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2001 CRC HOT-FUEL-HANDLING PROGRAM

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COORDINATING RESEARCH COUNCIL, INC.
3650 MANSELL ROAD·SUITE 140·ALPHARETTA, GA 30022

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COORDINATING RESEARCH COUNCIL, INC.
3650 MANSELL ROAD, SUITE 140
ALPHARETTA, GEORGIA 30022-8246
TEL: 678-795-0506 • FAX: 678-795-0509
WWW.CRCAO.COM

2001 CRC HOT-FUEL-HANDLING PROGRAM

(CRC Project No. CM-138-01)

Prepared by the

CRC Volatility Group

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CRC Performance Committee
of the
Coordinating Research Council

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ABSTRACT

The 2001 CRC Hot-Fuel-Handling Program, a follow-on program to the 1999 CRC volatility program, was conducted at Renegade Raceways near Yakima, Washington, July 2—August 31, 2001. The goal of the program was to develop a front-end volatility parameter and/or index that accurately predicts the hot-fuel-handling performance of both hydrocarbon-only fuels and fuels containing various concentrations of ethanol. The program selected 20 fuel-injected vehicles for detailed testing from a pool of 85 2000—2001 model vehicles. The 20 vehicles were selected on the basis that they were responsive to changes in fuel front-end volatility by showing driveability malfunctions under the program's test conditions. The program investigated three volatility levels of hydrocarbon-only gasoline and 3, 6, and 10 volume percent ethanol blends for a total of 12 test fuels. The front-end volatility design parameter for the test fuels was the temperature for a vapor-liquid ratio of one at a pressure of 500 kPa (TVL1-500), which best correlated with driveability performance in the 1999 CRC volatility program. The vapor pressures of the fuels ranged from 8 psi to more than 18 psi. The target ambient testing temperature was from 80°F to 100°F.

The program further demonstrated the reliability of TVL1-500 and the temperature for a vapor-liquid ratio of 20 (TVL20) plus ethanol concentration fuel parameters in predicting vehicle driveability total weighted demerits. Increasing fuel volatility and increasing ambient temperature yielded increased vehicle total weighted demerits. Increased fuel weathering, as measured by loss of vapor pressure, took place with increasing ambient temperature, increasing fuel volatility and with vehicles manufactured with return-type fuel delivery systems.

TVL1-500 is the single volatility parameter which exhibits the highest level of correlation. The combination of TVL20 plus the ethanol concentration model is as equally reliable as TVL1-500 for predicting vehicle driveability demerits. The TVL20 plus ethanol concentration model has proven to be linear with ethanol content. Either of the following two pairs of fuel properties, TVL20 plus ethanol content, or dry vapor pressure equivalent (DVPE) plus ethanol content, have predictive value equivalent to the single fuel property TVL1-500 in predicting hot-start driveability demerits. Fuel weathering was independent of ethanol concentration except for its effect on vapor pressure.

I. INTRODUCTION

The CRC Volatility Group conducted a hot-fuel handling program in 1999 with the objective to determine the fuel volatility parameter (vapor pressure, vapor-liquid ratio, and/or distillation properties) that best correlated with vapor lock and hot-driveability performance of late-model, fuel-injected vehicles. The program involved the testing of hydrocarbon-only fuels and 10 volume percent ethanol blends having vapor pressures ranging from 9 psi to more than 15 psi in 11 vehicles using the test procedure developed in a 1998 program. The results of the program were reported in CRC Report No. 623, 1999 CRC Hot-Fuel-Handling Program (Reference 1).

The 1999 program showed that the current fuel volatility hot-fuel-handling control parameters, dry vapor pressure equivalent (DVPE) and the temperature for a vapor-liquid ratio of 20 (TVL20), provided relatively poor correlation with hot fuel driveability of hydrocarbon-only fuel and 10 volume percent ethanol blends in modern PFI cars at the same time. Other conventional fuel volatility parameters, such as different TVL ratios or distillation variables, showed little or no improvement in predicting hot driveability performance. Fuel volatility measurements at higher pressures, representative of those in fuel injection systems, showed the best correlation with both hydrocarbon and 10 volume percent ethanol fuels. Several indices using conventional fuel volatility parameters in combination with ethanol concentration also showed good correlation with total weighted demerits (TWD). Based on these findings, it was recommended that a follow-on program be conducted to determine the effect of ethanol content at three concentration levels and at three volatility levels and compare their performance with similar volatility hydrocarbon-only fuels.

The objective of the 2001 program was to determine the effect of fuel front-end volatility and ethanol content on hot-fuel-handling driveability performance of a large group of late-model, fuel-injected vehicles under warm ambient conditions. The program involved the testing of 3, 6, and 10 volume percent ethanol blends and matching volatility hydrocarbon-only fuels having vapor pressures ranging from 8 psi to more than 18 psi. The program involved the screening of 85 vehicles to obtain a test fleet of 20 vehicles that demonstrated sensitivity to fuel front-end volatility parameters.

Members of the Data Analysis Panel and participants in the program are shown in Appendices A and B, respectively. Appendix C outlines the program as approved by the CRC Performance Committee. Also included in Appendix C is the newly developed flushing procedure based on a contract study (Reference 2).

II. CONCLUSIONS

The following conclusions resulted from the analysis of the data and observations from the 2001 Hot-Fuel-Handling Program:

- The 2001 program substantially advances two fuel models developed from the 1999 CRC Hot-Fuel-Handling Program. The two models are based upon measured fuel parameters of TVL1-500 [temperature at which the vapor-liquid ratio equals 1 at 500 kPa (72.5 psi)] and TVL20 plus a coefficient*ethanol concentration (temperature at which the vapor-liquid ratio equals 20 plus a coefficient*ethanol concentration).

- TVL1-500 proved to be the single volatility parameter with the highest level of correlation, validating its predictive reliability first developed in the 1999 CRC Hot-Fuel-Handling Program.

- The TVL20 plus ethanol offset model is equally reliable to TVL1-500 for predicting total weighted demerits.

- TVL1-500 can be calculated from either TVL20 plus a coefficient*ethanol concentration or dry vapor pressure equivalent (DVPE) plus a different coefficient*ethanol concentration.

- Vehicle total weighted demerits on average increase with increasing fuel volatility and increasing ambient temperature.

- Increased weathering of fuel took place with increasing ambient temperatures. Weathering is defined as loss of fuel vapor pressure.

- The test vehicles manufactured with return-type fuel delivery systems weathered the fuel to a greater degree than did the vehicles with returnless fuel delivery systems.

- Increased fuel weathering took place with increasing fuel volatility as defined by vapor pressure.

- Fuel weathering was independent of ethanol concentration except for its effect on vapor pressure.

- It is demonstrated that the ethanol offset is linear when using the TVL20 plus ethanol concentration model.

- Results of the 2001 program confirm the predictive reliability of the findings of the 1999 program when utilizing TVL1-500 and TVL20 plus ethanol concentration.

III. TEST VEHICLES

For the test fleet, a group of 20 sensitive vehicles was needed. Twenty vehicles comprised the largest population that could be logistically handled with the resources and time available. A group of 85 fuel-injected vehicles was originally acquired to obtain vehicles that were sensitive to fuel front-end volatility. To find the sensitive vehicles, all 85 vehicles were first screened using the most volatile 10 volume percent ethanol blend. Past history has shown that TWDs of 15 or less fall into the area of noise in the data; therefore, those vehicles showing TWDs of 15 or less on the most volatile 10 percent ethanol blend were considered to be non-sensitive. Non-sensitive vehicles were returned to the rental agency. Then those vehicles giving driveability problems on the volatile fuel were tested on a low volatility fuel to verify that the vehicles were sensitive to fuel front-end volatility properties. Upon completion of the screening process, 20 test vehicles were chosen. Three additional vehicles were then held in reserve in case mechanical problems were encountered in the 20-vehicle fleet. The TWD ratings for all of the vehicles tested on the high volatility fuel are shown in Figure 1. The darker bars indicate the selected vehicles. Four of the higher TWD vehicles were not chosen because their driveability did not change when a lower volatility fuel was tested. This lack of response could be due to mechanical problems with the vehicles. Other higher TWD vehicles were not chosen because they duplicated makes and models already selected for the program.

All but one of the vehicles came from a Yakima rental agency. Honda provided the Acura vehicle. All but two of the 20 test vehicles were 2001 model year vehicles. The exceptions were two 2000 models. All vehicles had automatic transmissions and air conditioning. All were equipped with various types of port fuel injection. These vehicles were set up to drain the fuel tank through a Schrader or other valve on the fuel rail. No carbureted vehicles were in the program. The fleet covered the various types of fuel pumps in use today – turbine, gear-rotor, and rollervane. The fleet had both types of fuel return strategy – return and returnless. Also, both plastic and metal fuel tanks were in the test vehicles. Engine displacement ranged from 1.8 to 4.3 liters. Starting odometer readings ranged from 379 to 26,175 miles. The fleet consisted of 11 cars and 9 light-duty trucks or vans. Vehicles were manufactured by DaimlerChrysler, Ford, General Motors, Honda, and Mitsubishi. A complete description of the 85-vehicle fleet is presented in Table 1 with the 20 selected vehicles indicated by an "X."

IV. TEST FUELS

Twelve fuels were used in the test program to assess the effect of fuel volatility properties on vapor lock and hot-driveability performance. The fuels were grouped into three volatility levels of four fuels each. Each volatility group consisted of a hydrocarbon-only fuel and 3, 6, and 10 volume percent ethanol blends. The volatility parameter used for designing the front-end

volatility of each group was the temperature at which the vapor pressure equals 500 kPa with a vapor-liquid ratio of one. This is the volatility parameter that in the 1999 volatility program best correlated with vehicle hot-fuel-handling driveability performance for all fuels. In this report, this measured property is labeled TVL1-500. As shown in the table of fuel specifications in Appendix C, specific limits for TVL1-500 and covered target ranges for DVPE, TVL20, and distillation points were provided to the fuel blending contractor.

The low volatility test fuel series was coded L 0, L 3, L 6, and L 10 for hydrocarbon-only and 3, 6, and 10 volume percent ethanol blends. The intermediate volatility series was coded I 0, I 3, I 6, and I 10 for hydrocarbon-only and 3, 6, and 10 volume percent ethanol blends. The high volatility series was similarly coded H 0, H 3, H 6, and H 10.

Average TVL1-500, DVPE, TVL20, distillation temperatures, ethanol content, and other property inspection results as determined by the supplier (Laboratory A) and Fuel Acceptance Panel (Laboratories B, C, D, E, and F) are shown in Table 2. Individual test results obtained by each inspecting laboratory are shown in Table D-1 of Appendix D. Samples for a volunteer laboratory (Laboratory G) were obtained from drums on-site and shipped to the laboratory's facility for inspection. Standard ASTM test methods were used to determine all of the volatility properties, except for the TVL1-500 inspection which was set up with a special apparatus and measured by Laboratory H.

The analyses that were conducted to obtain the TVL1-500 data were performed in accordance with a test method developed by General Motors. The degassed TVL1-500 data were obtained by injecting 500 ml ±0.05 ml into a 1-liter pressure vessel. A vacuum pump capable of reaching pressures below 0.1 kPa along with nitrogen cooling was also utilized. The vessel was placed in a Dewar with liquid nitrogen that was maintained at a level approximately 4 cm below the top of the vessel. The sample was cooled until both the liquid and vapor temperatures reached –135°C (the lowest temperature measured by the equipment) and then allowed to equilibrate for a minimum of 30 minutes. At this point the line was opened to the vacuum pump and the vessel was evacuated for 30 seconds to remove any air. Then the vessel was isolated from the vacuum and removed from the Dewar. The vessel was allowed to warm up approximately to ambient temperature and then wrapped with 2 cm thick insulation and placed on a stirring hot plate. The liquid was slowly heated until the vessel pressure reached approximately 550 kPa. Next, the heating element was shut off and the sample was allowed to slowly cool. As the sample cooled, the liquid temperature corresponding to 500 kPa was measured and recorded.

Fuel samples were taken from each chilled drum of each test fuel for vapor pressure determination prior to using the drum. Fuel samples were obtained from each vehicle after the end of each test as the tank was being drained.

V. TEST SITE

The test program was conducted at the Renegade Raceways near Yakima, Washington, in the valley of the Yakima River. The raceways are at an altitude of 990 feet. The test site was a 0.7-mile long, 60-foot wide, flat, paved, two-lane drag strip, along with several adjacent single-lane, paved, auxiliary roads normally used for racecar preparation. A large, rectangular, paved area suitable for defueling/refueling and vehicle storage also was utilized. Two office trailers were rented. One was used for the on-site vapor pressure measuring operation and the other was used as an office. Three refrigerated containers were rented for fuel storage, and a hydraulic lift-gate truck was rented for equipment transport and storage. Four roofless wooden sheds for hot-soaking a vehicle were constructed, each capable of holding two vehicles. A group of two sheds was set up at the head of the track and the other group of two sheds was set up at the far end of the track.

The program was conducted from July 2, 2001, through August 31, 2001. Site set-up and vehicle preparation was done during the first week. Testing was conducted from July 7th through August 30th. The last few days of the test program were required to deinstrument the vehicles and shut the site down. The target ambient testing temperature range was from 80°F to 100°F.

VI. TEST PROGRAM

A. Test Procedure

The test procedure used in this program was the same as used in the 1999 CRC Hot-Fuel-Handling Program conducted July 19 – August 27, 1999, in Yakima, Washington.

In this test procedure, after switching fuels, the test vehicle is warmed-up on a nearby highway. It is then driven onto the test track and accelerated 10 times at wide-open-throttle from 0 to 35 mph with braking between each acceleration. The test vehicle is then parked in a soak shed for 20 minutes with the ignition off. The engine is then restarted after the 20-minute soak. Recording of data for calculation of TWDs begins when the engine is restarted. The starting time, idle quality, and the occurrences of any stalls are recorded. After easing the test vehicle from the soak shed, it is accelerated at wide-open-throttle to 35 mph. Any driveability malfunctions, such as hesitation, surge, stumble, stall, or backfire, and their severity are recorded. Ten wide-open-throttle accelerations from 0 to 35 mph are then repeated. The test vehicle is then parked in a soak shed. The transmission is shifted into park and the engine idled for 20 minutes. The idle quality is assessed and if the engine stalls, the stall is recorded and an

attempt to restart the engine is undertaken immediately. If the engine continues to stall after three restarts, the test is aborted. At the end of the 20-minute idle test period, the transmission is shifted into drive and the idle quality and any stalls are recorded. The vehicle is then slowly driven from the soak shed and accelerated at light-throttle to 35 mph. Driveability malfunctions and their severity are recorded. The vehicle is driven back to the soak shed and parked for 20 minutes with the engine off. The starting time is recorded and the idle quality and number of stalls are recorded. The transmission is shifted into drive and the idle quality and number of stalls are recorded. The vehicle is eased out onto the track and accelerated at light-throttle to 35 mph. Driveability malfunctions and their severity are recorded.

B. Fueling and Sampling Procedures

All test fuel prior to being used to supply the test vehicles was stored in one of the three refrigerated containers controlled to 70°F. The fuel was delivered to the test vehicles through metered dispensing pumps installed inside one of the refrigerated containers. Samples were taken for vapor pressure and TVL20 inspections from each drum when it was opened; the samples were analyzed using two Grabner DVPE instruments provided by General Motors and one Setavap TVL20 instrument provided by Petroleum Systems Services Corporation. Calibrations for the Grabner instruments were performed by Petroleum Systems Services Corporation and both machines were consistent with each other. The testing results are shown in Table D-2. A sample of each test fuel was taken from a drum and sent to Marathon-Ashland (Laboratory G) for ASTM D 5191 vapor pressure, ASTM D 86 distillation, and ASTM D 5599 oxygenate inspections. The results from these inspections are shown in Table D-3

A new fuel tank flushing procedure was developed for and used in this program. It was most important to minimize ethanol carry-over into a hydrocarbon-only fuel because small amounts of ethanol can cause a DVPE increase. The flushing procedure was developed under contract by Southwest Research Institute (Reference 2). The flushing procedure is shown in Appendix C. To assess the efficiency of the new flushing procedure, samples were obtained from each test vehicle after a switch from fuel H 10 (highest ethanol content) to the hydrocarbon-only fuel L 0 (flushed with L 0) and inspected for ethanol content. The oxygenate inspections determined by Laboratory G are shown in Table D-4.

