenty-eight drivers completed questionnaires for the eight buses during the project. Questionnaires from each driver were compared to determine variations in individual driver perceptions. For example, one driver never marked the "none" box with respect to any of the driveability problems, while another driver indicated no problem with respect to engine stalls and then noted under "comments" that the bus stalled. The following is a summary of the driveability problems of each bus.

Bus 124 (gasoline) - This bus was only surveyed for 11 days. Three drivers operated this bus during the test period. During this time period, no driveability problems were encountered.

Bus 125 (gasoline) - This bus was surveyed for 125 days. During this time period, nine drivers submitted surveys on the operation of the bus. Cold start problems with engine stalls were indicated as being noticeable twice.

TABLE 8
Engine Compression Test Results
(pounds per square inch atmospheric)

Condition	Cycle #	Bus						
		125	126	127	128	129	131	132
Dry	1	185 psi	175 psi	185 psi	180 psi	170 psi	175 psi	175 psi
	2	175	180	175	175	180	170	175
	3	180	175	180	180	170	175	170
	4	175	175	180	175	180	175	175
	5	175	175	180	175	170	170	175
	6	180	175	180	180	175	165	175
	7	175	175	175	175	170	165	175
	8	175	180	180	180	175	170	175
Wet	1	190	185	200	195	185	190	190
	2	185	185	190	195	185	185	190
	3	185	190	190	190	185	180	180
	4	185	190	190	185	195	205	190
	5	180	190	190	190	185	170	185
	6	190	185	190	190	190	195	190
	7	185	190	185	190	185	175	185
	8	190	190	185	190	190	195	190

FIGURE 3
Driveability Survey

GRAND PRAIRIE INDEPENDENT SCHOOL DISTRICT

TRANSPORTATION DEPARTMENT
DRIVEABILITY QUESTIONNAIRE

Please fill out and return this form each day, will all your paperwork.

NAME:_____ VEHICLE #:_____ DATE:_____

MARK THE BOX WHICH BEST DESCRIBES THE VEHICLE'S PERFORMANCE.

DRIVEABILITY PROBLEMS

	None	Barely Noticeable	Noticeable	Very Troublesome
1. Starting Problems (engine cold)	___	___	___	___
2. Starting Problems (engine warm)	___	___	___	___
3. Engine Stalls	___	___	___	___
4. Idle roughness	___	___	___	___
5. Acceleration problems (no power)	___	___	___	___
6. Hesitates, stutters or backfires	___	___	___	___
7. Engine knock or ping	___	___	___	___
8. Overall, performance problems were	___	___	___	___

9. If any, which performance problem was most annoying:_____

10. Comments: (use reverse side if needed)_____

_____

_____

_____

_____

_____

Bus 126 (gasoline) - Surveys were submitted for 125 days of operation. Sixteen drivers operated this bus during the test period. Hesitations and engine stall problems were noted throughout the month of September. The spark plugs and fuel filter were replaced twice during September. This bus continued to experience cold start problems and stalling through December. In March, acceleration problems began to occur.

Bus 127 (gasoline) - Surveys were submitted for 131 days of operation. During this time period, fourteen drivers operated and commented on this bus. Bus 127 began to have hesitation problems in September. By October, cold starts also became a problem. In December, this bus began to stall as well, and experienced poor acceleration. The bus backfired and had acceleration problems through March.

Bus 128 (gasoline) - This bus was surveyed for 152 days. Nineteen drivers operated this bus during the test period. Engine knocks and noticeable cold start problems were experienced periodically from September to November. Hesitation was noticeable in February.

Bus 129 (gasoline) - Surveys were submitted for 150 days of operation. Seventeen drivers operated this bus during the test period. Engine stalls were experienced from September through October when the engine was cold. In January, some problems with cold starts were noted.

Bus 130 (dedicated CNG) - This bus was surveyed for 37 days. During this time period, ten drivers operated and commented on this bus. Bus 130 had trouble with respect to engine idle. Several times the comment was made that "the bus runs rough." Acceleration problems were also noted.

Bus 131 (converted CNG) - This bus was surveyed for 111 days. Twelve drivers operated this bus during the test period. Acceleration problems and engine stalls were the major problems with this bus. During December, starting problems were a major concern. Almost every driver noted acceleration problems. The drivers often experienced break downs; at times a replacement bus was required. The bus was noted to have no power and a rough idle throughout the study.

Bus 132 (converted LPG) - Surveys were submitted for 135 days of operation. During this time period, thirteen drivers operated this bus. Very few comments were made on Bus 132. One driver experienced a lack of power with respect to

acceleration. Another driver experienced a problem with respect to cold starts in January; however, she also noted the bus "drives and runs great." This was the only positive comment recorded for any bus.

From a driveability standpoint, the converted LPG bus operated better than the CNG and gasoline powered buses. The dedicated CNG bus also performed better than the gasoline buses. The converted CNG bus had numerous major problems throughout the study, ranking this bus well below all others in the study.

STUDY RESULTS

This study was conducted to examine the operation of alternative-fueled school buses with respect to gasoline-powered buses. Two CNG-powered buses, one with a dedicated CNG engine and one with a converted CNG engine, were included in the study. A school bus converted to operate on LPG was also examined in this study. Conversion costs and the cost of the dedicated CNG engine were not included in the comparison. Each type of bus was examined with respect to the following categories:

- Fuel economy
- Operating costs
- Acceleration
- Emissions
- Oil Samples
- Engine compression
- Driveability

Each alternative-fueled bus exhibited strengths and weaknesses. The performance of each bus/fuel combination for every category is as follows:

- Fuel Economy - The two buses using CNG exhibited good fuel economy when compared to the gasoline-powered buses in the study. It should be noted that ambient air temperatures were used to calculate fuel usage instead of cylinder temperatures, which is expected to result in a slight error in the calculations.

  The calculated fuel economy of the dedicated CNG-powered bus was approximately 35% better than the average gasoline-powered bus.

The converted CNG-powered bus experienced an average fuel economy of 18% to 42% better than the average gasoline-powered bus. The fuel economy of the converted CNG bus did seem to be affected by temperature. During the December to February time frame, fuel economy dropped by approximately 18%.

The LPG-powered bus experienced the worst fuel economy, ranging from 17% to 36% lower than the average gasoline-powered bus. The bus operating on LPG also seemed to be affected by temperature, with a 13% drop in fuel efficiency experienced during the December-February time frame.

- Operating Costs - Fuel costs were examined in this project. At approximately 43¢ per gallon equivalent, CNG was about 30¢/gallon less expensive than gasoline. When converted to fuel cost per mile, the fuel cost to operate the CNG-powered buses was less than half the fuel cost of operating the average gasoline-powered bus.

  At the time of the study, the cost of LPG for the GPISD ranged from 4 cents to 9 cents per gallon higher than gasoline. Because the LPG-powered bus experienced lower fuel economy than the average gasoline-powered bus, the LPG fuel cost was about 24% to 53% higher per mile than the average gasoline-powered bus.

  Maintenance costs on the CNG-powered buses were absorbed by Dallas Fleet Maintenance, Inc. and Lone Star Energy. However, it should be noted that the dedicated CNG-powered bus required only normal maintenance, whereas the converted CNG-powered bus required ongoing maintenance because of operational problems. The LPG-powered bus required standard maintenance only.

- Acceleration - Acceleration from 0-45 mph was tested to compare acceleration rates. Both the dedicated CNG-powered bus and the LPG-powered bus exhibited good acceleration at 30.5 seconds and 31.3 seconds, respectively. These acceleration rates compare favorably to the average gasoline-powered acceleration rate of 32.0 seconds. However, the converted CNG-powered bus proved to be lacking with respect to acceleration, with an average rate of 34.5 seconds.

- Emissions - All of the buses in the study were tested to determine if the U.S. EPA emissions standards were met for hydrocarbons, carbon monoxide (CO) and dilution CO-CO_2. All buses in the study passed all emissions tests.

- Oil Samples - Oil samples indicated no significant degeneration of the oil in any of the buses throughout the study.

- Engine Compression - Tests were conducted at the beginning of the study on all buses, except bus 130 (dedicated CNG bus). Bus 130 was not available at the time of this test. Because no significant engine wear was suspected, engine compression tests were not conducted upon the completion of the project.

- Driveability - When examining the driveability surveys, bus 132 (the converted LPG bus) received few comments. This bus generally operated well and was extremely reliable. Bus 130, the dedicated CNG bus, also had very few problems. Engine idle and acceleration problems were noted periodically. The gasoline-powered buses experienced a variety of problems, ranging from engine knocks and stalls to cold start problems. The converted CNG bus, bus 131, experienced continuous problems with engine stalls, cold start problems and poor acceleration.

APPENDIX

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
01/01/92	Howard Johnson	124									
03/05/92	T. Washington	124									
03/06/92	T. Washington	124									
03/07/92	T. Washington	124									
03/07/92	Chris Snyder	124									
03/08/92	T. Washington	124									
03/09/92	T. Washington	124									
03/13/92	Howard Johnson	124									
03/15/92	Howard Johnson	124									
03/21/92	Howard Johnson	124									
03/22/92	Howard Johnson	124									
08/21/91	Nora Washington	125				Barely Noticed					
08/22/91	Nora Washington	125									Brakes were annoying. Scream at every stop.
08/22/91	Nora Washington	125									
08/26/91	Nora Washington	125									
08/27/91	Nora Washington	125									
08/28/91	Nora Washington	125									
08/30/91	Nora Washington	125									
09/03/91	Chris Snyder	125									
09/03/91	Nora Washington	125									
09/04/91	Chris Snyder	125									
09/05/91	Chris Snyder	125									
09/06/91	Chris Snyder	125									
09/09/91	Chris Snyder	125									
09/10/91	Chris Snyder	125									
09/11/91	Chris Snyder	125									
09/12/91	Chris Snyder	125									
09/13/91	Chris Snyder	125									
09/16/91	Chris Snyder	125									
09/17/91	Chris Snyder	125									
09/18/91	Howard Johnson	125									
09/19/91	Howard Johnson	125									
09/20/91	Howard Johnson	125									
09/23/91	Howard Johnson	125									
09/24/91	Howard Johnson	125									
09/26/91	Howard Johnson	125									
09/27/91	Howard Johnson	125									
09/30/91	Howard Johnson	125									
10/01/91	Howard Johnson	125									
10/02/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	In shop from last driver writeup (anti-freeze)
10/04/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/08/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/09/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Gas cap apparently not tightly closed - bus used more gas than normal - was also in shop for repair in Arlington (anti-freeze leak)
10/09/91		125									
10/09/91		125									
10/10/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/11/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/12/91	M. Randall	125									
10/14/91	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/15/91	M. Randall	125	Noticeable	Noticeable	Noticeable	Barely Noticed	Noticeable	Barely Noticed	Barely Noticed	Noticeable	Engine didn't turn over today when I was gasing after p.m. run
10/15/91		125									
10/21/91	Georgia Epps	125									
10/22/91	Georgia Epps	125									
10/23/91	Georgia Epps	125									
10/25/91	Georgia Epps	125									
10/28/91	Georgia Epps	125									
10/29/91	Georgia Epps	125									
10/30/91	J. Miller	125									
10/31/91	J. Miller	125									
11/01/91	J. Miller	125									
11/04/91	J. Miller	125									
11/05/91	J. Miller	125									
11/06/91	J. Miller	125									
11/07/91	J. Miller	125									
11/08/91	J. Miller	125	Barely Noticed								
11/11/91	J. Miller	125									
11/12/91	J. Miller	125									
11/13/91	M. Baxter	125									
11/14/91	M. Baxter	125									
11/15/91	M. Baxter	125									
11/18/91	M. Baxter	125									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
11/19/91	M. Baxter	125									
11/20/91	M. Baxter	125									
11/21/91	M. Baxter	125									
11/22/91	M. Baxter	125									
11/25/91	M. Baxter	125									
11/26/91	M. Baxter	125									
11/27/91	M. Baxter	125					Barely Noticed	Barely Noticed			Hesitates, poor power
12/04/91	Kathy Haylow	125									
12/05/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/06/91	Kathy Haylow	125						Barely Noticed			Always hesitates
12/09/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/10/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/12/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/13/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/16/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/17/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/18/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/19/91	Kathy Haylow	125						Barely Noticed			Hesitates
12/20/91	Kathy Haylow	125						Barely Noticed			Hesitates
01/06/92	Nora Washington	125									
01/07/92	Nora Washington	125									
01/08/92	Chris Snyder	125									
01/09/92	Chris Snyder	125									
01/10/92	Chris Snyder	125									
01/14/92	Chris Snyder	125									
01/15/92	Chris Snyder	125									
01/16/92	Chris Snyder	125									
01/17/92	Chris Snyder	125									
01/21/92	Chris Snyder	125									
01/22/92	Howard Johnson	125									
01/23/92	Howard Johnson	125									
01/24/92	Howard Johnson	125									
01/27/92	Howard Johnson	125									
01/28/92	Howard Johnson	125									
01/29/92	Georgia Epps	125									
01/29/92	Howard Johnson	125									
01/30/92	Howard Johnson	125									
01/31/92	Howard Johnson	125									
02/03/92	Howard Johnson	125									
02/04/92	Howard Johnson	125									
02/05/92	M. Randall	125	Barely Noticed								
02/06/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/07/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/08/92	Georgia Epps	125									
02/10/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/11/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/12/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/13/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/14/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/17/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/29/92	Georgia Epps	125									
02/29/92	M. Randall	125	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Got new times (recaps) <—What? SAM
03/01/92	Georgia Epps	125									
03/02/92	Georgia Epps	125									
03/06/92	Georgia Epps	125									
03/07/92	Georgia Epps	125									
03/09/92	Georgia Epps	125									
03/10/92	Georgia Epps	125									
03/14/92	J. Miller	125									
03/15/92	J. Miller	125									
03/16/92	J. Miller	125									
03/19/92	J. Miller	125									
03/20/92	J. Miller	125	Barely Noticed								
03/21/92	J. Miller	125									
03/22/92	J. Miller	125									
04/02/92	T. Cockrell	125	Noticeable		Noticeable	Barely Noticed	Barely Noticed			Barely Noticed	
04/03/92	T. Cockrell	125	Barely Noticed								
04/04/92	T. Cockrell	125									
08/21/91	Chris Snyder	126			Very Troubled		Barely Noticed	Very Troubled		Barely Noticed	Engine stalls - put new spark plugs & filter
08/26/91	Chris Snyder	126									
08/27/91	Chris Snyder	126									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
08/28/91	Chris Snyder	126									
08/29/91	Chris Snyder	126									
08/30/91	Chris Snyder	126									
09/04/91	M. Baxter	126				Barely Noticed	Noticeable	Very Troubled		Barely Noticed	If at dead stop you must feather accelerator
09/06/91	M. Baxter	126					Barely Noticed	Very Troubled			Engine hesitates on take off
09/09/91	M. Baxter	126									
09/10/91	S. Whitworth	126									
09/10/91	M. Baxter	126									
09/11/91	M. Baxter	126									
09/12/91	S. Whitworth	126									
09/13/91	Kathy Haylow	126									
09/13/91	Vivian Roberts	126									
09/13/91	Vivian Roberts	126	Barely Noticed								
09/16/91	Howard Johnson	126									
09/17/91	Howard Johnson	126									
09/18/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/19/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/20/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/23/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/24/91	M. Randall	126	Noticeable	Noticeable	Very Troubled	Noticeable	Barely Noticed	Very Troubled	Very Troubled	Very Troubleso	Turned off bus @ school - popping sounds
09/24/91		126									Engine won't turn - work order done
09/24/91		126									Replaced spark plugs and fuel filter
09/24/91		126									Also tightened starter wires
09/25/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/26/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Barely Noticed	Barely Noticed	Barely Noticed	Bus bogs down @ 40 mph - no power
09/27/91	M. Randall	126									
09/30/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/01/91	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/02/91	Georgia Epps	126									
10/03/91	Georgia Epps	126									
10/04/91	Georgia Epps	126									
10/07/91	Georgia Epps	126									
10/08/91	Georgia Epps	126									
10/09/91	Georgia Epps	126						Barely Noticed	Barely Noticed		Tightened air compressor
10/10/91	Georgia Epps	126									
10/11/91	Georgia Epps	126									
10/11/91	Howard Johnson	126									
10/14/91	Georgia Epps	126									
10/16/91	J. Miller	126	Barely Noticed								
10/17/91	J. Miller	126	Barely Noticed								
10/18/91	J. Miller	126	Barely Noticed		Barely Noticed		Barely Noticed				
10/22/91	J. Miller	126	Barely Noticed		Very Troubled					Noticeable	
10/22/91	J. Miller	126	Barely Noticed								
10/23/91	J. Miller	126	Barely Noticed								
10/24/91	J. Miller	126									
10/25/91	J. Miller	126	Barely Noticed								
10/28/91	Howard Johnson	126									
10/29/91	J. Miller	126									
10/30/91	S. Whitworth	126									
10/31/91	S. Whitworth	126									
11/01/91	S. Whitworth	126									
11/04/91	M. Baxter	126									
11/06/91	M. Baxter	126									
11/07/91	M. Baxter	126									
11/08/91	M. Baxter	126									
11/11/91	M. Baxter	126									
11/12/91	M. Baxter	126									
11/13/91	Kathy Haylow	126					Barely Noticed	Barely Noticed		Barely Noticed	No power, hesitates
11/14/91	Kathy Haylow	126				Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Slow power - hesitates on take off
11/15/91		126									Brakes drag (some)
11/15/91	Kathy Haylow	126					Barely Noticed	Barely Noticed		Barely Noticed	Hesitates on take-off & slow acceleration
11/15/91	Georgia Epps	126									
11/18/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			Slow pick-up
11/19/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			Hesitates on take-off
11/20/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			Hesitates, no power
11/21/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			Hesitates, no pick-up
11/22/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			No power, hesitates
11/25/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			Hesitates, slow power
11/26/91	Kathy Haylow	126					Barely Noticed	Barely Noticed			Hesitates, poor power
12/02/91	Nora Washington	126	Very Troubled								Tack door will not stay closed - Plus engine is
12/02/91		126									very hard to turn over when it is 30 to 35 degr.