After each test, the fuel from the tank was sampled through a valve on the fuel rail by running the discharge through a copper cooling coil in an ice chest. Ice was kept in the coolers to keep the copper coils cold to chill the fuel. Chilled one-quart cans were flushed with the chilled fuel and then filled with the same fuel. The samples were immediately brought to the laboratory trailer and placed in an ice chest containing ice. The samples were then removed for evaluation from the ice chest, opened for air saturation as required by ASTM D 5191 and then tested in the Grabner instrument. The samples were also tested by D 5188 for TVL20 in a Setavap and a Grabner instrument. The inspection results for the end-of-test vehicle samples are shown in Table D-2.

C. Test Plan

At the beginning of the program, each vehicle was first tested using the highest volatility ethanol blended fuel with the highest ethanol content (Fuel H 10). If no driveability malfunctions were observed, the vehicle was parked and later returned to the rental agency. Those vehicles encountering driveability problems were parked in another location for further assessing. They were then supposed to be tested on the least volatile hydrocarbon-only fuel (L 0) to make sure the earlier driveability malfunctions were due to fuel volatility and not vehicle mechanical problems. Since L 0 did not arrive at the Yakima test site on time because of blending problems, L 3 was used in its place for screening vehicles. The goal was to select 20 sensitive vehicles for testing on all test fuels.

The scheduling of the vehicles was organized such that all vehicles were tested on all fuels twice. The duplicate ratings were scheduled so they would be obtained at different ambient temperatures. The general procedure on a given day was to test only one or two fuels across part of the fleet. Late in the program, as many as four fuels were tested in a day. All of the fleet could not be tested in a single day on one fuel because on the average only about 16 tests could be run in a day. The number of tests per day was controlled mostly by the ambient temperature and ranged from six to 22 tests per day. Some days, testing could not begin until late afternoon because the minimum ambient temperature had not been reached.

At the end of each test, the data were recorded and reviewed. These data for all vehicles and fuels were continuously reviewed to help in the scheduling of the fuels based on the expected ambient temperature.

During the testing, some vehicles showed malfunctions on the least volatile hydrocarbon-only fuel. To ensure that these problems were not mechanically related, a nonoxygenated, 7 psi commercial gasoline was purchased and run in the suspect vehicle. In all cases, these particular vehicles ran fine on the commercial gasoline.

D. Data Worksheets

The data from the vehicle data sheets were summarized each day and entered into an Excel spreadsheet for each test. Information such as testing date, vehicle, fuel, and rater was given, and for each sequence of the test, start-of-test ambient temperature, fuel tank temperature, fuel rail temperature, and driveability malfunctions and their severity were recorded and entered into a computer summary sheet. A summary of the data is presented in Appendix E in Table E-1 for the test vehicles and in Table E-2 for the nonsensitive vehicles.

VII. DISCUSSION OF RESULTS

A. Driveability Malfunctions/Demerits

The following system was used in this program to calculate total weighted demerits (TWD) from the observed driveability malfunctions.

Malfunction	Rating	Demerit(s)
Start Time	Seconds	5 x (Seconds – 1)
Rough Idle	Clear	0
	Trace	1
	Medium	2
	Heavy	4
	Extreme	8
Stall in Park	Count	10 x Count
Stall in Drive	Count	16 x Count
No Start (3 maximum)	Count	32 x Count
Unable to Start or Operate After Numerous Attempts		192[1]
Driving Malfunctions[2]	Clear	0
	Trace	4
	Medium	8
	Heavy	16
	Extreme	32
	Stall	64

[1] Maximum demerit rating; excludes all other malfunction demerits for that individual soak cycle; equivalent to three driving stalls.
[2] Includes hesitation, stumble, surge, and backfire.

B. Data Set Analysis

The final data set was analyzed using the SAS System to calculate least square mean values for each vehicle and all vehicles and for each fuel and all fuels. The initial model

included fuel, vehicle, fuel*vehicle interactions, ambient temperature, ambient temperature squared, and vehicle*ambient temperature interactions. The TWD values were log transformed due to the wide range of vehicle/fuel TWDs (1-192). Table 3 shows the p values for several of the regression variables investigated. Also, shown is the correlation coefficient (R^2), coefficient of variation, and root mean square error for each of the equations. The table further shows how each equation correlated with TVL1-500 and an ethanol corrected TVL20 (to be discussed later). All of this information was used to select the following statistically significant model effects: fuel, vehicle, and ambient temperature.

The data do not require a rater correction, because the raters did not test a common vehicle. Because some vehicles showed a significant response to ambient temperature, the test results were adjusted for ambient temperature. The date variable, while initially appearing significant, was not meaningful because the fuel and vehicle testing order was not random. Adding a temperature squared term provided benefits for some regression factors; however, no technical justification was developed to support the additional complication of a quadratic equation to further data analysis. No interaction terms were significant. Some attempts were made to account for weathering, but none were successful. The least square mean natural log corrected TWDs are listed by vehicle and fuel in Table 4. Figure 2 shows the mean correct TWD (antilog of LN TWD) for each of the 20 test vehicles. Figure 3 shows the mean corrected TWD (antilog of LN TWD) for each of the 12 test fuels.

C. Fuel Property Effect Analysis

Using the TWD data from Table 4, regression analyses were undertaken against TVL1-500, TVL20, and DVPE. The best fit as determined by the largest R^2 was for TVL1-500 as shown in Figure 4. For this program, this was the primary volatility design variable (see Appendix C). The next best fit was with TVL20 as shown in Figure 5, which is the variable currently specified in ASTM specification D 4814 to control hot fuel handling problems. The poorest fit was with DVPE as shown in Figure 6.

The 1999 program data analysis showed that adding an ethanol term to either TVL20 or DVPE improved their correlation with TWD. The result of adding an ethanol content term to TVL20 is shown in Figure 7. The R^2 for this regression is slightly better than the one for TVL1-500 alone (0.8792 vs. 0.8634). The results of a regression of DVPE and ethanol content are shown in Figure 8. This correlation has the highest (0.88) R^2. The -1.27*ethanol content adjustment for TVL20 compares favorably to the -1.01 and -1.33 factors found for 10 volume percent ethanol in the 1999 program. For DVPE, the +0.336*ethanol content adjustment also compares favorably to the +0.234 and +0.268 factors found for 10 volume percent ethanol in 1999.

D. Calculating TVL1-500 from TVL20, DVPE, and Ethanol

The physical chemistry of TVL1-500, TVL20, and DVPE is explained in Appendix F. Because a physical relationship among TVL1-500, TVL20, and DVPE is expected, equations relating the more commonly measured parameters to TVL1-500 were sought. Using the fuel inspection data in Table 2, regression analyses to calculate TVL1-500 from the traditional front-end volatility parameters, either TVL20 or DVPE, and ethanol content were conducted. The results of these analyses and plots of the correlations are shown in Appendix G. The best R^2 fit with parameter TVL1-500 was found for the combination of TVL20 and the ethanol concentration (adjusted R^2=0.971). The correlation using DVPE and the ethanol concentration was slightly lower than the linear fit found for TVL20 and the ethanol concentration (adjusted R^2=0.955). The correlations for TVL20 or DVPE without the ethanol concentration were much poorer than the linear fit found for the combination with the ethanol term. The R^2 linear fit for TVL20 and DVPE with TVL 1-500 was 0.788 and 0.738, respectively. Comparing the ratio of the ethanol content regression coefficient to either TVL20 or DVPE for these calculation equations (-1.42 for TVL20 and +0.373 for DVPE) shows results similar to the ethanol coefficient in Figures 5 and 6. This finding further supports the ethanol offsets that were developed.

E. Ambient Temperature

The testing ambient temperatures ranged from 77°F to 104°F versus the target temperature range of 80°F to 100°F. Only 1.2 percent of the testing occurred at temperatures below 80°F, however, and less than 4.7 percent of the testing occurred above 100°F. The average maximum ambient temperatures for each test vehicle on each fuel are shown in Tables 5a and 5b. The individual ambient temperatures for each vehicle on each fuel for each test are shown in Appendix H. The average ambient temperature was 90.8°F, with a standard deviation of 5.9°F.

F. Fuel Tank Flushing

As a result of inspecting end-of-test fuel samples for oxygenate carryover in the 2000 CRC Intermediate-Temperature Volatility Program and finding more oxygenate present than expected, it was recommended that a new, more efficient fuel flushing procedure be developed. A contract study was undertaken (Reference 2). As a result of this study, a new flushing procedure shown in Appendix C was developed.

To assess the efficiency of this new flushing procedure under field conditions, end-of-test samples were obtained from the fuel tanks of each vehicle after it had been switched from the highest ethanol content fuel, H 10, to the lowest hydrocarbon-only content fuel, L 0. The fuel used for flushing was L 0 since it was the next fuel to be tested. The oxygenate inspection results from Laboratory G are shown in Table D-4 and are plotted in Figure 9. The new flushing procedure reduced carryover to less than 0.5 percent except for one vehicle, which is a great improvement.

G. Fuel Weathering

Fuel samples were obtained from each vehicle fuel tank at the end of each test run and analyzed for DVPE. Fresh fuel samples were analyzed for DVPE when each drum was opened. Taking the difference between the fresh fuel DVPE value and the end of test value provides the fuel vapor pressure weathering for each run. The final data set was analyzed using the SAS GLM System to correct for differences in testing ambient temperatures. The significant variables in the weathering model included vehicle, initial DVPE, initial DVPE squared, maximum ambient temperature (T) during a test, and the product of initial DVPE and maximum ambient temperature. There was no independent effect of ethanol concentration, other the effect ethanol addition may have had on DVPE. Linear and other models including transformations were investigated, but the best model was a quadratic model with a DVPE and ambient temperature interaction. The problem with a linear model is that it went negative (gain in vapor pressure) at the lower DVPE levels. The resulting model is as follows:

$$\text{Loss} = 7.805 - 1.362*\text{DVPE} + 0.0320*\text{DVPE}^2 - 0.0614*\text{T} + 0.0093*\text{DVPE}*\text{T}$$

This equation is applicable within the vapor pressure range (8.2 to 18.7 psi) assessed in this program.

Table 6 shows the different intercepts and coefficients for the 20 tests vehicles. The worst vehicle at the average temperature and the average DVPE fuel had nearly four times more weathering than the vehicle with the least loss in vapor pressure as shown in Figure 10. The highest 8 vehicles have return-type fuel injection systems. The average DVPE loss for return fuel system vehicles is 3.29 psi. This compares to 2.13 psi loss for returnless fuel system vehicles. Figure 11 shows the average weathering loss for each test fuel.

Figure 12 shows the average predicted loss in vapor pressure (weathering) as a function of the initial DVPE for three ambient temperature conditions (average for the program and the two design temperature extremes). As expected, when vapor pressure increases, the loss in vapor pressure increases. Also, as ambient temperature increases, the loss in vapor pressure increases.

H. Vehicle Fuel System Effects

The test vehicles covered a combination of fuel system variables. The fuel injection systems were either return, where fuel was returned from the injectors back to the fuel tank, or returnless where no fuel was returned to the tank. The vehicles were equipped with three kinds of fuel pumps: gear rotor, rollervane, and turbine. Two types of fuel tank materials were used: metal or plastic. Table 1 shows the systems for each of the test vehicles. Twelve vehicles were equipped with return fuel systems and eight were returnless. Thirteen vehicles had plastic fuel tanks and seven had metal tanks. Eleven vehicles had turbine fuel pumps, five had gear rotor pumps, and seven had rollervane pumps. A SAS system analysis showed that only the average 27 (3.30 LN) TWD for the returnless system was significantly different ($p = 0$ .0521) from the average 19.5 (2.97 LN) TWD of the return fuel systems.

VIII. REFERENCES

1) Coordinating Research Council, Inc., 1999 CRC Hot-Fuel-Handling Program, CRC Report No. 623, August 2000.
2) Southwest Research Institute, A Vehicle Fuel Tank Flush Effectiveness Evaluation Program, August 2001.

TABLES

AND

FIGURES

Table 1
2001 CRC Hot Fuel Handling Test Program
Total Vehicle List

Test Fleet	Year	Make	Model	Engine	Type	Fuel System	Mileage	VIN	Fuel Pump Type	Return vs. Returnless	Tank Material
	2001	Chrysler	PT Cruiser	2.4L	L4	PFI	3,548	3C4FY4BB11T659198	Gear-Rotor	Returnless	Plastic
X	2000	Dodge	Caravan	3.3L	V6	PFI	25,324	1B4GP44G7YB751537	Gear-Rotor	Returnless	Plastic
X	2001	Dodge	Dakota SLT	4.7L	V8	PFI	237	1B7GL22N115332528	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Intrepid	2.7L	V6	SFI	21,191	2B3HD46R61H506225	Gear-Rotor	Returnless	Plastic
X	2001	Dodge	Neon	2.0L	L4 16 Valve	SFI	343	1B3ES46C71D270220	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Neon	2.0L	L4	SFI	16,476	1B3E546C21D155184	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Ram 1500	5.9L	V8	PFI	384	387HF13251g801201	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Ram 1500	5.9L	V8	PFI	2,905	1B7HG13251J601031	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Ram 1500	8.0L	V10	PFI	8,660	1B7KF23W91J552045	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Stratus	2.4L	L4	PFI	11,356	1B3EJ46X81W553645	Gear-Rotor	Returnless	Plastic
	2001	Dodge	Stratus	2.4L	L4	PFI	331	1B3EJ46X71N690706	Gear-Rotor	Returnless	Plastic
X	2001	Jeep	Cherokee	4.0L	V6	SFI	16,570	1J4FF58S61L540572	Gear-Rotor	Returnless	Plastic
X	2001	Jeep	Grand Cherokee	4.0L	V6	PFI	8824	1J4GW48591C557056	Turbine	Returnless	Plastic
	2001	Jeep	Grand Cherokee	4.0L	V6	PFI	18,442	1S4GW48571C500287	Turbine	Returnless	Plastic
X	2001	Jeep	Liberty	3.7L	V6	PFI	754	1J4GL48K02W125433	Turbine	Returnless	Plastic
	2001	Ford	Escort	2.0L- SOHC SPI	L4	SFI	14,638	3FAFP13P61R137715	Turbine	Electronic Returnless	Plastic
	2001	Ford	Explorer	4.0L - SOHC	V6	SFI	15,546	1FMZU73E01ZA22309	Turbine	Mechanical Returnless	Steel
	2001	Ford	F150 Truck	5.4L - SOHC	V8	SFI	356	1FTRX18L01NB86523	Turbine	Return	Steel
	2001	Ford	Focus	2.0L- SOHC SPI	L4	SFI	10,589	1FAFP33P91W180597	Turbine	Electronic Returnless	Plastic
X	2000	Ford	Focus	2.0L Zetec DOHC	L4	SFI	17,226	1FAFP3135YR241649	Turbine	Electronic Returnless	Plastic
	2001	Ford	Focus	2.0L- SOHC SPI	L4	SFI	13,519	1FAFP33P21W104445	Turbine	Electronic Returnless	Plastic
	2001	Ford	Taurus	3.0L	V6	SFI	20,558	1FAFP55U91G102216	Turbine	Mechanical Returnless	Steel
	2000	Ford	Taurus	3.0L FFV	V6	SFI	34,936	1FAFP5529YG171870	Turbine	Electronic Returnless	Steel
X	2000	Ford	Taurus FFV	3.0L FFV	V6	SFI	23,208	1FAFP5821YG196290	Turbine	Electronic Returnless	Steel
X	2000	Ford	Taurus FFV	3.0L FFV	V6	SFI	21,911	1FAFP5823YG171844	Turbine	Electronic Returnless	Steel
	2001	Ford	E-150 Van	4.2L	V6	SFI	10,747	1FTRE14221HA52775	Turbine	Return	Steel
	2001	Lincoln	Town Car	4.6L- SOHC	V8	SFI	3,085	1LNHM81W11Y717952	Turbine	Return	Steel
	2000	Mercury	Grand Marquis	4.6L- SOHC	V8	SFI	23,581	2MEFM74WXYX731357	Turbine	Return	Steel
	2001	Mercury	Grand Marquis	4.6L- SOHC	V8	SFI	3,942	2MEFM74W01X688539	Turbine	Return	Steel
	2001	Mercury	Grand Marquis	4.6L- SOHC	V8	SFI	6,058	2MEFM74W41X679732	Turbine	Return	Steel
	2001	Mercury	Sable	3.0L	V6	SFI	343	1MEFM50U31G644680	Turbine	Mechanical returnless	Steel
	2001	Mercury	Sable	3.0L	V6	SFI	362	1MEFM50U91G643291	Turbine	Mechanical returnless	Steel
	2001	Volvo	S60	2.4L	L5	SFI	5,268	YV1R561R412042222	Turbine	Mechanical returnless	Plastic
	2001	Volvo	V70	2.4L	L5	SFI	4,191	YV1SW61R712099360	Turbine	Mechanical returnless	Plastic
	2001	Buick	Century	3.1L	V6	SFI	355	2G4WS52J511333609	Gear-Rotor	Return	Plastic
	2000	Buick	Regal	3.8L	V6	SFI	33,579	2G4WB52K3Y1168694	Gear-Rotor	Return	Plastic

Table 1
2001 CRC Hot Fuel Handling Test Program
Total Vehicle List

Test Fleet	Year	Make	Model	Engine	Type	Fuel System	Mileage	VIN	Fuel Pump Type	Return vs. Returnless	Tank Material
	2001	Cadillac	DeVille	4.6L	V8	SFI	6,750	1G6KD54Y01U233125	Gear-Rotor	Return	Plastic
	2001	Cadillac	DeVille	4.6L	V8	SFI	8,035	1G6KD54Y81U222700	Gear-Rotor	Return	Plastic
	2000	Chevrolet	Astro AWD	4.3L	V6	SFI	36,408	1GNEL19W8YB190535	Rollervane	Return	Steel
X	2000	Chevrolet	Blazer	4.3L	V6	SFI	22,333	1GNCT18WXYK296963	Rollervane	Return	Steel
X	2000	Chevrolet	Blazer	4.3L	V6	SFI	26,175	1GNDT13W2Y2355838	Rollervane	Return	Steel
	2001	Chevrolet	Cavalier	2.2L	L4	SFI	16,011	1G1J124417113395	Turbine	Return	Plastic
	2001	Chevrolet	Express	4.3L	V6	SFI	327	1GCEG15W91123878	Rollervame	Return	Steel
	2001	Chevrolet	Impala	3.4L	V6	SFI	15,473	2G1WF52E119188283	Gear-Rotor	Return	Plastic
	2001	Chevrolet	Impala	3.4L	V6	SFI	338	2G1WF52E119372218	Gear-Rotor	Return	Plastic
	2000	Chevrolet	Metro	1.3L	L4	SFI	30,843	2C1MR522XY6710591	Turbine	Return	Plastic
	2000	Chevrolet	Metro	1.3L	L4	SFI	3,164	2C1MR5223Y6712070	Turbine	Return	Plastic
X	2001	Chevrolet	Prizm	1.8L	L4	SFI	326	1Y1SK52832Z405590	Turbine	Returnless	Plastic
	2001	Chevrolet	Suburban	5.3L	L4	SFI	543	2GCEC19T311398861	Gear-Rotor	Return	Plastic
	2001	Chevrolet	Suburban	5.3L	V8	SFI	19,234	3GNFK16T81G122430	Gear-Rotor	Return	Plastic
	2001	Chevrolet	Tahoe	5.3L	V8	SFI	8,592	1GNEK13T31J252369	Gear-Rotor	Return	Plastic
	2001	Chevrolet	Tahoe	5.3L	V8	SFI	4,757	1GNEK13TX1J252532	Gear-Rotor	Return	Plastic
	2002	Chevrolet	Trail Blazer	4.2L	V6	SFI	334	1GNDT135722165098	Turbine	Return	Plastic
	2001	GMC	Jimmy	4.3L	V6	SFI	17,189	1GKDT13W312157384	Turbine	Return	Plastic
	2001	GMC	Sonoma	4.3L	V6	SFI	365	1GTCS19W318247701	Turbine	Return	Plastic
	2001	GMC	Sonoma	4.3L	V6	SFI	361	1GTC519W618246459	Turbine	Return	Plastic
	2001	Oldsmobile	Alero	3.4L	V6	SFI	28,790	1G3NL52E3YC423622	Turbine	Return	Plastic
X	2001	Oldsmobile	Alero	2.4L	L4	SFI	379	1G3NL52T61C277320	Turbine	Return	Plastic
	2001	Oldsmobile	Alero	2.4L	L4	SFI	356	1G3NL52T51C277244	Turbine	Return	Plastic
	2001	Oldsmobile	Auroa	3.5L	V6 Twin-Cam	SFI	20,902	1G3GR64H614133721	Gear-Rotor	Return	Plastic
	2001	Oldsmobile	Auroa	3.5L	V6 Twin-Cam	SFI	15,724	1G3GR64H41415088	Gear-Rotor	Return	Plastic
X	2001	Pontiac	Bonneville	3.8L	V6	SFI	13,038	1G2HX54K714216532	Gear-Rotor	Return	Plastic
	2001	Pontiac	Bonneville	3.8L	V6	SFI	14,259	1G2HX54K514216786	Gear-Rotor	Return	Plastic
	2001	Pontiac	Grand Am	3.4L	V6	SFI	220	1G2WF52E11M675364	Turbine	Return	Plastic
	2000	Pontiac	Grand Prix	3.1L	V6	SFI	33,655	1G2WJ52J6YF297685	Gear-Rotor	Return	Steel
	2001	Pontiac	Grand Prix	3.8L	V6	SFI	221	1G2WP52K71F270041	Gear-Rotor	Return	Plastic
	2001	Pontiac	Montana	3.4L	V6	SFI	21,801	1GMDX03E01D106328	Gear-Rotor	Return	Plastic
	2001	Pontiac	Sunfire	2.2L	L4	SFI	362	1G2JB124517416353	Turbine	Return	Plastic
X	2001	Saab	95	2.3L	L4	SFI	21,629	YS3ED58E413002740	Turbine	Return	Plastic
	2001	Saab	95	3.0L	V6	SFI	15,874	YS3EF48Z713011844	Turbine	Return	Plastic
X	2001	Saturn	L200	2.2L	L4	SFI	396	1G8JU52FX1Y587571	Turbine	Return	Plastic
X	2001	Saturn	L200	2.2L	L4	SFI	392	1G8JU52FX1Y587862	Turbine	Return	Plastic

Table 1
2001 CRC Hot Fuel Handling Test Program
Total Vehicle List

Test Fleet	Year	Make	Model	Engine	Type	Fuel System	Mileage	VIN	Fuel Pump Type	Return vs. Returnless	Tank Material
	2001	Saturn	SL2	1.9L	L4	SFI	8,669	1G82K52711Z305250	Turbine	Returnless	Plastic
	2001	Saturn	SL200	1.9L	L4	SFI	7,851	1G82K52791Z292943	Turbine	Returnless	Plastic
X	2001	Honda	Acura CL	3.2L	V6 VTEC-ULEV	SFI	4729	19UYA42411A001050	Turbine	Semi-Return	Steel
	2001	Mitsubishi	Galant	2.4L	L4	SFI	20,214	4A3AA46G41E050348	Rollervane	Return	Plastic
	2001	Mitsubishi	Mirage	1.8L	L4 16 Valve	SFI	332	JA3AY26C11U048853	Rollervane	Return	Steel
	2001	Mitsubishi	Mirage	1.8L	L4	SFI	321	JA3AY26CX1U048804	Rollervane	Return	Steel
X	2001	Mitsubishi	Montero	3.0L	V6	SFI	5,978	JA4MT31H41P044939	Rollervane	Return	Steel
X	2001	Mitsubishi	Montero	3.0L	V6	SFI	1,015	JA4MT31H61P006936	Rollervane	Return	Steel
	2001	Nissan	Infiniti J-30	3.0L	V6	SFI	10,226	JNKCA31A31T018618	Turbine	Return	Steel
	2001	Suzuki	Grand Vitara	2.5L	L4	SFI	2,157	JS3TD62V214167145		Return	Steel
	2001	Suzuki	Grand Vitara	2.5L	L4	SFI	3,245	JS3TD62V214167100		Return	Steel
	2001	Toyota	Camry	2.2L	L4	SFI	10,524	JT2BG22K910569583	Gear-Rotor	Returnless	Steel
	2001	Toyota	Corolla	1.8L	L4	SFI	20,072	1NXBR12E01Z442411	Gear-Rotor	Returnless	Steel

Table 2
Summary of Inspections of CRC 2001 Volatility Program Fuels

Property	Test Method	Units	Fuel Code											
			L 0	L 3	L6	L10	I 0	I 3	I 6	I 10	H 0	H3	H 6	H 10
TVL1-500	GM	°C	110.8	108.6	105.8	110.5	101.2	101.7	99.7	101.7	96.2	93.2	94.8	92.8
Temperature for V/L=20	ASTM D 5188	°F	116.7	121.3	119.0	131.7	101.8	105.5	108.9	114.0	88.5	94.2	97.8	99.5
DVPE	ASTM D 5191	psi	12.4	11.2	11.1	8.2	15.5	14.2	13.1	12.3	18.7	17.3	16.4	16.1
Distillation	ASTM D 86													
Initial Boiling Point		°F	81.3	86.5	90.7	102.4	78.0	80.4	84.8	85.2	72.9	74.9	76.5	77.8
5% Evaporated		°F	97.9	105.6	107.9	123.0	85.0	91.8	97.0	101.9	76.9	78.9	82.9	86.5
10% Evaporated		°F	108.9	115.9	116.9	128.9	94.0	99.4	105.4	110.8	82.4	88.3	92.7	96.4
20% Evaporated		°F	125.9	131.4	129.9	137.4	108.3	111.0	116.3	123.4	94.7	102.5	106.9	113.0
30% Evaporated		°F	147.3	156.6	141.0	145.3	125.5	124.4	127.1	135.0	111.2	118.1	122.6	130.5
40% Evaporated		°F	168.9	182.8	158.0	152.7	147.7	147.4	137.5	145.4	135.8	142.5	138.6	145.6
50% Evaporated		°F	189.1	200.9	199.2	184.5	173.8	177.4	163.1	154.5	171.3	178.0	165.5	155.3
60% Evaporated		°F	207.2	216.7	220.2	216.7	201.0	207.4	196.8	200.3	210.1	206.7	214.4	197.5
70% Evaporated		°F	226.3	233.7	236.8	233.1	225.8	230.7	219.5	227.6	234.3	230.7	236.2	232.4
80% Evaporated		°F	253.4	258.5	261.0	254.6	251.1	253.6	244.6	254.1	260.1	258.2	262.0	259.2
90% Evaporated		°F	311.9	314.4	315.4	309.5	303.1	304.9	299.2	312.1	313.7	315.8	321.2	308.0
95% Evaporated		°F	336.6	340.1	341.6	339.1	333.1	334.2	333.6	337.5	341.1	340.8	343.9	334.3
End Point		°F	371.0	375.0	382.3	377.3	371.0	370.1	374.7	370.6	379.3	374.9	381.1	371.5
Recovery		vol %	97.6	97.5	97.4	97.7	96.0	96.4	96.8	97.3	94.6	94.4	95.3	95.6
Residue		vol %	1.0	0.8	0.8	1.3	1.5	1.4	0.9	0.8	1.2	1.4	1.2	1.3
Loss		vol %	1.7	1.7	1.8	1.0	2.5	2.2	2.4	1.8	3.9	4.0	3.4	3.1
Percent Evaporated at 158°F		vol %	35.0	30.5	40.0	42.2	44.0	43.7	48.2	50.9	46.3	44.5	47.8	50.9
Percent Evaporated at 200°F		vol %	55.7	49.2	50.2	54.7	59.8	57.3	61.1	59.9	57.2	57.5	56.7	60.5
Percent Evaporated at 300°F		vol %	87.9	87.5	87.2	88.4	89.2	89.0	90.1	87.9	87.6	87.3	86.4	88.3
Ethanol	ASTM D 4815	vol %	0.0	3.0	6.3	10.0	0.0	2.7	5.9	9.8	0.0	3.0	6.0	10.2
MTBE	ASTM D 4815	vol %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gravity	ASTM D 4052	°API	63.0	61.8	61.7	60.8	68.1	66.0	65.2	62.0	69.0	67.4	66.2	62.6
Corrected Composition														
Aromatics	ASTM D 1319	vol %	23.1	22.8	21.5	20.2	21.1	21.0	19.4	22.3	21.4	18.2	18.2	22.2
Olefins	ASTM D 1319	vol %	5.3	3.9	3.5	3.5	3.7	6.4	6.4	4.5	6.0	6.0	4.8	3.7
Saturates	ASTM D 1319	vol %	71.4	70.1	68.5	66.2	74.9	69.6	68.4	63.9	72.2	72.4	71.0	64.1
Butanes	DHA	vol %	9.7	8.1	5.5	0.5	13.2	7.9	6.1	6.4	20.1	15.8	12.8	13.5
Pentanes	DHA	vol %	18.6	11.5	16.7	10.7	22.2	24.8	22.6	18.6	21.3	17.1	18.5	14.4
Benzene	ASTM D 3606	vol %	0.4	0.4	0.3	0.4	0.3	0.5	0.5	0.4	0.4	0.4	0.2	0.9
Solvent washed gum	ASTM D 381	mg/100ml	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead	ASTM D 3237	g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Research Octane Number	ASTM D 2699	ON	91.1	92.2	94.7	95.4	91.0	93.6	92.0	95.0	94.6	93.4	96.7	94.0
Motor Octane Number	ASTM D 2700	ON	83.5	84.2	86.0	86.0	84.0	85.0	83.6	85.2	86.2	85.4	87.5	84.0
(R+M)/2	D 2699/2700	ON	87.3	88.2	90.4	90.7	87.5	89.3	87.8	90.1	90.4	89.4	92.1	89.0

Table 3
Summary of Regression Equation p Values, Regression Correlations, and Volatility Correlations

Variable p Value								TWD Correlation			Model R^2	
Fuel	Vehicle	Temperature	Temperature^2	Date	Fuel*Vehicle	Fuel*Temperature	DVPE Loss	R^2	Coef Var	Root MSE	TVL1-500	TVL20+EtOH
<0.0001	<0.0001	0.0005	-	<0.0001	0.0326	-	-	0.8399	14.52	0.4519	0.6768	0.7543
<0.0001	<0.0001	<0.0001	-	-	-	-	-	0.5641	16.28	0.5049	0.8634	0.8792
0.0002	<0.0001	<0.0001	-	-	-	0.0002	-	0.5978	15.78	0.4909	0.7799	0.8096
<0.0001	<0.0001	<0.0001	-	-	**0.5697**	-	-	0.7590	16.72	0.5213	-	-
<0.0001	<0.0001	0.0003	0.0001	-	**0.4691**	-	-	0.7731	16.26	0.5069	-	-
<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	0.5785	16.29	0.5080	0.8697	0.8724
0.0001	<0.0001	<0.0001	-	-	-	0.0002	0.003	0.6118	15.43	0.4799	0.8031	0.8659

Bold-face font indicates that the terms are not significant.