Date	Driver Name	Bus #	Starting Problems: Engine Cold	Starting Problems: Engine Warm	Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
12/02/91		126									Need a front end alignment - Steer wheel wobble
12/03/91	Nora Washington	126	Very Troubled								
12/04/91	Nora Washington	126	Very Troubled								
12/05/91	Nora Washington	126	Very Troubled							Noticeable	
12/06/91	Darlene McKee	126			Very Troubled		Barely Noticed			Barely Noticed	The engine stopped on my first stop and it took me 2 more minutes to restart.
12/06/91		126									
12/06/91	T. Washington	126									
12/09/91	Nora Washington	126									
12/10/91	Carl Phillips	126									
12/11/91	Nora Washington	126									
12/12/91	Nora Washington	126									Bus is pulling to one side on left front wheel
12/12/91	Carl Phillips	126									
12/18/91	Nora Washington	126									No Defrost
12/19/91	Nora Washington	126	Noticeable								Hard to start in morning when Temp = 30 degr.
12/20/91	Nora Washington	126	Noticeable								
01/07/92	Chris Snyder	126									
01/08/92	Howard Johnson	126									
01/09/92	Howard Johnson	126									
01/10/92	Howard Johnson	126									
01/14/92	Howard Johnson	126									
01/15/92	Howard Johnson	126									
01/16/92	Howard Johnson	126									
01/17/92	Howard Johnson	126									
01/21/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/21/92	Howard Johnson	126									
01/22/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/24/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/27/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/28/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/29/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/30/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/31/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/03/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/04/92	M. Randall	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/05/92	Georgia Epps	126									
02/06/92	Georgia Epps	126									
02/07/92	Georgia Epps	126									
02/10/92	S. Whitworth	126									
02/11/92	Georgia Epps	126									
02/13/92	Georgia Epps	126									
02/14/92	Georgia Epps	126									
02/17/92	Georgia Epps	126									
02/17/92	Georgia Epps	126									
02/18/92	Georgia Epps	126									
02/19/92	J. Miller	126									
02/20/92	J. Miller	126									
02/21/92	J. Miller	126									
02/24/92	J. Miller	126									
02/25/92	J. Miller	126									
02/26/92	J. Miller	126	Barely Noticed		Barely Noticed						
02/27/92	J. Miller	126	Barely Noticed								
02/28/92	J. Miller	126									
03/02/92	J. Miller	126									
03/03/92	J. Miller	126	Barely Noticed		Barely Noticed						
03/04/92	T. Washington	126					Noticeable	Barely Noticed	Noticeable	Noticeable	
03/06/92	T. Washington	126	Barely Noticed				Very Troubled	Barely Noticed		Noticeable	
03/09/92	T. Washington	126	Barely Noticed				Very Troubled	Barely Noticed		Noticeable	
03/10/92	Louise Walker	126	Very Troubled	Very Troubled	Very Troubled	Very Troubled	Noticeable	Very Troubled	Noticeable	Very Troublesome	
03/15/92	Kim Guinn	126	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Barely Noticed	Barely Noticed	Barely Noticed	No Acceleration - bus handles well otherwise
03/25/92	S.J.	126				Barely Noticed		Barely Noticed			
08/29/91	M. Baxter	127									
08/30/91	M. Baxter	127				Noticeable					Engine idle raises up and down when barely giving gas (probably just cold). <Choke out>
08/30/91		127									
09/03/91	M. Baxter	127									
09/04/91	M. Randall	127									
09/05/91	M. Randall	127									
09/06/91	M. Randall	127								Barely Noticed	
09/09/91	M. Randall	127						Barely Noticed	Barely Noticed	Noticeable	Brakes need to be checked
09/10/91	M. Randall	127					Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/11/91	M. Randall	127						Barely Noticed	Barely Noticed	Barely Noticed	
09/12/91	M. Randall	127				Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
09/13/91	M. Randall	127				Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/16/91	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/17/91	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
09/18/91	Georgia Epps	127									
09/19/91	Georgia Epps	127									
09/20/91	Georgia Epps	127									
09/23/91	Georgia Epps	127									
09/24/91	Georgia Epps	127									
09/27/91	Georgia Epps	127									
09/27/91	Georgia Epps	127						Noticeable			Bus Hesitates - at red light wants to die out
09/30/91	Suzanne Goodbod	127									
10/01/91	Georgia Epps	127									
10/01/91	M. Baxter	127									
10/02/91	J. Miller	127									
10/03/91	J. Miller	127									
10/04/91	J. Miller	127									
10/07/91	J. Miller	127									
10/08/91	J. Miller	127	Barely Noticed								
10/09/91	J. Miller	127	Barely Noticed								
10/10/91	J. Miller	127	Noticeable								
10/11/91	J. Miller	127	Barely Noticed								
10/14/91	Vivian Roberts	127									
10/15/91	J. Miller	127									
10/15/91	M. Baxter	127									
10/16/91	M. Baxter	127									
10/17/91	M. Baxter	127									
10/18/91	M. Baxter	127									
10/22/91	M. Baxter	127									
10/23/91	M. Baxter	127									
10/23/91	M. Baxter	127									
10/24/91	M. Baxter	127									
10/25/91	M. Baxter	127									
10/27/91	S. Whitworth	127	Barely Noticed								
10/29/91	S. Whitworth	127	Barely Noticed								
10/30/91	Kathy Haylow	127			Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Uneven acceleration - has power, runs bad.
10/31/91	Kathy Haylow	127			Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Bus runs bad, poor acceleration
11/01/91	Kathy Haylow	127			Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Runs bad - has power, but acceleration is poor
11/04/91	Kathy Haylow	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Brakes grab & runs rough - uneven acceleration
11/05/91	Kathy Haylow	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Runs rough - poor acceleration, brakes drag
11/06/91	Kathy Haylow	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Poor acceleration, brakes drag
11/07/91	Kathy Haylow	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Poor acceleration, brakes drag
11/08/91	Kathy Haylow	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Poor acceleration, brakes drag
11/11/91	S. Whitworth	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Poor power, brakes drag
11/12/91	Kathy Haylow	127	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed		Barely Noticed	Very poor power, brakes drag, runs rough
11/13/91	Nora Washington	127		Very Troubled	Noticeable						Brakes knock and scream. Hard to start in cold
11/13/91		127									weather. Back-up buzzer gone out.
11/14/91	Nora Washington	127	Noticeable	Noticeable							Brakes are knocking. Back-up buzzer is out
11/15/91		127									Brakes are screaming real bad.
11/15/91	Nora Washington	127	Noticeable	Noticeable						Noticeable	Brakes are knocking. Back-up buzzer is out
11/18/91	Nora Washington	127								Noticeable	Brakes are knocking. Scream real loud when hot
11/19/91	Nora Washington	127								Very Noticeabl	Brakes are knocking. Scream real loud when hot
11/20/91	Nora Washington	127							Noticeable		
11/21/91	Nora Washington	127	Noticeable						Noticeable		
11/22/91	Nora Washington	127									
11/25/91	Nora Washington	127	Very Troubled								
11/26/91	Nora Washington	127									
11/27/91	Nora Washington	127	Very Troubled								
12/02/91	Chris Snyder	127									
12/03/91	Chris Snyder	127									
12/04/91	Chris Snyder	127									
12/07/91	Vivian Roberts	127	Very Troubled		Very Troubled	Noticeable	Barely Noticed	Very Troubled		Noticeable	Engine doesn't turn over on 1st start. Engine
12/07/91		127									dies at first stop--several days now. Sluggish
12/09/91	Chris Snyder	127									
12/10/91	Chris Snyder	127									
12/11/91	Chris Snyder	127									
12/12/91	Chris Snyder	127									
12/13/91	Chris Snyder	127					Barely Noticeable				Acceleration a little rough
12/16/91	Chris Snyder	127					Barely Noticed				Hesitates a little when accelerate
12/17/91	Chris Snyder	127					Barely Noticed				Hesitates a little when accelerate
12/18/91	Vivian Roberts	127									
12/19/91	Chris Snyder	127					Barely Noticed	Barely Noticed			Hesitates when you accelerate a little