Table 4
Least Square Mean Natural Log TWD Values

Fuel	Test Vehicle									
	1	5	6	7	8	11	16	20	22	24
L 0	2.23	3.48	2.93	2.16	3.30	3.40	3.11	3.02	3.36	3.44
L 3	2.18	3.19	2.31	2.38	2.64	2.57	3.08	2.43	2.78	2.69
L 6	2.35	3.51	3.28	2.85	3.10	2.91	3.13	2.13	3.25	3.66
L 10	1.98	3.02	3.23	2.08	2.68	2.77	3.01	1.95	2.84	2.09
I 0	2.39	3.42	3.20	2.51	3.09	3.38	3.44	2.88	3.59	4.19
I 3	2.68	3.69	3.35	2.71	3.33	3.26	3.25	3.16	4.17	4.66
I 6	3.02	3.77	3.31	2.62	2.81	3.35	3.53	3.61	4.00	4.54
I 10	2.84	3.53	2.80	2.67	3.05	3.08	2.97	2.68	3.38	4.31
H 0	3.41	4.14	3.56	3.36	3.15	3.88	2.82	3.33	4.76	4.76
H 3	2.87	4.03	3.21	2.72	2.67	3.70	3.64	3.66	4.54	4.60
H 6	3.45	4.42	3.83	3.49	3.12	3.24	3.49	3.55	4.18	4.07
H 10	3.95	4.33	3.52	3.82	3.12	3.51	3.51	3.95	4.58	4.49

Fuel	Test Vehicle										
	27	33	43	48	51	54	58	65	82	84	All
L 0	2.77	2.76	3.03	2.59	2.64	2.51	2.60	2.54	2.15	2.48	2.83
L 3	2.62	2.26	2.62	2.56	2.72	2.60	2.61	2.30	2.02	2.32	2.54
L 6	3.38	2.68	3.00	2.34	2.81	2.58	2.32	2.72	2.65	2.27	2.85
L 10	3.00	2.47	2.84	2.36	2.80	2.45	2.55	2.87	1.25	2.65	2.54
I 0	3.29	2.91	2.97	2.51	3.03	2.72	2.63	2.54	2.26	2.45	2.97
I 3	3.59	2.61	2.78	2.68	3.27	2.63	2.96	2.68	2.56	2.99	3.16
I 6	3.60	2.48	3.12	3.26	2.81	2.66	2.88	2.94	3.41	2.87	3.23
I 10	2.75	2.43	3.03	3.38	2.74	2.41	2.57	2.47	1.21	2.11	2.82
H 0	3.60	2.71	3.59	3.24	3.11	2.90	2.98	3.18	3.51	3.05	3.45
H 3	3.69	2.75	3.46	3.99	3.70	3.23	3.16	2.68	4.28	2.94	3.48
H 6	4.06	2.63	3.42	3.55	3.25	2.90	3.10	3.60	4.23	3.02	3.53
H 10	3.91	3.33	3.13	4.17	4.30	2.90	3.10	3.91	4.40	3.87	3.79

Table 5a

Maximum Ambient Test Temperature by Vehicle

	Maximum Ambient Test Temperature		
Vehicle	Low	High	Average
1	80	103	90.4
5	82	103	92.7
6	81	104	91.7
7	81	102	91.4
8	79	103	88.9
11	81	104	92.2
16	81	101	89.4
20	81	100	90.6
22	80	102	92.5
24	78	101	90.2
27	80	102	91.5
33	82	104	91.3
43	80	99	90.6
48	81	100.4	89.7
51	82	103	92.4
54	79	99.5	89.7
58	79	101	89.9
65	79	99.9	90.1
82	77	100	89.6
84	80	100	91.1

Table 5b

Maximum Ambient Test Temperature by Fuel

	Maximum Ambient Test Temperature		
Fuel	Low	High	Average
H0	77	92	87.6
H3	79	96	87.4
H6	81	98	89.6
H10	83	100	92.2
I0	81	95	88.1
I3	86	100	92.6
I6	86	101	93.6
I10	86	101	94.1
L0	82	104	93.6
L3	80	98	88.4
L6	81	102	92.3
L10	80	101	90.5

Table 6
Quadratic + Temp-Initial DVPE Interaction Model - Beta Coefficients

Vehicle	Coefficients					Loss When DVPE = 13.9 and T = 91, psi
	Intercept	DVPE	DVPE2	Amb T	DVPE*T	
1	5.4969	-1.0532	0.0320	-0.0614	0.0093	3.21
5	6.9621	-1.2592	0.0320	-0.0614	0.0093	1.81
6	5.5856	-1.1218	0.0320	-0.0614	0.0093	2.34
7	6.0938	-1.1628	0.0320	-0.0614	0.0093	2.28
8	6.4066	-1.1907	0.0320	-0.0614	0.0093	2.20
11	6.6933	-1.2030	0.0320	-0.0614	0.0093	2.32
16	4.2518	-0.9601	0.0320	-0.0614	0.0093	3.25
20	6.1146	-1.2033	0.0320	-0.0614	0.0093	1.74
22	7.8046	-1.3623	0.0320	-0.0614	0.0093	1.22
24	6.7695	-1.2353	0.0320	-0.0614	0.0093	1.95
27	5.3884	-1.0122	0.0320	-0.0614	0.0093	3.67
33	4.2658	-0.8767	0.0320	-0.0614	0.0093	4.43
43	7.5600	-1.2842	0.0320	-0.0614	0.0093	2.06
48	5.0716	-0.9501	0.0320	-0.0614	0.0093	4.21
51	4.8646	-0.9594	0.0320	-0.0614	0.0093	3.88
54	5.5368	-1.0952	0.0320	-0.0614	0.0093	2.66
58	5.2153	-1.0908	0.0320	-0.0614	0.0093	2.40
65	5.5338	-1.0508	0.0320	-0.0614	0.0093	3.28
82	6.9949	-1.2584	0.0320	-0.0614	0.0093	1.85
84	6.9185	-1.2596	0.0320	-0.0614	0.0093	1.76
Overall	5.9764	-1.1295	0.0320	-0.0614	0.0093	2.63

Figure 1
Vehicle Screening Results on Fuel H 10
No Temperature Correction

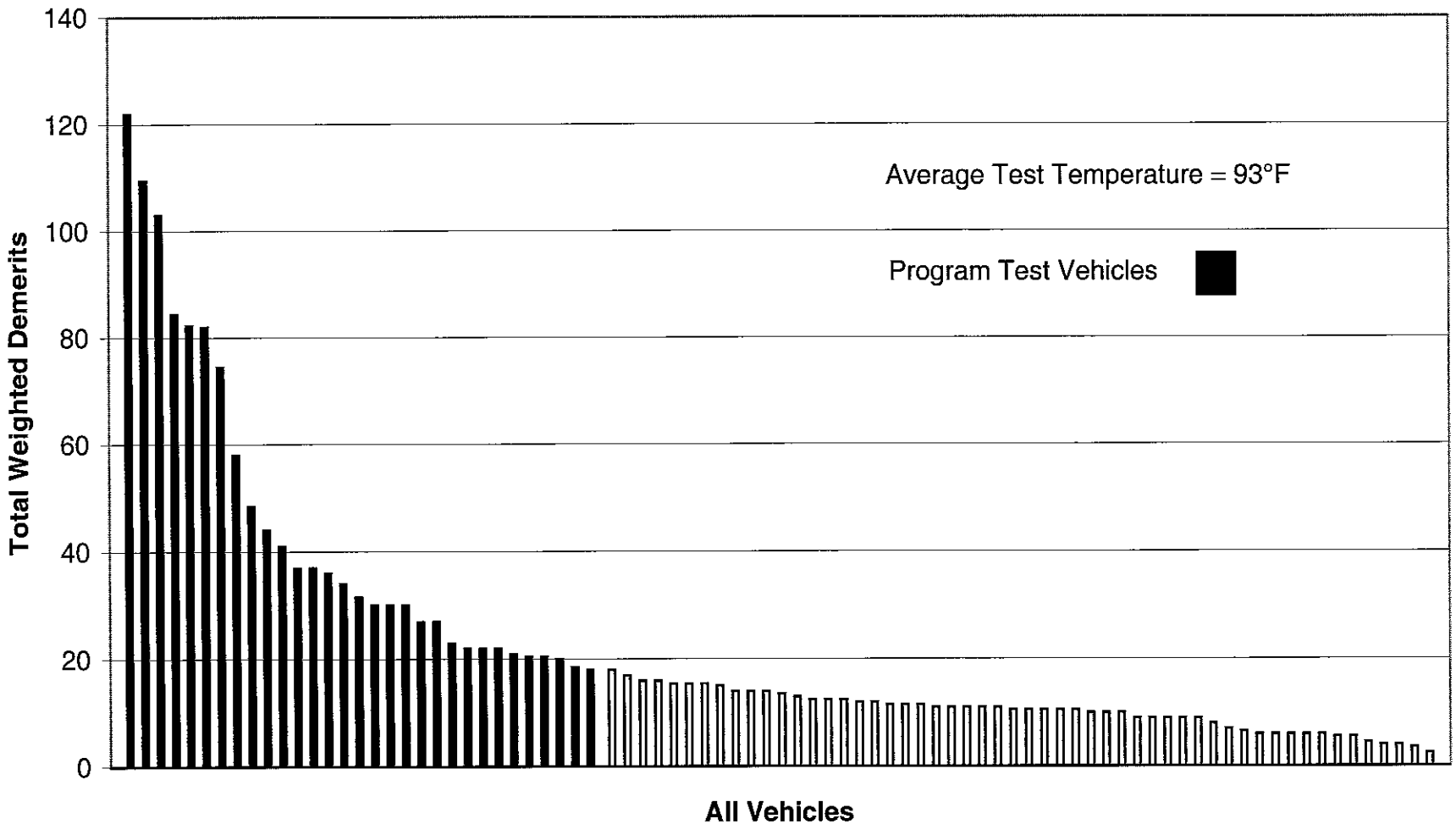


Figure 2
Mean Corrected TWD vs. Vehicle

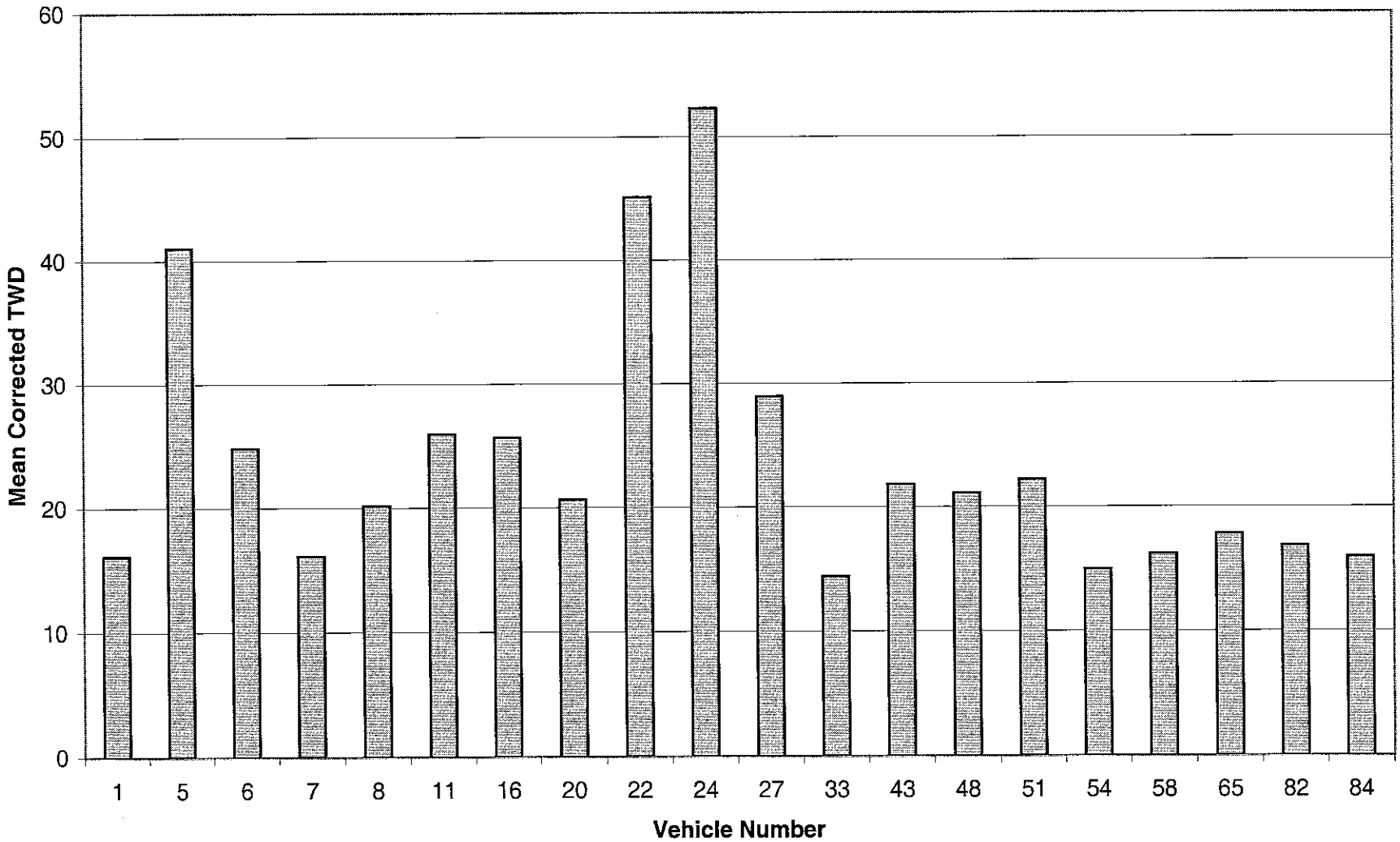


Figure 3
Mean Corrected TWD vs. Fuel

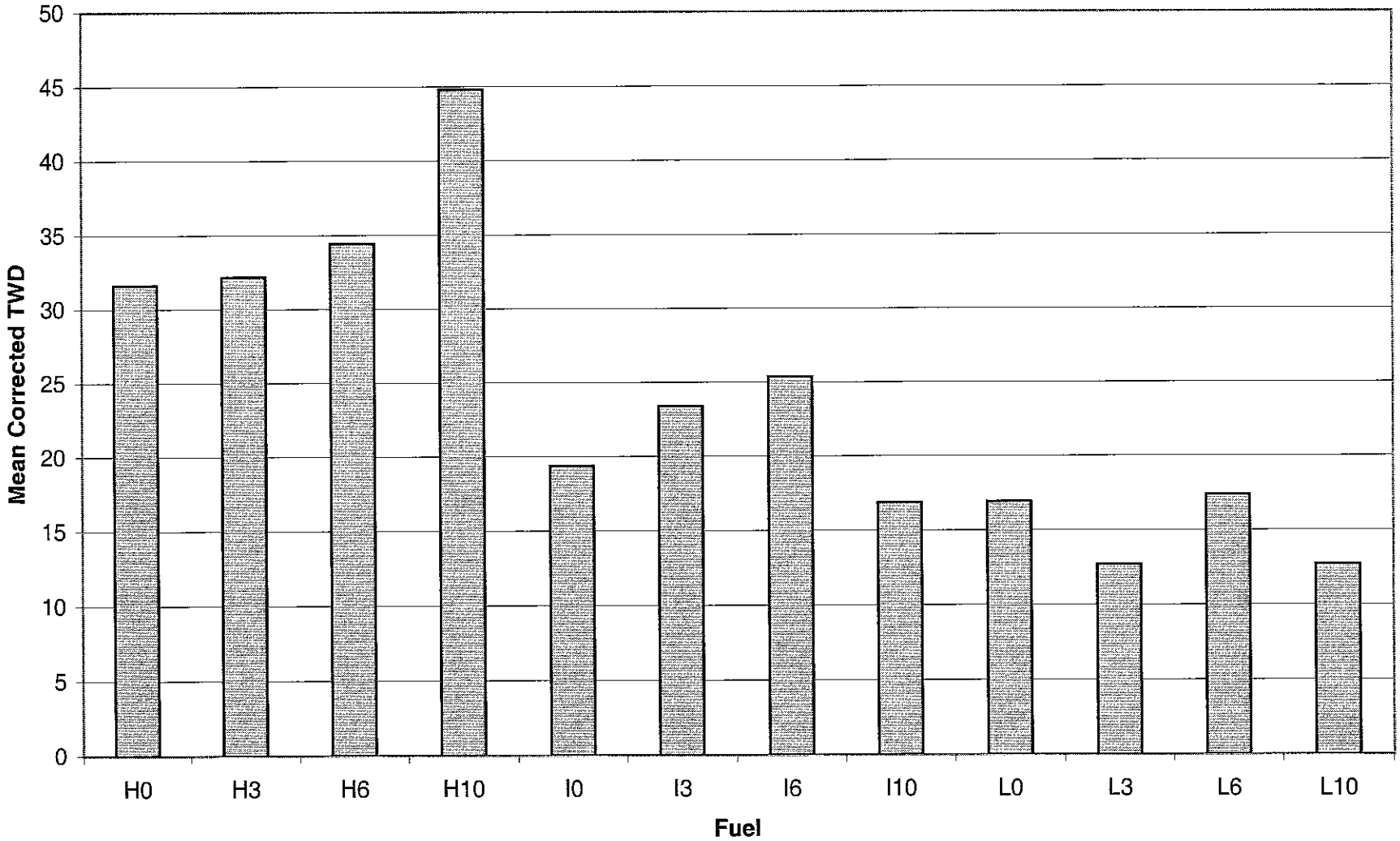


Figure 4
Relationship Between LN Mean Corrected TWD and T V/L=1 at 500 kPa

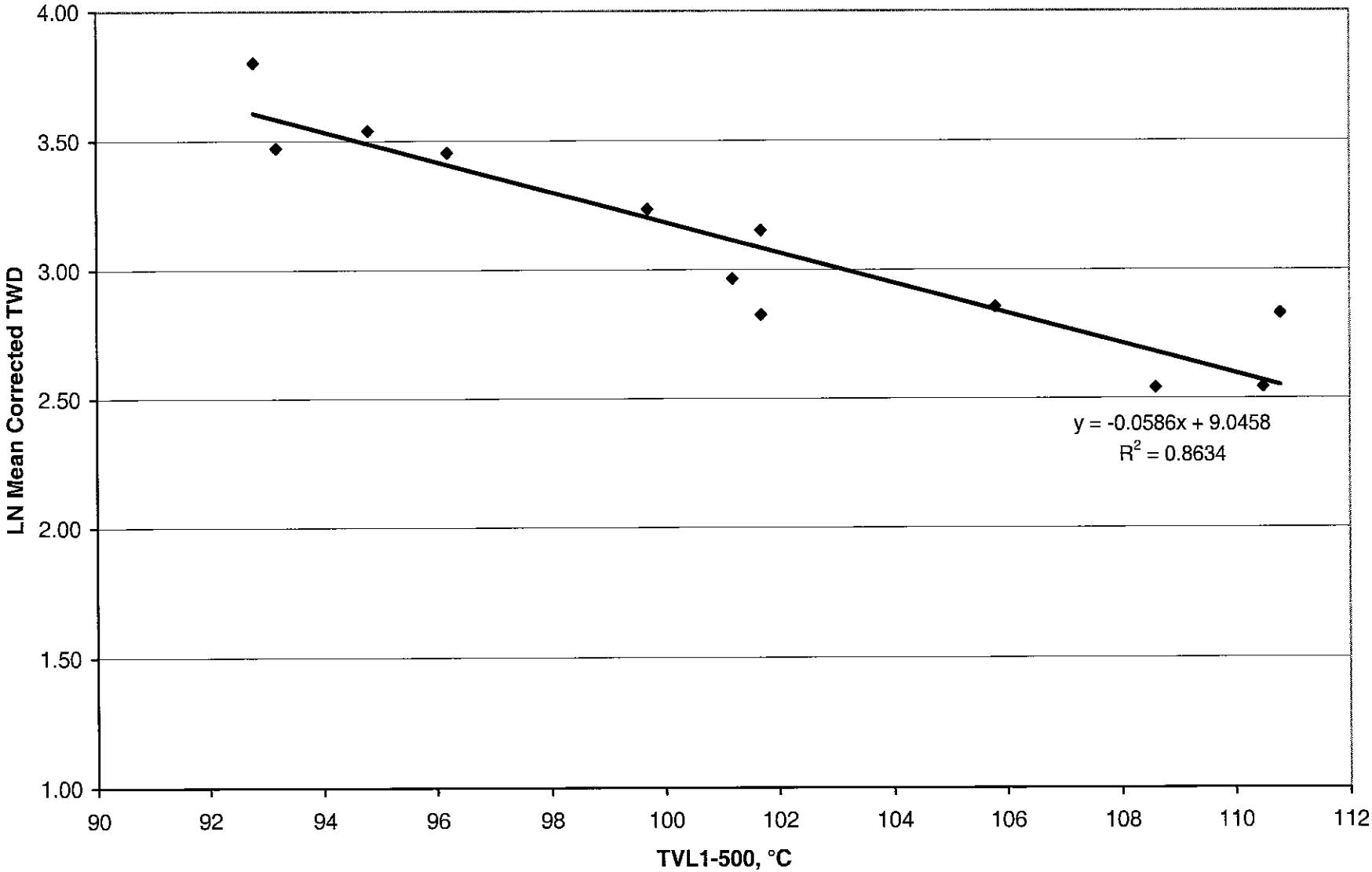


Figure 5
Relationship Between LN Mean Corrected TWD and T V/L= 20

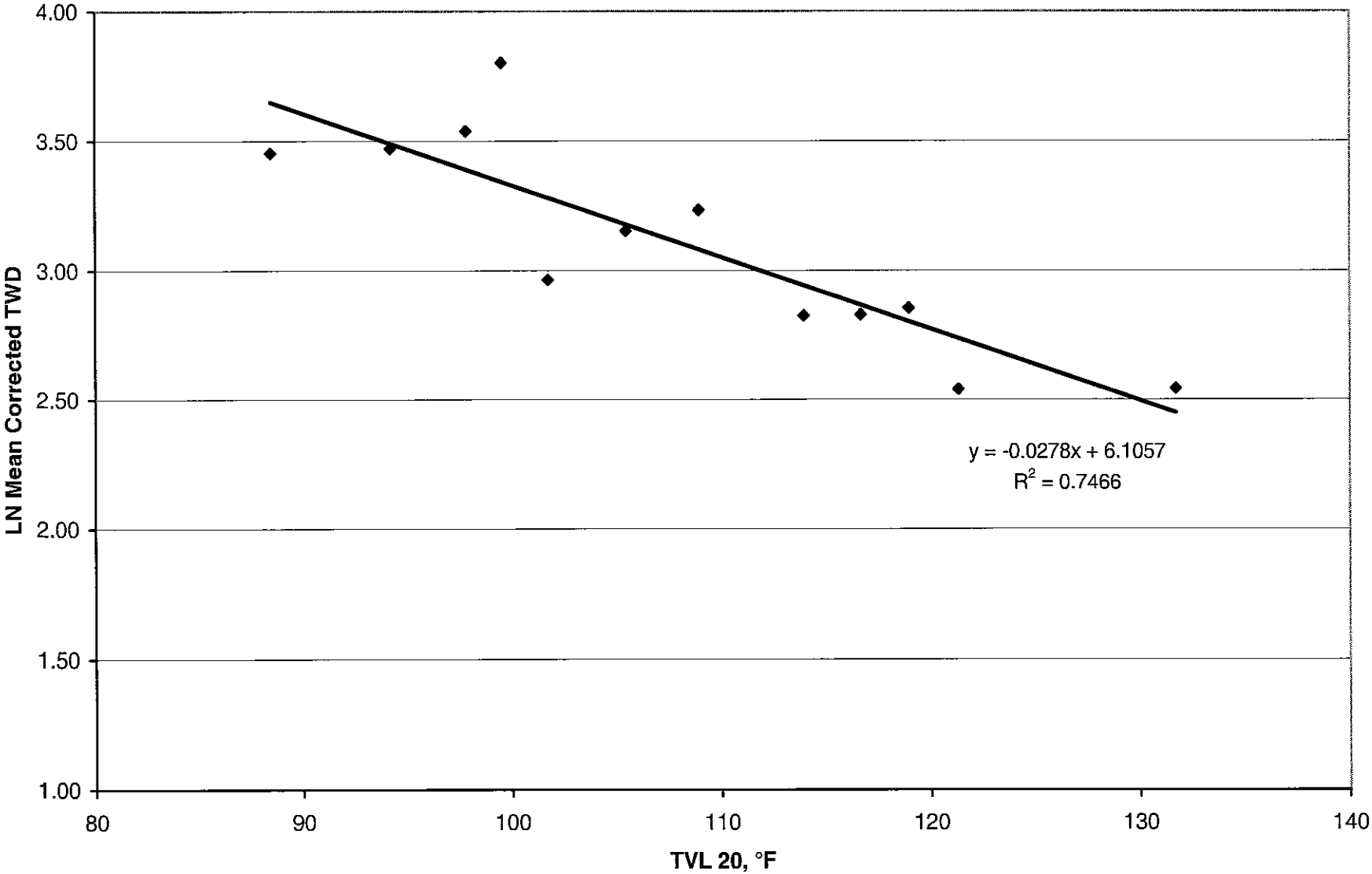


Figure 6
Relationship Between LN Mean Corrected TWD and DVPE

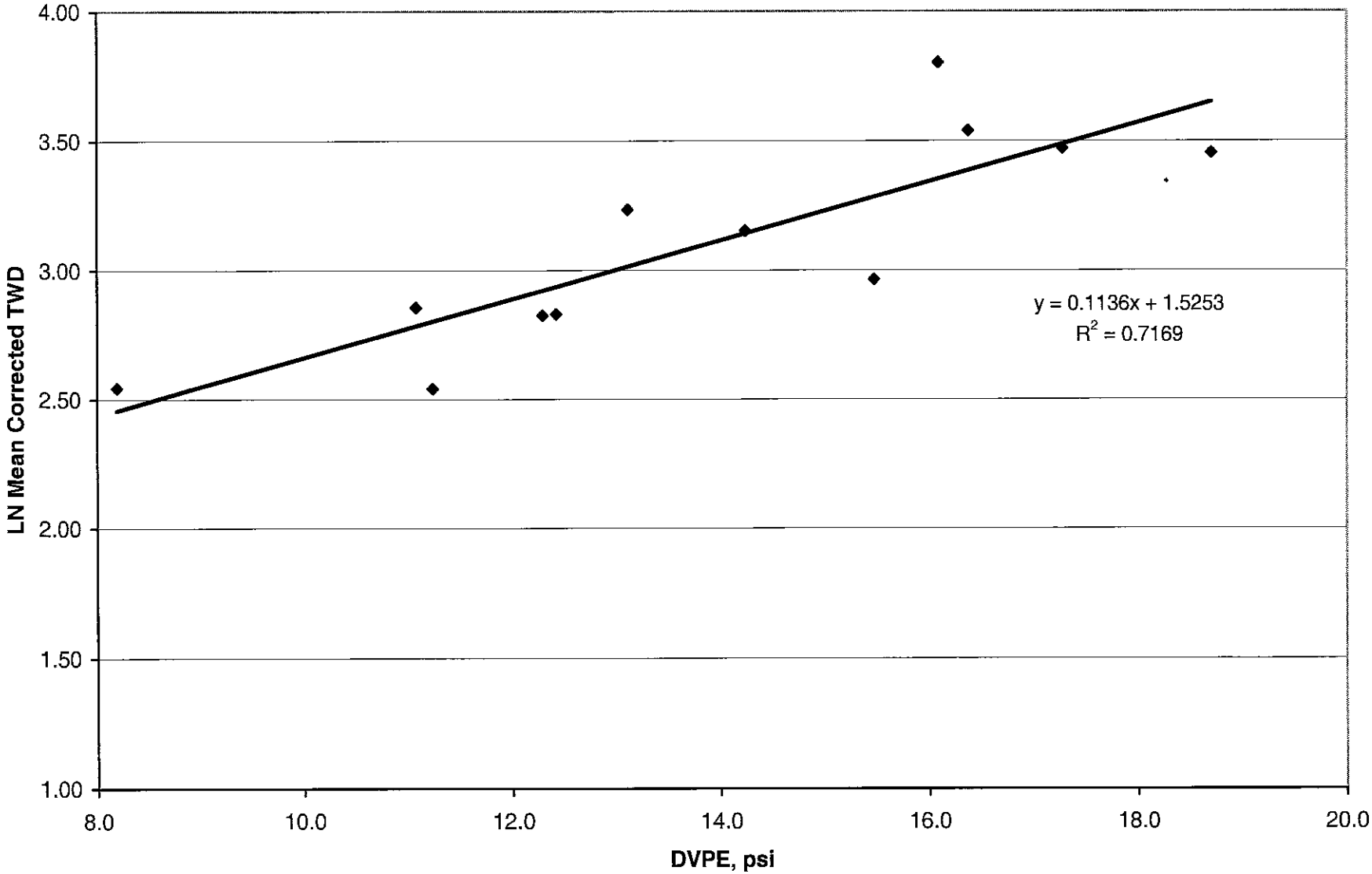


Figure 7
Relationship Between LN Mean Corrected TWD
and T V/L= 20 - 1.27*(EtOH Vol %)