Date	Driver Name	Bus #	Starting Problems				Accel. Problems	Hesitates, Stutters,	Engine Knock	Overall	Comments
			Engine Cold	Engine Warm	Engine Stalls	Idle Rough	(no power)	or Backfires	or Ping	Performance	
12/20/91	Chris Snyder	127					Barely Noticed	Barely Noticed			Hesitates when you accelerate a little
01/06/92	Howard Johnson	127									
01/07/92	Howard Johnson	127									
01/08/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/09/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/10/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/14/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/15/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Had no heat during evening run
01/16/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	
01/22/92	Georgia Epps	127									
01/24/92	Georgia Epps	127									
01/27/92	Georgia Epps	127									
01/27/92	Georgia Epps	127									
01/27/92	M. Randall	127	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/28/92	Georgia Epps	127									
01/29/92	Georgia Epps	127									
01/30/92	Georgia Epps	127									
01/30/92	Georgia Epps	127									
02/03/92	Georgia Epps	127									
02/04/92	Georgia Epps	127									
02/05/92	J. Miller	127									
02/06/92	Darlene McKee	127									
02/07/92	Darlene McKee	127									
02/10/92	J. Miller	127									
02/11/92	J. Miller	127	Barely Noticed								
02/12/92	J. Miller	127									
02/13/92	J. Miller	127	Barely Noticed								
02/14/92	J. Miller	127	Barely Noticed								
02/17/92	J. Miller	127	Barely Noticed								
02/18/92	J. Miller	127	Barely Noticed								
02/19/92	T. Washington	127					Noticeable	Noticeable		Noticeable	
03/02/92	T. Washington	127					Noticeable	Noticeable		Noticeable	Backfires. Bus had no power after 1st gear
03/03/92	T. Washington	127									
03/04/92	Kathy Haylow	127									Shakes at 40 mph
03/05/92	Kathy Haylow	127									Shakes at 40 mph
03/06/92	Kathy Haylow	127									Shakes at 40 mph
03/09/92	Kim Guinn	127									
03/23/92	Nora Washington	127									
03/24/92	Nora Washington	127				Noticeable					
03/24/92	Nora Washington	127				Noticeable					Bus has a bad rattling in it, is very noticeable
03/26/92	Howard Johnson	127									
03/27/92	Howard Johnson	127									
08/21/91	M. Randall	128	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Speedometer out. Noise under floor under drive
03/28/92	M. Randall	128									
08/26/91	D. Roberson	128									
08/27/91	D. Roberson	128									
08/29/91	S. Whitworth	128	Noticeable	Barely Noticeable							
08/30/91	S. Whitworth	128	Noticeable	Barely Noticeable							
09/03/91	Fay Lewis	128									
09/05/91	Georgia Epps	128									
09/06/91	Georgia Epps	128									
09/09/91	Georgia Epps	128								Noticeable	A knock under the hood
09/11/91	Georgia Epps	128									
09/11/91	Georgia Epps	128									
09/12/91	Georgia Epps	128									
09/13/91	Georgia Epps	128									
09/16/91	Georgia Epps	128									
09/17/91	Vivian Roberts	128				Noticeable				Noticeable	Bumby ride – may be shocks
09/17/91	Georgia Epps	128									
09/20/91	Vivian Roberts	128				Barely Noticed					Oil was quart low. Added oil and water
09/21/91	Georgia Epps	128									
09/23/91	J. Miller	128									
09/24/91	Vivian Roberts	128								Noticeable	Knock in left front of engine
09/25/91	Vivian Roberts	128							Noticeable		
09/26/91	Vivian Roberts	128							Barely Noticed		
09/27/91	Vivian Roberts	128					Noticeable			Barely Noticed	Brakes are squeaky
09/30/91	J. Miller	128									
10/01/91	J. Miller	128									
10/02/91	M. Baxter	128									
10/02/91	M. Baxter	128									
10/04/91	Fay Lewis	128					Noticeable				