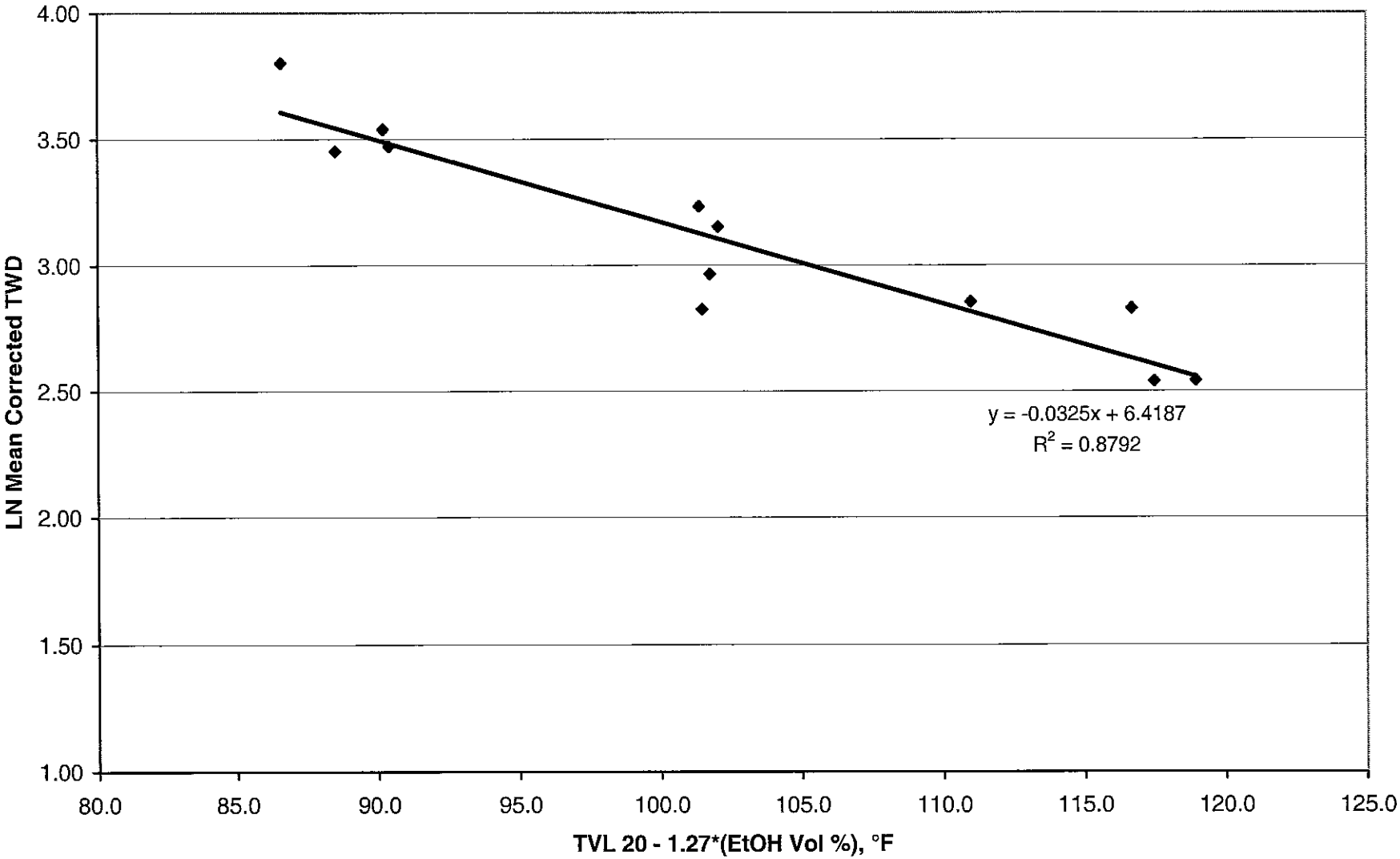


Figure 8
Relationship Between LN Mean Corrected TWD and DVPE + 0.336*(EtOH Vol %)

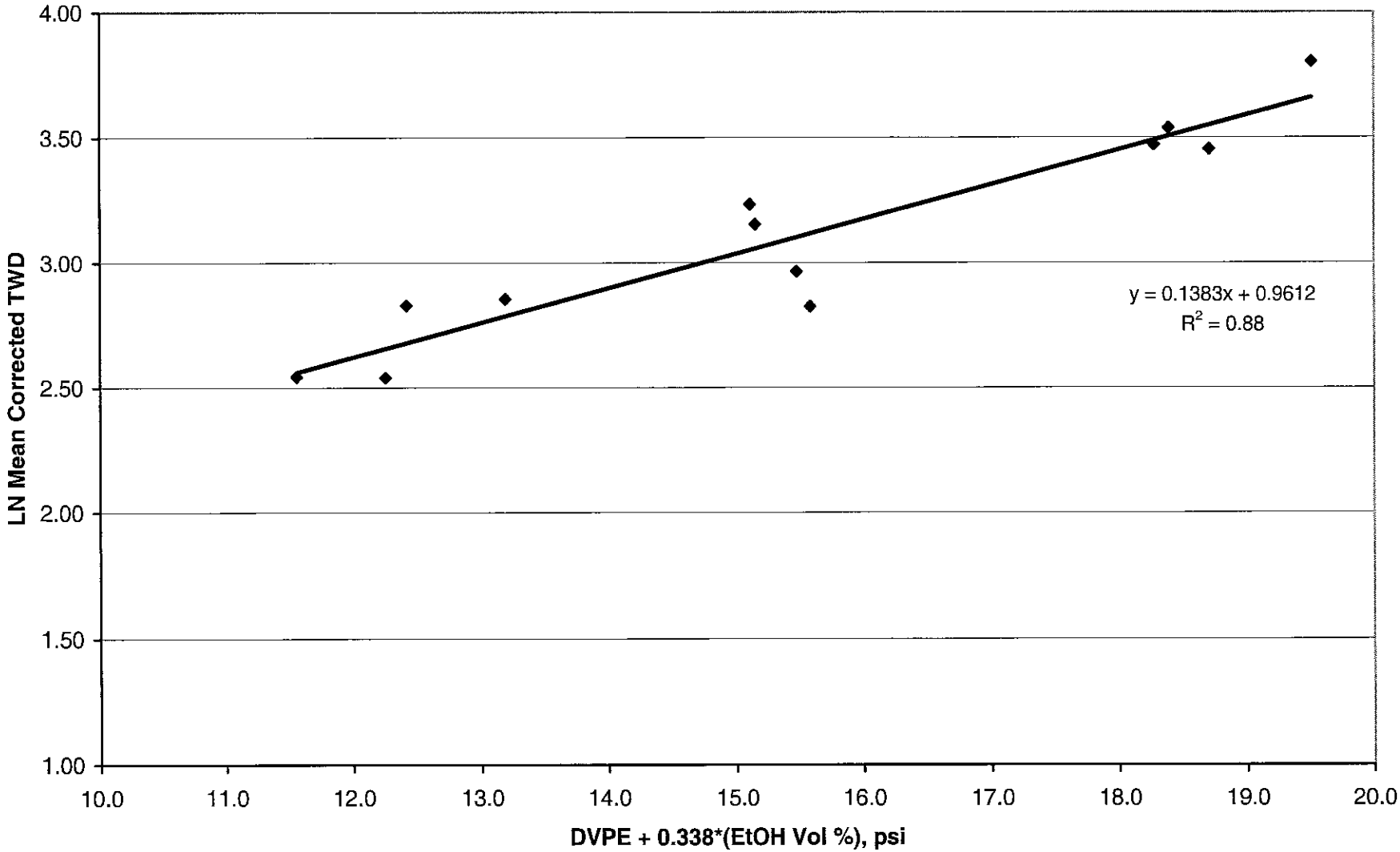


Figure 9
Ethanol Carry-Over From H10 After Flushing With L0 Hydrocarbon-Only Fuel