Date	Driver Name	Bus #	Starting Problems: Engine Cold	Starting Problems: Engine Warm	Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
10/07/91	Fay Lewis	128									
10/08/91	Fay Lewis	128									
10/09/91	Fay Lewis	128	Noticeable	Noticeable							
10/10/91	Fay Lewis	128									
10/10/91	M. Baxter	128									
10/10/91	M. Baxter	128									
10/14/91	T. Washington	128	Barely Noticed			Barely Noticed		Barely Noticed		Barely Noticed	
10/15/91	M. Baxter	128									
10/15/91	M. Baxter	128									
10/16/91	Georgia Epps	128									
10/16/91	Kathy Haylow	128									
10/17/91	Kathy Haylow	128									
10/18/91	Kathy Haylow	128	Barely Noticed								
10/21/91	Kathy Haylow	128					Barely Noticed				Hesitates when taking off
10/22/91	T. Alexander	128	Barely Noticed								Brakes Grab
10/23/91	Kathy Haylow	128	Barely Noticed								Brakes grab as you take off
10/24/91	Kathy Haylow	128	Barely Noticed								Brakes grab as you take off
10/25/91	Kathy Haylow	128	Barely Noticed								Brakes grab as you take off
10/28/91	Kathy Haylow	128	Barely Noticed								Brakes grab as you take off
10/29/91	Kathy Haylow	128	Barely Noticed								Brakes grab as you take off
10/30/91		128									Brakes are pulling to one side
10/30/91	Nora Washington	128								Very Troubled	Knock under the bus under the foot pedal.
10/31/91	Nora Washington	128								Very Troubled	Bus has wobbly back left tire. Brakes are screaming, still pulling, still a knock under
10/31/91		128									the driver's side
10/31/91		128									
11/01/91	Nora Washington	128								Very Troubled	Bus has wobbly back left tire. Still a knock under the hood
11/01/91		128									
11/04/91	Nora Washington	128		Noticeable							Engine hard to start when cold. Leak in floor under driver's foot & gas pedal
11/04/91		128									
11/05/91	M. Baxter	128									
11/06/91	Nora Washington	128		Noticeable							Hard to start when cold. Hood knocks
11/08/91	Nora Washington	128	Noticeable							Noticeable	Hood is vibrating
11/09/91	Nora Washington	128									
11/11/91	Nora Washington	128								Noticeable	Hood is vibrating
11/12/91	Nora Washington	128									
11/13/91	Chris Snyder	128									
11/14/91	Chris Snyder	128									
11/15/91	Chris Snyder	128									
11/18/91	Chris Snyder	128									
11/19/91	Chris Snyder	128									
11/20/91	Chris Snyder	128									
11/21/91	Chris Snyder	128									
11/22/91	Chris Snyder	128									
11/25/91	Chris Snyder	128									
11/26/91	Chris Snyder	128									
11/27/91	Chris Snyder	128									
12/02/91	Howard Johnson	128									
12/03/91	Howard Johnson	128									
12/04/91	Howard Johnson	128									
12/05/91	Howard Johnson	128									
12/06/91	Howard Johnson	128									
12/09/91	Howard Johnson	128									
12/10/91	Howard Johnson	128									
12/11/91	Howard Johnson	128									
12/12/91	Howard Johnson	128									
12/13/91	Howard Johnson	128									
12/16/91	Howard Johnson	128									
12/17/91	Howard Johnson	128									
12/18/91	Howard Johnson	128									
12/19/91	Howard Johnson	128									
12/20/91	Howard Johnson	128									
01/06/92	M. Randall	128	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/07/92	M. Randall	128	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/08/92	Georgia Epps	128									
01/09/92	Georgia Epps	128									
01/10/92	Georgia Epps	128									
01/14/92	S. Goodbody	128									
01/15/92	Georgia Epps	128									
01/16/92	Georgia Epps	128									
01/17/92	Georgia Epps	128									
01/21/92	Georgia Epps	128									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
01/22/92	J. Miller	128	Barely Noticed								
01/23/92	J. Miller	128	Barely Noticed								
01/24/92	J. Miller	128	Barely Noticed								
01/27/92	Darlene McKee	128									
01/28/92	J. Miller	128	Barely Noticed								
01/30/92	J. Miller	128	Barely Noticed								
01/31/92	J. Miller	128	Barely Noticed								
02/03/92	J. Miller	128									
02/04/92	Darlene McKee	128									
02/05/92	T. Washington	128									
02/06/92	T. Washington	128									
02/07/92	T. Washington	128									
02/10/92	T. Washington	128	Barely Noticed						Noticeable	Barely Noticed	Bus is making a hissing noise
02/11/92	T. Washington	128									
02/12/92	T. Washington	128									
02/13/92	T. Washington	128									
02/14/92	E. Paredez	128									
02/17/92	Smiciklas	128	Noticeable								Brakes squeek a lot when you take off and when
02/17/92		128									moving. Sounds like emergency brake is on
02/18/92	T. Washington	128									
02/19/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/20/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/21/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/24/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/25/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/26/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/27/92	Kathy Haylow	128						Noticeable			Hesitates a lot
02/28/92	Kathy Haylow	128						Noticeable			Hesitates a lot
03/02/92	Kathy Haylow	128						Noticeable			Hesitates a lot
03/03/92	Kathy Haylow	128						Noticeable			Hesitates a lot
03/04/92	Nora Washington	128									
03/06/92	Nora Washington	128									
03/09/92	Nora Washington	128									
03/10/92	Kim Guinn	128			Engine Stalls						
03/10/92	Nora Washington	128									
03/11/92	Nora Washington	128									
03/12/92	Nora Washington	128									
03/13/92	Nora Washington	128									
03/23/92	Chris Snyder	128									
03/24/92	Chris Snyder	128									
03/25/92	Chris Snyder	128									
03/27/92	J. Miller	128									
03/30/92	J. Miller	128									
03/31/92	J. Miller	128									
04/01/92	J. Miller	128									
04/02/92	J. Miller	128									
04/03/92	J. Miller	128									
04/06/92	J. Miller	128									
04/07/92	J. Miller	128									
04/08/92	J. Miller	128									
04/09/92	J. Miller	128									
04/11/92	J. Miller	128									
04/12/92	J. Miller	128									
04/15/92	J. Miller	128									
04/16/92	J. Miller	128									
04/21/92	J. Miller	128									
04/22/92	J. Miller	128									
04/23/92	J. Miller	128									
08/21/91	Georgia Epps	129	Barely Noticed								
08/22/91	Georgia Epps	129	Barely Noticed				Barely Noticed				
08/22/91	Georgia Epps	129	Barely Noticed		Barely Noticed					Barely Noticed	Bus stops at intersections when cold
08/26/91	Georgia Epps	129	Barely Noticed								
08/27/91	Georgia Epps	129									
08/28/91	Georgia Epps	129									
08/29/91	Georgia Epps	129									
08/29/91	Georgia Epps	129									Sometimes stops @ intersections when cold.
08/29/91		129									Otherwise, runs very good
09/02/91	Georgia Epps	129									
09/04/91	J. Miller	129									
09/05/91	J. Miller	129			Noticeable						
09/06/91	J. Miller	129									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
09/09/91	J. Miller	129									
09/10/91	J. Miller	129	Barely Noticed					Barely Noticed			
09/11/91	J. Miller	129	Barely Noticed								
09/12/91	Fay Lewis	129									
09/13/91	Fay Lewis	129	Very Troubled	Noticeable				Barely Noticed			
09/16/91	Darlene McKee	129								Noticeable	Transmission shifts sooner than should.
09/16/91		129									Gears slipping - has a hard time shifting.
09/17/91	Darlene McKee	129								Noticeable	Transmission
09/18/91	Fay Lewis	129					Barely Noticed				
09/19/91	Fay Lewis	129	Noticeable			Barely Noticed					
09/20/91	D. Roberson	129									
09/23/91		129									
09/23/91	Fay Lewis	129	Noticeable								
09/25/91	Fay Lewis	129									
09/26/91	Fay Lewis	129									
09/27/91	Fay Lewis	129									
09/30/91	Fay Lewis	129									
10/01/91	M. Baxter	129									
10/03/91	Kathy Haylow	129									
10/04/91	Kathy Haylow	129									
10/07/91	Kathy Haylow	129	Noticeable								Takes longer to start when cold
10/08/91	Kathy Haylow	129	Noticeable								Takes longer to start when cold
10/09/91	Kathy Haylow	129	Noticeable								Takes longer to start when cold
10/10/91	Kathy Haylow	129	Noticeable								Takes longer to start when cold
10/15/91	Kathy Haylow	129	Noticeable								Takes longer to start when cold
10/16/91	Nora Washington	129									Brakes pull to left
10/17/91	Nora Washington	129									Brakes pull to left
10/21/91	Nora Washington	129									Amber light sticks
10/22/91	Nora Washington	129									
10/24/91	T. Washington	129									
10/24/91	Nora Washington	129									Brakes pulling to left. Brakes act like they
10/24/91		129									don't want to stop @ about 55 mph
10/28/91	Nora Washington	129									Brakes pulling to left
10/29/91	Nora Washington	129								Very Troubleso	Brakes screaming
10/30/91	Chris Snyder	129									
10/31/91	Chris Snyder	129									
11/01/91	Chris Snyder	129									
11/04/91	Chris Snyder	129									Bus pulls to left
11/04/91	Nora Washington	129	Noticeable							Very Troubleso	Hard to start when cold
11/05/91	Chris Snyder	129									
11/06/91	Chris Snyder	129									
11/07/91	Chris Snyder	129									
11/08/91	Chris Snyder	129									
11/11/91	Chris Snyder	129									