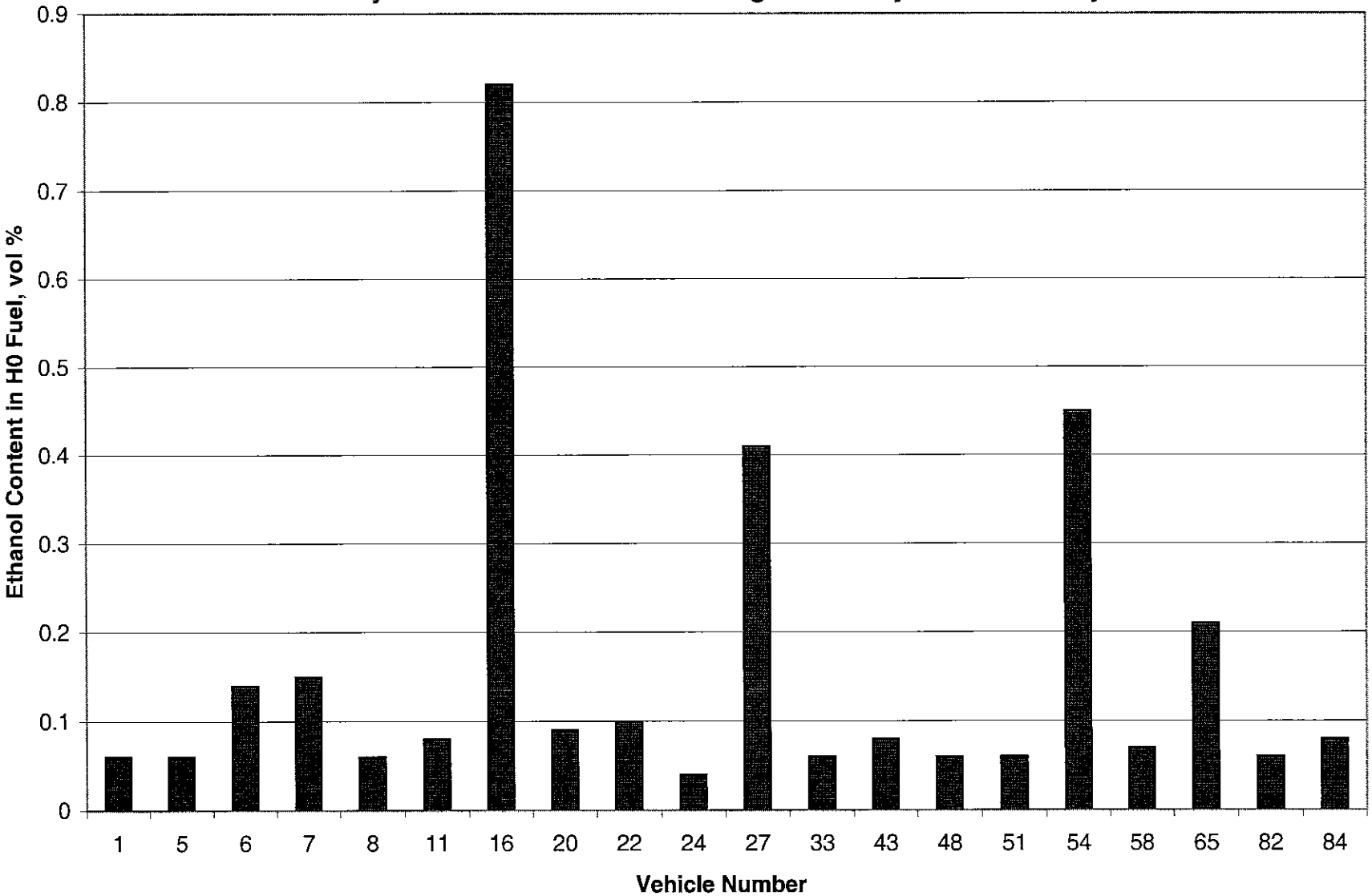


Figure 10
Vehicle Effect on Fuel Weathering

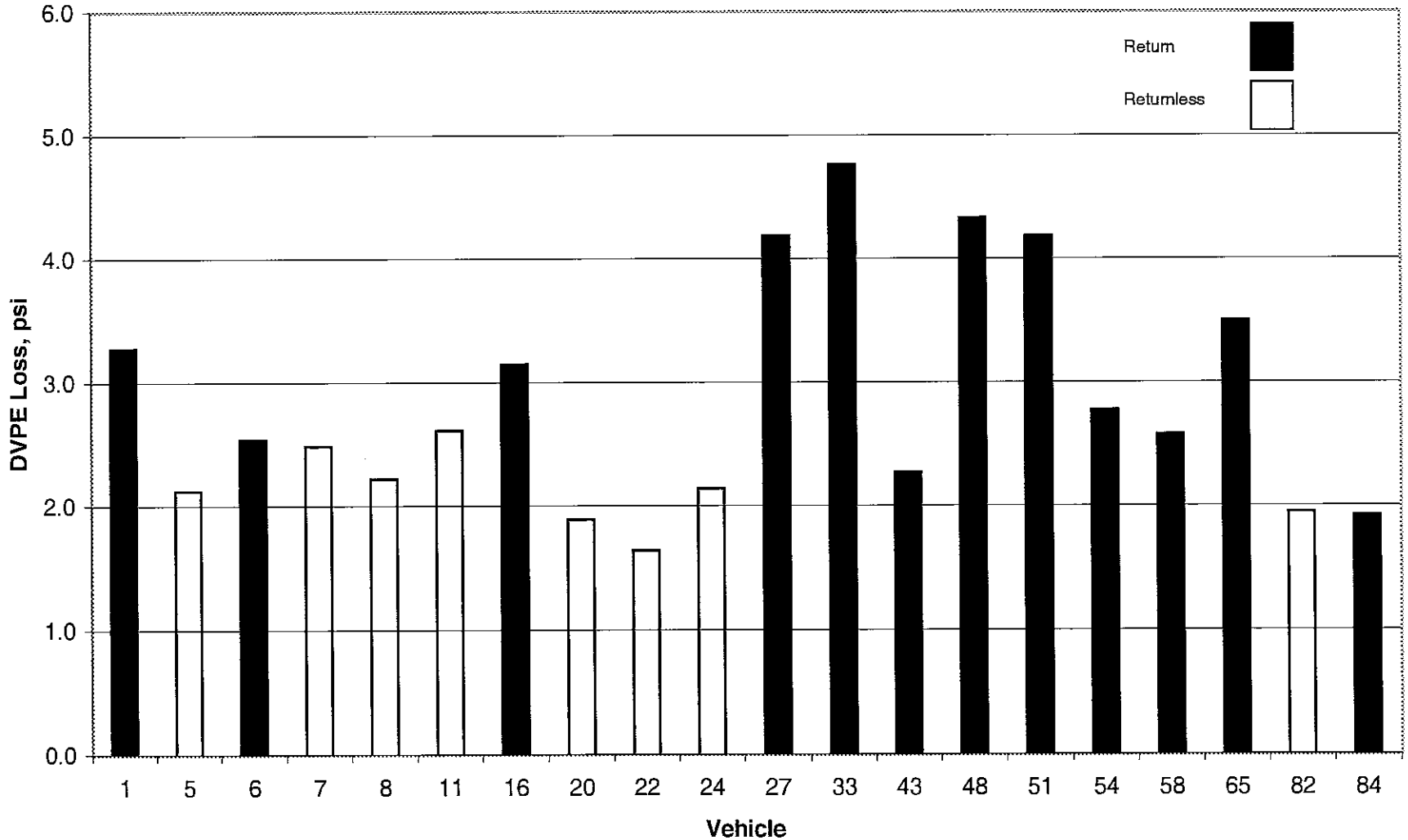


Figure 11
Fuel Effect on Fuel Weathering

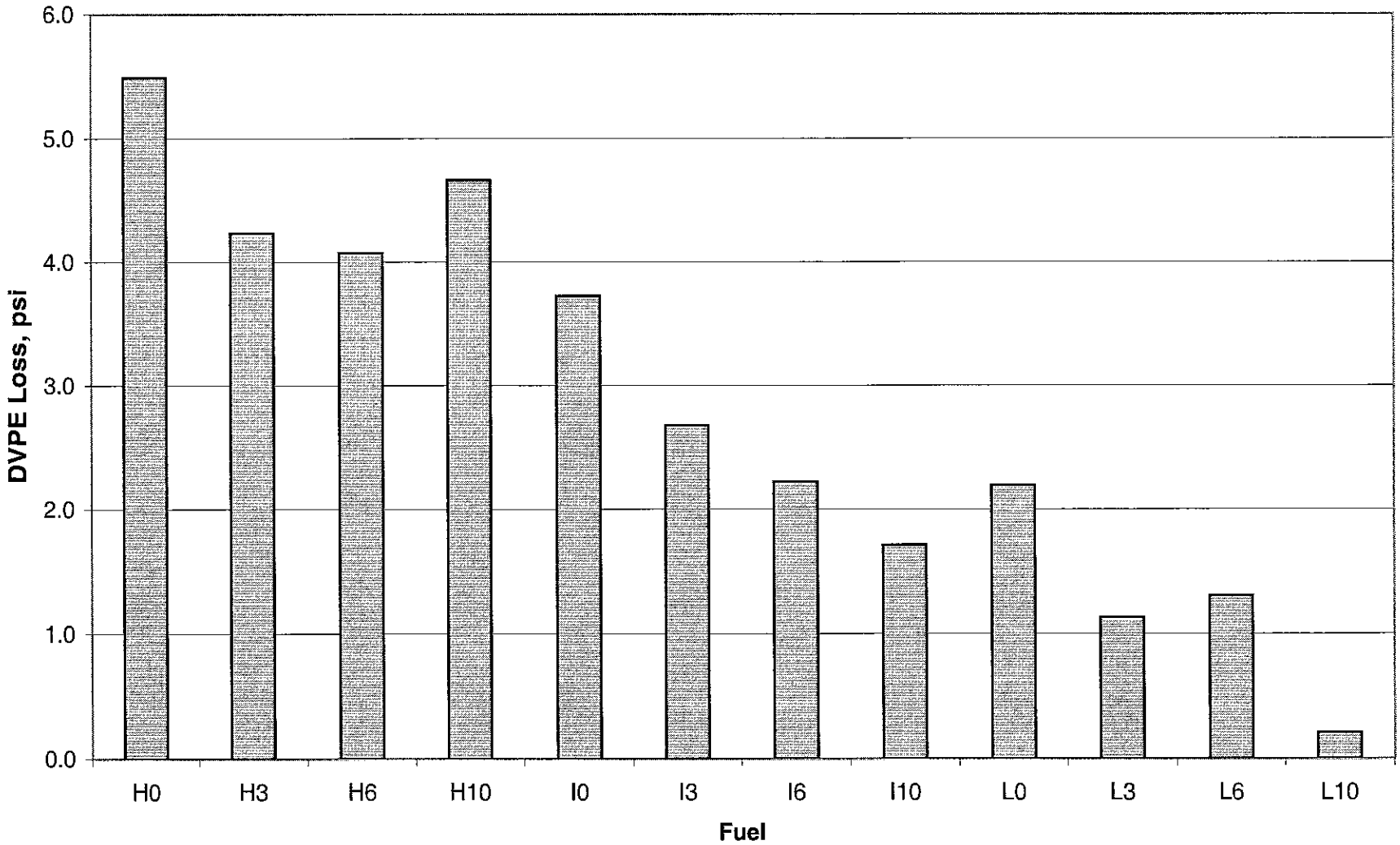
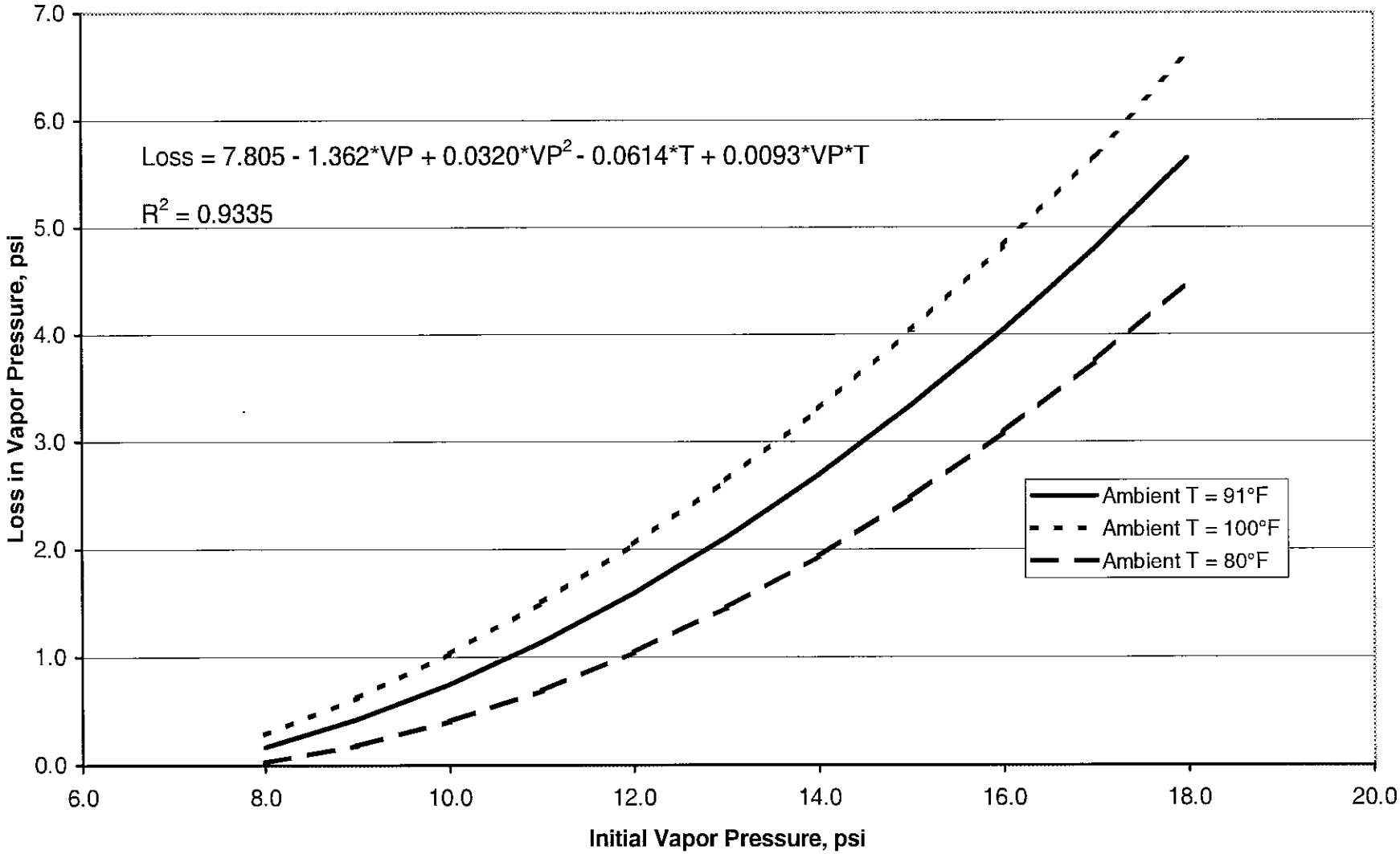


Figure 12
Average Effect of Vapor Pressure
and Ambient Temperature on Fuel Weathering



APPENDIX A

MEMBERS OF THE

2001 CRC HOT-FUEL-HANDLING PROGRAM

DATA ANALYSIS PANEL

Appendix A

Members of the
2001 CRC Hot-Fuel-Handling Program
Data Analysis Panel

Name	Company
L. M. Gibbs, Leader	Chevron Products Company
Beth Evans	Consultant
B. E. Goodrich	BP Oil Company
C. H. Jewitt	Renewable Fuels Association
J. M. Knight	General Motors Powertrain
M. J. McNally	ExxonMobil
K. L. Perry	General Motors Research
C. E. Richardson	Ford Motor Company
J. H. Shipinski	Toyota

APPENDIX B

PARTICIPANTS IN THE

2001 CRC HOT-FUEL-HANDLING PROGRAM

ON-SITE AT YAKIMA, WASHINGTON

Appendix B

Participants in the 2001 CRC Hot-Fuel-Handling Program On-Site at Yakima, Washington

Name	Company
Ted Adcock	Equilon Enterprises
Harold "Archie" Archibald	Consultant
Dwight Bare	Consultant
Leon Bergeron	Ford Motor Company
Rob Boom	Chevron Products Company
Mike Briggs	Consultant
Eddie Carral	Chevron Oronite Company
Beth Evans	Consultant
Matt Franklin	Chevron Products Company
Steve Hardin	Chevron Products Company
Steve Hill	BP Oil Company
Bill Horyn	BP Oil Company
Carl Jewitt	Renewable Fuels Association
Jeff Knight	General Motors Powertrain
Ray Kobe	Consultant
Phil Krysinski	DaimlerChrysler
Yeong Kwan	ExxonMobil
Lloyd McGill	Equilon Enterprises
Mark Matthews	BP Oil Company
Marcus Moore	ExxonMobil
Kevin Perry	General Motors
Jimmy Pitta	Chevron Oronite Company
Don Pivonka	Consultant
Dennis Poma	BP Oil Company
Greg Poore	Honda Research and Development
Clive Pyburn	Consultant
Doug Rathe	Equilon Enterprises
Rick Riley	Consultant
Gary Sengelmann	Equilon Enterprises
Steve Simms	BP Oil Company
Dave Sporleder	Shell Canada
Ron Stone	Consultant
Phil Van Acker	BP Oil Company
Damon Vaudrin	Chevron Oronite Company

APPENDIX C

2001 CRC HOT-FUEL-HANDLING PROGRAM

2001 CRC HOT-FUEL-HANDLING PROGRAM

Objective

Determine under warm ambient conditions the effect of fuel front-end volatility and ethanol content on hot-fuel-handling driveability performance in a large group of late model vehicles equipped with fuel injection systems.

Deliverables

A front-end volatility parameter and/or index that accurately predicts the hot-fuel-handling performance of both hydrocarbon-only fuels and various concentrations of ethanol blends.

Introduction

In 1999, the CRC Volatility Group conducted a hot-fuel-handling program in 11 vehicles to determine what volatility parameter best predicted hot driveability performance in fuel injected equipped vehicles. The findings of the program showed that the best single parameter was an experimental one that measured the temperature for a vapor-liquid ratio of 1 at 500 kPa (TVL1-500). The temperature for a vapor-liquid ratio of 20 (TVL20), which is the parameter currently used in ASTM D 4814 to control vapor lock, did not predict performance the same for hydrocarbon-only fuels and ethanol blends. An index using TVL20 and ethanol content terms predicted performance nearly as well as TVL1-500. The results of this program are presented in CRC Report No. 623.

Because only one concentration of ethanol (10 volume percent) was tested, it is not known if the driveability response is linear with ethanol concentration. Before new hot-fuel-handling control limits can be adopted in ASTM D 4814, the effect of ethanol concentration has to be determined. Further, a broader cross-section of vehicles needs to be investigated before new limits can be considered by ASTM.

Test Program

Vehicle hot-fuel-handling performance will be determined using the test procedure from the 1999 CRC volatility test program. Hydrocarbon-only fuels and three concentrations of ethanol blends will be evaluated in a large group of late model fuel-injected vehicles. This program will be conducted in the summer of 2001.

Test Fuels

The test fuel design will evaluate hydrocarbon-only fuel and three concentrations of ethanol blends (5, 7.5, and 10 volume percent) at three volatility levels. The volatility levels will be such that the low volatility fuel series will just not cause driveability problems, the intermediate volatility series will cause mild driveability problems, and the high volatility series will cause severe driveability malfunctions. The volatility levels will be selected based on the results from

the 1999 CRC volatility program. The most volatile hydrocarbon-only fuel will be equal to or slightly more volatile than the most volatile ethanol blend in order to bracket the ethanol blends. This will provide a better assessment of the ethanol term in an index equation. With this design, the program will evaluate a total of 12 test fuels.

The specifications for the 12 test fuels are shown in Table 1. The limits are designed around the single best parameter from the 1999 CRC Volatility Program. Estimates of equivalent TVL20 values for the fuels are shown. This initial proposal requires that each test fuel be specially blended. It may be possible to blend a common base fuel and add butane and a mixture of C6 and C7 paraffins along with the various concentrations of ethanol to meet the requirements of the various test fuels. A Fuel Blending and Analysis Task Force will be formed to develop the final detailed specifications for the test fuels and to assist in the analyses of the fuels.

Test Vehicles

Forty-five (45) late model fuel injected equipped vehicles will be used in the test program to evaluate the hot-fuel-handling driveability performance of the test fuels. The vehicles will be selected based on vehicle sales distribution, will have stabilized mileages at over 6,000 odometer miles, and be in good mechanical condition with functional air conditioning systems. The vehicles will nominally cover the 1999-2001 model years.

Since this survey program is larger than the 1999 research program, fuel will be drained from the fuel tanks by pumping it out through Schrader values rather installing tank drains. This time no thermocouples will be installed to determine fuel system temperatures.

Test Procedure

The Modified Traditional Track Test Procedure used in the 1999 CRC volatility program will be used in this follow-up program. Each vehicle will be flushed with test fuel and filled to 40 percent of tank capacity. The most volatile fuel will be tested in each vehicle at increasing ambient temperatures until malfunctions are reported. If no problems are observed at the highest available temperature with the most volatile fuel, the vehicle will be parked and eliminated from the test fleet. If driveability problems are observed, lower volatility fuels will be tested at several ambient temperatures.

Test Temperatures

The ambient test temperature will be a minimum of 80°F. It is desirable to conduct some testing above 100°F, depending upon the weather conditions.

Test Location

The test program will be conducted at the Renegade Raceways in Yakima, Washington, where the desired ambient conditions occur in the summer.

Timing

The timing will be for a one week set-up and a five-week testing program in July/August 2001. It is planned that the data analysis and report-writing activities can be completed within about nine-months following the completion of the testing portion of the program.

Personnel Requirements

The program will require 13 people on-site for each testing week for a total of 65 person-weeks. Mechanics and set-up people will be required for the week prior to the start of testing.

Table 1

2001 CRC Volatility Program Test Fuel Inspections

Property	Test Methods	Low Volatility Series				Intermediate Volatility Series				High Volatility Series			
		L0	L3	L6	L10	I0	I3	I6	I10	H0	H3	H6	H10
Ethanol, Vol %	D 4815	0	2.5-3.5	5.5-6.5	9.5-10.5	0	2.5-3.5	5.5-6.5	9.5-10.5	0	2.5-3.5	5.5-6.5	9.5-10.5
TVL1-500, °C Target	GM	110	110	110	110	100	100	100	100	90	90	90	90
TVL20. °F Approximate	D 5188	120	126	128	132	103	109	111	114	86	92	94	97
DVPE, psi	D 5191	11.8-12.2	10.8-11.2	9.8-10.2	7.8-8.2	14.8-15.2	13.8-14.2	12.8-13.2	11.8-12.2	17.8-18.2	16.8-17.2	15.8-16.2	15.8-16.2
10% Evaporated, °F	D 86	110-125	115-130	115-130	120-135	95-110	95-110	100-115	100-115	75-90	80-95	85-100	85-100
50% Evaporated, °F	D 86	185-195	195-205	195-205	180-190	175-185	170-180	160-170	150-160	165-175	170-180	155-165	155-165
90% Evaporated, °F	D 86	300-330	300-330	300-330	300-330	290-330	290-330	290-330	290-330	290-330	290-330	290-330	290-330
Aromatics, vol %	D 1319	20-30	15-25	15-25	15-25	20-30	15-25	15-25	15-25	20-30	15-25	15-25	15-25
Olefins, vol %	D 1319	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
Saturates, vol %	D 1319	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report
Benzene, vol %	D 3606	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MTBE, vol %	D 4815	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead, g/gal	D 3237	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Washed Gum, mg/100mL	D 381	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
RON	D 2699	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90
MON	D 2700	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
(R+M)/2	Calculation	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
API Gravity	D 4052	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report

Fuel Tank Flushing Procedure

Precautionary notes:

1. ***When draining the vehicle fuel tank, leave the fuel pump on until no drops are coming out of the line. This will ensure that each vehicle fuel tank drain is complete, and the same as the other fuel tank drains.***
2. ***Use a UL approved ground strap to ground defueling equipment to the fuel injector rail or fuel line fitting for all fuel draining.***

Flushing Procedure:

1. When a vehicle comes in from testing, hook up the chilled sampling system, and draw the required fuel sample through the Schrader valve or adapter line fitting using the vehicle fuel pump.
2. Remove the sampling system. Immediately prior to testing, install drain line, and then completely drain the fuel tank through the Schrader valve or adapter line fitting using the vehicle fuel pump.
3. Remove the fill cap, add four gallons of the next test fuel to the vehicle fuel tank, and replace the fill cap.
4. Start and idle the vehicle for a total of 2 minutes.
5. Completely drain the fuel tank through the Schrader valve or adapter line fitting using the vehicle fuel pump.
6. Remove the fill cap, add four gallons of the next test fuel to the vehicle fuel tank, and replace the fill cap.
7. Start and idle the vehicle for a total of 2 minutes. From approximately 15 seconds into the idle for a period of 30 seconds, rock the rear end of the vehicle from side to side. This task will require one person on each side of the vehicle.
8. Completely drain the fuel tank through the Schrader valve or adaptive line fitting using the vehicle fuel pump.
9. When the rating crew is ready, remove the fill cap, add four or five gallons as required of the test fuel to the vehicle fuel tank, and replace the fill cap.