11/12/91	Chris Snyder	129									
11/13/91	Harold Johnson	129									
11/14/91	Harold Johnson	129									
11/15/91	Harold Johnson	129									
11/18/91	Harold Johnson	129									
11/19/91	Harold Johnson	129									
11/20/91	Harold Johnson	129									
11/21/91	Harold Johnson	129									
11/22/91	Harold Johnson	129									
11/25/91	Harold Johnson	129									
11/26/91	Harold Johnson	129									
11/27/91	Harold Johnson	129									
12/02/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/03/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/04/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/05/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Bus pulls to the left. Bad steering
12/06/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	
12/09/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Brakes pull to the left
12/10/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/11/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Still pulls to left
12/12/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Very Troubleso	Bus pulls to left - needs alignment
12/13/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Heater broken
12/14/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Gas tank read 1/2 full when it was filled up
12/14/91		129									less than 24 hours before
12/16/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/17/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/18/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
12/19/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
12/20/91	M. Randall	129	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
01/06/92	Georgia Epps	129									
01/07/92	Georgia Epps	129									
01/09/92	J. Miller	129									
01/10/92	Kim Guinn	129									
01/14/92	J..Miller	129									
01/16/92	J. Miller	129	Noticeable								
01/17/92	J. Miller	129	Noticeable	Barely Noticed	Barely Noticed						
01/21/92	J. Miller	129	Noticeable	Barely Noticed							
01/22/92	M. Baxter	129									
01/23/92	M. Baxter	129									
01/24/92	M. Baxter	129									
01/27/92	M. Baxter	129									
01/28/92	M. Baxter	129									
01/29/92	M. Baxter	129									
01/30/92	M. Baxter	129									
01/31/92	M. Baxter	129									
02/03/92	M. Baxter	129									
02/04/92	M. Baxter	129									
02/05/92	Kathy Haylow	129						Barely Noticed			Hesitates some
02/06/92	Kathy Haylow	129						Barely Noticed			Hesitates
02/07/92	Kathy Haylow	129						Barely Noticed			Hesitates
02/10/92	S. Goodbody	129									
02/11/92	Kathy Haylow	129						Barely Noticed			Hesitates a little
02/12/92	Kathy Haylow	129						Barely Noticed			Hesitates a little
02/13/92	Kathy Haylow	129						Barely Noticed			Hesitates a little
02/14/92	Kathy Haylow	129						Barely Noticed			Hesitates a little
02/17/92	Smiciklas	129									
02/17/92	Kathy Haylow	129						Barely Noticed			Hesitates a little
02/18/92	Nora Washington	129									
02/18/92	Kathy Haylow	129						Barely Noticed			Hesitates a little
02/20/92	Nora Washington	129									
02/20/92	Nora Washington	129									
02/24/92	Nora Washington	129									
02/25/92	Nora Washington	129									Brakes pulling to left in front
02/25/92	Nora Washington	129									
02/27/92	Nora Washington	129									
02/28/92	Smiciklas	129									Lot of smoke coming out of tailpipe
03/02/92	Nora Washington	129									
03/03/92	Nora Washington	129									
03/04/92	Nora Washington	129									
03/04/92	Chris Snyder	129									
03/05/92	Chris Snyder	129									
03/06/92	Chris Snyder	129									
03/09/92	Chris Snyder	129									
03/10/92	Chris Snyder	129									
03/11/92	Chris Snyder	129									
03/12/92	C. Bell	129									
03/23/92	Howard Johnson	129									
03/24/92	Howard Johnson	129									
03/27/92	T. Cockrell	129									
03/30/92	T. Cockrell	129									
03/31/92	T. Cockrell	129									
04/01/92	T. Cockrell	129									
04/02/92	T. Cockrell	129									
04/03/92	T. Cockrell	129									
04/05/92	T. Cockrell	129									
04/05/92	T. Cockrell	129									
04/06/92	T. Cockrell	129									
04/07/92	T. Cockrell	129									
04/08/92	T. Cockrell	129									
04/11/92	T. Cockrell	129									
04/12/92	T. Cockrell	129									
04/15/92	T. Cockrell	129									
04/16/92	T. Cockrell	129									
04/20/92	T. Cockrell	129									
04/21/92	T. Cockrell	129									
04/22/92	T. Cockrell	129									
04/23/92	T. Cockrell	129									
04/25/92	T. Cockrell	129									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
11/25/91	M. Randall	130	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Noticeable	Noticeable	Noticeable	Bus runs very rough. No power up to 40 mph
11/26/91	S. Goodbody	130	Barely Noticed		Very Troubled	Very Troubled	Very Troubled	Very Troubled	Very Troubled	Noticeable	Loud noise when let off of gas.
12/15/91	Georgia Epps	130									
12/16/91	Georgia Epps	130									
12/18/91	Georgia Epps	130									
12/19/91	Georgia Epps	130									
01/06/92	J. Miller	130					Barely Noticed			Barely Noticed	
01/07/92	J. Miller	130					Barely Noticed			Barely Noticed	
01/08/92	M. Baxter	130									
01/09/92	M. Baxter	130									
01/10/92	M. Baxter	130									
01/14/92	M. Baxter	130									
01/15/92	M. Baxter	130									
01/16/92	M. Baxter	130									
01/16/92	M. Baxter	130									
01/21/92	M. Baxter	130									
01/22/92	Kathy Haylow	130								Noticeable	
01/23/92	Kathy Haylow	130									
01/24/92	T. Washington	130									
01/24/92	Kathy Haylow	130									Gas hard to work
01/28/92	Kathy Haylow	130									Gas hard to work
01/30/92	Kathy Haylow	130									Gas hard to work
01/31/92	Kathy Haylow	130									Gas hard to work
02/03/92	Kathy Haylow	130									Gas hard to work
02/04/92	Kathy Haylow	130									Gas hard to work
02/05/92	Nora Washington	130				Very Trouble					Bus runs rough. Oil leak, moves too slow,
02/05/92		130									brakes pull to one side
02/06/92	Nora Washington	130									
02/07/92	Nora Washington	130					Very Troubled				
02/10/92		130									Smells like burning oil.
02/10/92	Nora Washington	130				Very Trouble	Very Troubled			Noticeable	Engine knock. Engine seems too loud. Water
02/10/92		130									leak under hood coming from a silver pipe.
02/11/92	Nora Washington	130					Noticeable	Noticeable			Loud and has acceleration problems
02/12/92	Nora Washington	130					Very Troubled	Noticeable			No power
02/13/92	Nora Washington	130					Very Troubled				Bus gets good gas mileage
02/14/92	Nora Washington	130								Very Troublesome	
02/17/92	Nora Washington	130								Very Troublesome	
02/18/92	Darlene McKee	130									
02/21/92	Chris Snyder	130									
02/24/92	Chris Snyder	130									
01/07/91	M. Baxter	131									Makes noise and acceleration stinks. Also
01/07/91		131									pressure gauge under hood needs testing.
01/07/91		131									While filling it stayed on 2300 lbs for 5 min.
09/09/91	Kathy Haylow	131					Noticeable				Slow pick-up
09/11/91	Kathy Haylow	131					Noticeable			Noticeable	Slow pick-up
09/12/91	Kathy Haylow	131									
09/13/91	Kathy Haylow	131					Noticeable				Slow pick-up
09/16/91	Kathy Haylow	131					Noticeable			Noticeable	Slow pick-up
09/17/91	Kathy Haylow	131					Noticeable				
09/18/91	D. Roberson	131									
09/19/91	Nora Washington	131					Noticeable				Hissing noise under gas pedal
09/19/91	Nora Washington	131									No good on take-off, especially on freeway
09/20/91	Nora Washington	131									Slow getting on freeway, even when pedal is to
09/20/91		131									the floor. Recommend no field trip on this bus
09/23/91	Nora Washington	131					Very Troubled			Noticeable	Hissing noise when pressing gas pedal
09/24/91	Nora Washington	131									
09/24/91	Nora Washington	131					Very Troubled			Very Troubleso	Slow on take-off. Hissing in engine. Bogs down
09/24/91		131									around 48 to 51 mph
09/25/91	Howard Johnson	131									
09/25/91	Nora Washington	131					Very Troubled				Bus bogs down @ 44 - 50 mph. Slow take off.
09/25/91		131									Engine hissing occurs right before gears shift
09/25/91		131									then it stops after gear shift occurs
09/26/91	Cecil Phillips	131					Very Troubled				Hissing sound. Acceleration really a problem.
09/26/91	Nora Washington	131					Very Troubled	Very Troubled		Very Troubleso	Bus acts like it doesn't want to run after you
09/26/91		131									put gas in it. Bogs down. Hissing noise.
09/27/91	Nora Washington	131					Very Troubled	Very Troubled			Engine hesitates after fill-up. Still hissing
09/30/91	Nora Washington	131					Very Troubled	Very Troubled		Noticeable	Engine hesitates after fill-up. Still hissing
10/01/91	Nora Washington	131					Very Troubled	Very Troubled		Noticeable	Wouldn't recommend a field trip on this bus
10/03/91	Chris Snyder	131					Very Troubled			Barely Noticed	No power. Hissing noise coming from rear
10/04/91	Chris Snyder	131					Very Troubled				No power. Hissing noise coming from rear
10/07/91	Chris Snyder	131					Noticeable				Hissing noise

Date	Driver Name	Bus #	Starting Problems: Engine Cold	Starting Problems: Engine Warm	Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
10/08/91	Chris Snyder	131					Noticeable				No power. Hissing noise coming from rear
10/09/91	Kathy Haylow	131					Very Troubled	Noticeable		Noticeable	Very slow take off
10/09/91	Chris Snyder	131					Noticeable				Very little power. Hissing noise
10/10/91	Chris Snyder	131					Noticeable				Very little power. Hissing noise in rear
10/11/91	Chris Snyder	131					Noticeable				Very little power
10/14/91	Chris Snyder	131					Noticeable				Very little power
10/15/91	Chris Snyder	131									
10/16/91	Howard Johnson	131									
10/17/91	Howard Johnson	131									
10/18/91	Howard Johnson	131									
10/21/91	Howard Johnson	131									
10/22/91	Howard Johnson	131									
10/23/91	Howard Johnson	131									
10/24/91	Howard Johnson	131									
10/25/91	Howard Johnson	131									
10/28/91	Howard Johnson	131									
10/29/91	Howard Johnson	131									
10/30/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/31/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Noticeable	Barely Noticed	Noticeable	Bus broke down. Popping noise in rear.
11/01/91	M. Randall	131	Barely Noticed	Barely Noticed	Noticeable		Barely Noticed	Barely Noticed	Noticeable	Noticeable	Hoses - usually sound from under the hood
11/01/91		131									Engine cut off during p.m. run
11/05/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
11/05/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Very Troubled	Very Troubled	Very Troublesome	Bus was vibrating badly and cut off at school
11/06/91	M. Randall	131	Noticeable	Barely Noticed		Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Bus died on a.m. run twice
11/07/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
11/08/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
11/11/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
11/12/91	M. Randall	131	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
11/13/91	Georgia Epps	131									
11/14/91	Georgia Epps	131									
11/15/91	T. Washington	131									
11/18/91	Darlene McKee	131			Noticeable					Barely Noticed	Stalled out once but re-started immediately
11/19/91	Darlene McKee	131			Barely Noticed						
11/20/91	Darlene McKee	131									
11/21/91	Darlene McKee	131	Very Troubled		Very Troubled					Very Troublesome	Quit running and didn't re-start for 5 min.
11/22/91	Darlene	131									
11/25/91	Darlene McKee	131									
11/26/91	Darlene McKee	131									
11/27/91	Georgia Epps	131									
12/02/91	J. Miller	131	Barely Noticed		Noticeable	Barely Noticed	Barely Noticed			Barely Noticed	
12/03/91	J. Miller	131	Noticeable		Noticeable				Barely Noticed	Barely Noticed	Bus jerks when stopping. Stalled 3 times
12/03/91		131									Will not start when cold
12/04/91	J. Miller	131	Noticeable		Noticeable				Barely Noticed	Barely Noticed	Bus stopped 2 times. All kinds of noise, jerky
12/04/91		131									motions when stopping or down inclines
12/05/91	J. Miller	131	Very Troubled		Noticeable				Barely Noticed	Barely Noticed	
12/06/91	J. Miller	131	Barely Noticed		Barely Noticed				Barely Noticed	Barely Noticed	Constant loud noise
12/09/91	J. Miller	131	Barely Noticed			Barely Noticed				Barely Noticed	
12/10/91	J. Miller	131	Barely Noticed			Barely Noticed				Barely Noticed	
12/11/91	Darlene McKee	131									
12/12/91	Darlene McKee	131									
12/13/91	J. Miller	131									
12/16/91	J. Miller	131	Barely Noticed		Barely Noticed					Barely Noticed	Engine stalls - needs longer warming time
12/17/91	J. Miller	131									
12/18/91	J. Miller	131	Very Troubled	Noticeable	Very Troubled	Barely Noticed	Barely Noticed	Barely Noticed	Very Troubled	Very Troublesome	
12/19/91	J. Miller	131	Noticeable		Very Troubled			Noticeable	Noticeable	Noticeable	
12/20/91	J. Miller	131									
01/06/92	M. Baxter	131				Barely Noticed	Barely Noticed			Noticeable	Noises when you let off gas
01/07/92	M. Baxter	131									
01/08/92	Kathy Haylow	131				Barely Noticed	Barely Noticed				Has no power and idles rough
01/09/92	Kathy Haylow	131				Barely Noticed	Barely Noticed				Has no power and idles rough
01/10/92	Kathy Haylow	131				Barely Noticed	Barely Noticed				Has no power and idles rough
01/14/92	Kathy Haylow	131	Barely Noticed			Barely Noticed	Barely Noticed				Takes a while to start when cold. Also runs
01/14/92		131									rough with no power
01/15/92	Kathy Haylow	131	Barely Noticed			Barely Noticed	Barely Noticed				Takes a while to start when cold. Also runs
01/15/92		131									rough with no power
01/16/92	Kathy Haylow	131	Barely Noticed			Barely Noticed	Barely Noticed				Takes a while to start when cold. Also runs
01/16/92		131									rough with no power
01/17/92	Kathy Haylow	131	Barely Noticed			Barely Noticed	Barely Noticed				Takes a while to start when cold. Also runs
01/17/92		131									rough with no power
01/22/92	Darlene	131								Barely Noticed	Not accl. fast enough to shift to another gear
01/23/92	Diana Gomez	131									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
01/23/92	Darlene	131									
01/28/92	Nora Washington	131					Very Troubled				
01/29/92	Nora Washington	131					Very Troubled				
01/30/92	Nora Washington	131					Very Troubled				No take-off power
01/31/92	Nora Washington	131					Very Troubled				
02/03/92	Nora Washington	131					Very Troubled				Problem with the gas guage
02/07/92	Chris Snyder	131									
02/10/92	Chris Snyder	131									
02/11/92	Chris Snyder	131									
02/12/92	Chris Snyder	131									
02/13/92	Chris Snyder	131									
02/14/92	Chris Snyder	131									
02/17/92	Chris Snyder	131									
02/18/92	Chris Snyder	131									
02/19/92	Howard Johnson	131					Noticeable				
02/20/92	Howard Johnson	131					Noticeable				
02/21/92	Howard Johnson	131					Noticeable				
02/24/92	Howard Johnson	131					Noticeable				
02/25/92	Howard Johnson	131					Noticeable				
02/26/92	Howard Johnson	131									
02/27/92	Howard Johnson	131			Very Troubled			Very Troubled			Hard to restart
02/28/92	Howard Johnson	131									
03/02/92	Howard Johnson	131									
08/21/91	Pam Eables	132									Transmission shifting
03/03/92	Kathy Haylow	132									
08/26/91	Kathy Haylow	132									
08/27/91	Kathy Haylow	132									
08/28/91	Kathy Haylow	132									
08/29/91	Kathy Haylow	132									
08/30/91	Kathy Haylow	132									
09/04/91	Nora Washington	132									Brakes pull left and drag
09/05/91	Nora Washington	132									
09/10/91	Nora Washington	132									
09/11/91	Nora Washington	132									
09/12/91	Nora Washington	132									
09/13/91	Nora Washington	132									
09/16/91	Nora Washington	132									
09/17/91	Nora Washington	132									
09/18/91	Chris Snyder	132									
09/19/91	Chris Snyder	132									
09/20/91	Chris Snyder	132									
09/23/91	Chris Snyder	132									
09/25/91	Chris Snyder	132									
09/26/91	Chris Snyder	132									
09/27/91	Chris Snyder	132									
09/30/91	Chris Snyder	132									
10/01/91	Chris Snyder	132									
10/02/91	Howard Johnson	132									
10/03/91	Howard Johnson	132									
10/04/91	Howard Johnson	132									
10/07/91	Howard Johnson	132									
10/08/91	Howard Johnson	132									
10/09/91	Howard Johnson	132									
10/10/91	Howard Johnson	132									
10/14/91	Howard Johnson	132									
10/15/91	Howard Johnson	132									
10/16/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Noticeable	Noticeable	Barely Noticed	Barely Noticed	Bus has no accel. power. Can't hold heavy load
10/17/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Noticeable	Noticeable	Barely Noticed	Barely Noticed	
10/21/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Noticeable	Barely Noticed	Barely Noticed	Barely Noticed	Bus has no acceleration or power when full
10/22/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/23/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/24/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/25/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/28/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Smell coming from propane gas station. Checked by mechanic and said to be O.K.
10/28/91		132									
10/29/91	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
10/30/91	Georgia Epps	132									
10/31/91	Georgia Epps	132									
11/01/91	Georgia Epps	132									
11/04/91	Georgia Epps	132									
11/05/91	Georgia Epps	132									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
11/06/91	Georgia Epps	132									
11/07/91	Georgia Epps	132									
11/08/91	Georgia Epps	132									
11/11/91	Georgia Epps	132									
11/13/91	J. Miller	132									
11/14/91	J. Miller	132									
11/15/91	J. Miller	132									
11/18/91	J. Miller	132									
11/19/91	J. Miller	132									
11/20/91	J. Miller	132									
11/21/91	J. Miller	132									
11/22/91	J. Miller	132									
11/25/91	J. Miller	132									
11/26/91	J. Miller	132									
11/27/91	J. Miller	132									
12/02/91	M. Baxter	132									
12/04/91	M. Baxter	132									
12/04/91	M. Baxter	132									
12/05/91	M. Baxter	132									
12/06/91	M. Baxter	132									
12/09/91	M. Baxter	132									
12/10/91	M. Baxter	132									
12/11/91	M. Baxter	132									
12/12/91	M. Baxter	132									
12/13/91	M. Baxter	132									
12/16/91	M. Baxter	132									
12/17/91	M. Baxter	132									
12/18/91	M. Baxter	132									
12/19/91	M. Baxter	132									
12/20/91	M. Baxter	132									
01/07/92	Kathy Haylow	132	Barely Noticed								A little hard to keep started when cold
01/08/92	Nora Washington	132									Gas guage not working properly
01/09/92	Nora Washington	132									
01/10/92	Kim Guinn	132									
01/10/92	Nora Washington	132									
01/14/92	Nora Washington	132									
01/15/92	Nora Washington	132								Noticeable	Possible gas tank leak
01/16/92	Nora Washington	132									
01/17/92	Nora Washington	132									Gas gauge broken
01/22/92	Chris Snyder	132									
01/23/92	Chris Snyder	132									
01/24/92	Chris Snyder	132									
01/24/92	S. Whitworth	132									
01/27/92	Chris Snyder	132									
01/28/92	Chris Snyder	132									
01/29/92	Chris Snyder	132									
01/30/92	Diana G.	132									
02/03/92	Chris Snyder	132									
02/04/92	Chris Snyder	132									
02/05/92	Howard Johnson	132									
02/06/92	Howard Johnson	132									
02/07/92	Howard Johnson	132									
02/10/92	Howard Johnson	132									
02/11/92	Howard Johnson	132									
02/12/92	Howard Johnson	132									
02/13/92	Howard Johnson	132									
02/14/92	Howard Johnson	132									
02/14/92	Kathy Haylow	132									Drives and runs great
02/14/92	Georgia Epps	132									
02/17/92	Howard Johnson	132									
02/18/92	Howard Johnson	132									
02/20/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/21/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/24/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/27/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
02/28/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
03/02/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
03/03/92	M. Randall	132	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	Barely Noticed	
03/05/92	Georgia Epps	132									
03/06/92	Georgia Epps	132									
03/06/92	Georgia Epps	132									

Date	Driver Name	Bus #	Starting Problems		Engine Stalls	Idle Rough	Accel. Problems (no power)	Hesitates, Stutters, or Backfires	Engine Knock or Ping	Overall Performance	Comments
			Engine Cold	Engine Warm							
03/09/92	Georgia Epps	132									
03/10/92	Georgia Epps	132									
03/11/92	Georgia Epps	132									
03/13/92	J. Miller	132									
03/14/92	Georgia Epps	132									
03/22/92	J. Miller	132									
03/23/92	J. Miller	132									
03/24/92	J. Miller	132									
03/26/92	J. Miller	132									
03/26/92	S.J.	132									
03/30/92	S.J.	132									Brakes screech
04/01/92	S.J.	132									
04/03/92	S.J.	132									
04/05/92	S.J.	132									