Modified Traditional Track Test Procedure

Version: 2/9/1999

1. Drain vehicle fuel tank. Fill tank to 40 percent capacity with test fuel. Record start of test information on data form. Set vehicle air conditioning on normal (fan speed one lower than high) with windows down about one inch for entire test duration.
2. Drive a nominal 15-mile warm-up cycle at 55 mph. Proceed to entrance of test track.
3. On test track, perform ten wide-open throttle accelerations from 0-35 mph (five in each direction). Park vehicle (back into) in soak tent.
4. Turn engine off and soak for 20 minutes.
5. After 20 minutes, restart engine. Record starting time, idle quality and the occurrence of any stalls. If engine stalls, restart immediately and record starting time and idle quality. Shift transmission into drive and record idle quality and any occurrence of stalls.
6. Ease vehicle at very light-throttle from soak tent onto test track. Stop and accelerate at wide-open-throttle to 35 mph. Record any vehicle driveability malfunctions (power loss, surge, stumble, stall, etc.) and severity.
7. Proceed to end of test track. Turn around and drive back to soak tent at 50 mph. Complete an additional lap (down and back) at 50 mph. Repeat step 3.
8. Shift transmission into park and idle for 20 minutes. If engine stalls, record stall incidence and idle soak time. Attempt to restart engine immediately. If engine starts and continues to run, continue test. If engine continues to stall after three restart attempts, restart vehicle by any appropriate means and abort test. Obtain fuel sample if test is aborted.
9. After 20 minute soak at idle, record idle quality. Shift to drive and record idle quality and any incidence of stalls and restarting.
10. Ease vehicle at very light-throttle from soak tent onto test track. Stop and accelerate at light-throttle* to 35 mph. Record any vehicle driveability malfunctions (power loss, surge, stumble, stall, etc.) and severity.
11. Proceed to end of test track. Turn around and drive back to soak tent at 50 mph. Park vehicle (back into) in soak tent.
12. Turn engine off and soak for 20 minutes.
13. After 20 minutes, restart engine. Record starting time, idle quality and the occurrence of any stalls. If engine stalls, restart immediately and record starting time and idle quality. Shift transmission into drive and record idle quality and any occurrence of stalls.
14. Ease vehicle at very light-throttle from soak tent onto test track. Stop and accelerate at light-throttle* to 35 mph. Record any vehicle driveability malfunctions (power loss, surge, stumble, stall, etc.) and severity.
15. End of test. Obtain vehicle fuel tank sample.

*Light-throttle acceleration is defined as the vacuum gauge reading for the initial throttle position required to attain 25 mph in 9 seconds.

APPENDIX D

DETAILED FUEL INSPECTIONS

AND ON-SITE VAPOR PRESSURE DETERMINATIONS

Table D-1
Individual Laboratory Fuel Inspections

Fuel Code			L 0							L 3						
Laboratory			A	B	C	D	E	F	Average	A	B	C	D	E	F	Average
Property	Method	Units														
TVL1-500	GM	°C	110.8	-	-		-		110.8	108.6	-	-	-	-		108.6
Temperature for V/L=20	ASTM D 5188	°F	116.0	117.1	118.0	115.9	117.1	116	116.7	120.6	121.5	123.4	118.8	122.1	121.6	121.3
DVPE	ASTM D 5191	psi	12.4	12.27	12.4	12.42	12.6	12.43	12.4	11.2	11.17	11.3	11.18	11.44	11.16	11.2
Distillation	ASTM D 86															
Initial Boiling Point		°F	80	80.4	80.2	80.0	80.0	87.0	81.3	84.0	88.4	87.4	84.9	85.0	89.1	86.5
5% Evaporated		°F	99	95.5	100.9	97.9	96.0	98.0	97.9	104.0	101.9	107.7	109.2	106.0	104.5	105.6
10% Evaporated		°F	109	107.6	111.2	107.5	107.0	111.1	108.9	115.0	114.4	117.1	117.5	116.0	115.5	115.9
20% Evaporated		°F	128	127.0	128.6	125.1	126.0	120.7	125.9	129.0	131.3	133.5	133.2	131.0	130.1	131.4
30% Evaporated		°F	151	146.8	148.1	145.0	145.0	147.6	147.3	155.0	155.8	158.3	159.2	156.0	155.5	156.6
40% Evaporated		°F	173	168.1	169.5	166.9	167.0	168.8	168.9	184.0	179.9	184.1	184.5	183.0	181.5	182.8
50% Evaporated		°F	192	188.4	189.6	187.2	188.0	189.1	189.1	202.0	198.7	202.1	201.2	201.0	200.3	200.9
60% Evaporated		°F	210	205.9	208.2	205.4	206.0	207.5	207.2	217.0	215.2	217.9	217.0	217.0	216.4	216.7
70% Evaporated		°F	228	227.1	227.1	223.7	225.0	226.7	226.3	234.0	231.2	235.2	233.2	235.0	233.7	233.7
80% Evaporated		°F	256	258.3	252.5	249.4	250.0	254.4	253.4	259.0	257.0	259.7	258.6	258.0	259.0	258.5
90% Evaporated		°F	316	316.4	310.1	308.2	307.0	313.9	311.9	314.0	312.3	315.5	317.1	312.0	315.4	314.4
95% Evaporated		°F	338	343.2	334.7	334.2	331.0	338.7	336.6	341.0	340.3	339.9	341.3	336.0	341.9	340.1
End Point		°F	372	383.4	366.9	361.1	371.0	371.9	371.0	380.0	368.9	376.7	371.8	377.0	375.6	375.0
Recovery		vol %	96.5	98.3	98.8	97.5	97.1	97.1	97.6	97.0	97.5	97.6	98.3	97.6	97.2	97.5
Residue		vol %	1.0	0.5	1.0	1.7	0.7	1.0	1.0	1.0	0.6	0.8	0.6	0.8	1.1	0.8
Loss		vol %	2.5	1.2	1.5	0.6	2.2	1.9	1.7	2.0	1.9	1.6	1.1	1.6	1.7	1.7
Gravity	ASTM D 4052	°API	63.0						63.0	61.8						61.8
Lead	ASTM D 3237	g/gal	<0.01						<0.01	<0.01						<0.01
Ethanol	ASTM D 4815	vol %	<0.05	0	<0.1	<0.1	<0.1	< 0.10	0.0	2.6	3.12	3.23	3	3	3.2	3.0
MTBE	ASTM D 4815	vol %	0.0		<0.1			< 0.10	0.0	0	-	0	-	<0.1	<0.10	0.0
Uncorrected Composition																
Aromatics	ASTM D 1319	vol %	23.0		25.03			21.2	23.1	22.3					22.3	22.3
Olefins	ASTM D 1319	vol %	5.6		4.99			5.3	5.3	4.4					3.8	4.1
Saturates	ASTM D 1319	vol %	71.4		69.28			73.5	71.4	73.3					73.9	73.6
Corrected Composition																
Aromatics	ASTM D 1319	vol %	23.0		25.0			21.2	23.1	21.7		25.0			21.6	22.8
Olefins	ASTM D 1319	vol %	5.6		5.0			5.3	5.3	4.3		3.9			3.7	3.9
Saturates	ASTM D 1319	vol %	71.4		69.3			73.5	71.4	71.4		67.2			71.6	70.1
Benzene	ASTM D 3606	vol %	0.4	0.38	0.32			0.32	0.4	0.3	0.48	0.43			0.49	0.4
Solvent washed gum	ASTM D 381	mg/100ml	<1						<1	<1						<1
Research Octane Number	ASTM D 2699	ON	91.1						91.1	92.2						92.2
Motor Octane Number	ASTM D 2700	ON	83.5						83.5	84.2						84.2
(R+M)/2	D 2699/2700	ON	87.3						87.3	88.2						88.2

Table D-1 Cont'd
Individual Laboratory Fuel Inspections

Fuel Code			L 6							L 10						
Laboratory			A	B	C	D	E	F	Average	A	B	C	D	E	F	Average
Property	Method	Units														
TVL1-500	GM	°C	105.8						105.8	110.5						110.5
Temperature for V/L=20	ASTM D 5188	°F	119.7	119.8	119.8		115.4	120.2	119.0	133.5	131.9	131	128.66	133.3	131.9	131.7
DVPE	ASTM D 5191	psi	10.9	11.07	11.2		11.3	10.95	11.1	8.1	8.11	8.3	8.35	8.3	8	8.2
Distillation	ASTM D 86															
Initial Boiling Point		°F	93	90.0	88.7		86.0	95.6	90.7	101.0	104.5	102.7	103.7	94.0	108.6	102.4
5% Evaporated		°F	108	105.3	109.0		108.0	109.0	107.9	123.0	122.0	122.7	122.6	123.0	124.7	123.0
10% Evaporated		°F	118	115.2	116.9		117.0	117.2	116.9	129.0	128.9	128.3	128.0	129.0	129.9	128.9
20% Evaporated		°F	131	128.4	129.7		131.0	129.3	129.9	138.0	137.1	136.9	136.6	138.0	137.8	137.4
30% Evaporated		°F	141	140.6	140.7		142.0	140.5	141.0	145.0	145.4	144.6	144.4	147.0	145.3	145.3
40% Evaporated		°F	156	161.9	157.8		156.0	158.4	158.0	152.0	153.5	152.0	151.3	155.0	152.5	152.7
50% Evaporated		°F	200	196.5	201.3		200.0	198.3	199.2	186.0	185.4	185.3	182.7	181.0	186.8	184.5
60% Evaporated		°F	220	219.5	221.5		221.0	218.9	220.2	218.0	215.4	216.8	214.8	218.0	216.9	216.7
70% Evaporated		°F	238	236.9	237.7		236.0	235.4	236.8	234.0	233.9	233.2	230.9	235.0	231.7	233.1
80% Evaporated		°F	262	261.7	260.6		261.0	259.7	261.0	257.0	254.9	254.6	251.6	255.0	254.3	254.6
90% Evaporated		°F	317	314.9	316.0		314.0	315.3	315.4	313.0	310.3	309.9	308.2	306.0	309.6	309.5
95% Evaporated		°F	343	343.3	340.5		338.0	343.2	341.6	345.0	325.0	341.9	342.9	335.0	344.6	339.1
End Point		°F	384	387.9	375.6		388.0	376.1	382.3	386.0	335.1	381.2	374.3	401.0	385.9	377.3
Recovery		vol %	96.4	97.4	97.5		98.3	97.6	97.4	98.1	95.3	98.0	97.7	99.3	97.9	97.7
Residue		vol %	1.0	0.4	1.0		0.7	0.9	0.8	1.0	3.4	1.0	1.1	0.4	1.0	1.3
Loss		vol %	2.6	2.2	1.5		1.0	1.5	1.8	0.9	1.3	1.0	1.2	0.3	1.1	1.0
Gravity	ASTM D 4052	°API	61.7						61.7	60.8						60.8
Lead	ASTM D 3237	g/gal	<0.01						<0.01	<0.01						<0.01
Ethanol	ASTM D 4815	vol %	6.1	6.22	6.63		6	6.44	6.3	9.9	9.7	10.38	10.1	9.7	10.31	10.0
MTBE	ASTM D 4815	vol %	0.0		<0.1			<0.10	0.0	0		<0.1			<0.10	0.0
Uncorrected Composition																
Aromatics	ASTM D 1319	vol %	23.0					20.6	21.8	23.4					20.7	22.1
Olefins	ASTM D 1319	vol %	4.4					3.4	3.9	5.1					3.2	4.2
Saturates	ASTM D 1319	vol %	72.6					76	74.3	71.5					76.1	73.8
Corrected Composition																
Aromatics	ASTM D 1319	vol %	21.7		23.5			19.4	21.5	21.3		20.7			18.8	20.2
Olefins	ASTM D 1319	vol %	4.1		3.2			3.2	3.5	4.6		3.0			2.9	3.5
Saturates	ASTM D 1319	vol %	68.4		65.7			71.4	68.5	65.1		64.6			69.0	66.2
Benzene	ASTM D 3606	vol %	0.2		0.32			0.41	0.3	0.4		0.29			0.4	0.4
Solvent washed gum	ASTM D 381	mg/100ml	<1						<1	<1						<1
Research Octane Number	ASTM D 2699	ON	94.7						94.7	95.4						95.4
Motor Octane Number	ASTM D 2700	ON	86.0						86.0	86						86.0
(R+M)/2	D 2699/2700	ON	90.4						90.4	90.7						90.7

Table D-1 Cont'd
Individual Laboratory Fuel Inspections

Fuel Code			T0							T3						
Laboratory			A	B	C	D	E	F	Average	A	B	C	D	E	F	Average
Property	Method	Units														
TVL1-500	GM	°C	101.2						101.2	101.7						101.7
Temperature for V/L=20	ASTM D 5188	°F	101.4	102	102.6	99.5	102.3	102.7	101.8	105	105.8	106	104.18	105.6	106.3	105.5
DVPE	ASTM D 5191	psi	15.2	15.29	15.6	15.64	15.6	15.53	15.5	14.1	14.13	14.3	14.26	14.43	14.24	14.2
Distillation	ASTM D 86															
Initial Boiling Point		°F	78	78.8	76.6	77.2	74.0	83.5	78.0	77.0	80.2	81.3	78.7	79.0	86.4	80.4
5% Evaporated		°F	87	84.2	82.5	84.0	84.0	88.4	85.0	89.0	89.0	93.0	92.1	93.0	94.5	91.8
10% Evaporated		°F	97	93.2	92.6	92.1	93.0	96.1	94.0	97.0	99.7	100.0	98.8	100.0	100.8	99.4
20% Evaporated		°F	111	107.6	108.3	105.2	108.0	109.4	108.3	108.0	112.2	112.1	110.2	111.0	112.3	111.0
30% Evaporated		°F	128	125.6	126.3	122.2	125.0	125.7	125.5	120.0	127.0	125.7	123.1	124.0	126.3	124.4
40% Evaporated		°F	150	147.2	149.9	144.2	148.0	147.1	147.7	145.0	148.9	147.5	146.9	148.0	148.0	147.4
50% Evaporated		°F	176	172.4	177.0	170.1	174.0	173.4	173.8	177.0	177.5	177.0	177.6	178.0	177.2	177.4
60% Evaporated		°F	203	199.4	203.9	196.8	202.0	200.6	201.0	207.0	206.8	207.1	207.3	209.0	207.1	207.4
70% Evaporated		°F	229	224.6	228.0	221.2	227.0	225.0	225.8	230.0	230.7	230.9	230.1	232.0	230.6	230.7
80% Evaporated		°F	253	251.6	252.3	247.1	252.0	250.5	251.1	253.0	255.1	253.0	252.5	254.0	253.9	253.6
90% Evaporated		°F	306	296.6	305.7	302.2	303.0	305.3	303.1	304.0	307.7	302.0	305.4	303.0	307.5	304.9
95% Evaporated		°F	337	325.4	334.4	334.5	331.0	336.0	333.1	336.0	331.2	334.5	337.6	327.0	338.9	334.2
End Point		°F	378	372.2	369.3	370.7	371.0	364.5	371.0	376.0	339.8	366.4	369.0	390.0	379.6	370.1
Recovery		vol %	95.0	97.4	95.0	96.0	96.2	96.2	96.0	95.6	95.4	96.2	96.0	98.3	96.9	96.4
Residue		vol %	1.0	2.0	1.0	3.0	0.9	1.0	1.5	1.0	2.3	1.1	2.3	0.5	0.9	1.4
Loss		vol %	4.0	0.6	4.0	0.8	2.9	2.8	2.5	3.4	2.3	2.7	1.1	1.2	2.2	2.2
Gravity	ASTM D 4052	°API	68.1						68.1	66						66.0
Lead	ASTM D 3237	g/gal	<0.01						<0.01	<0.01						<0.01
Ethanol	ASTM D 4815	vol %	0.0	0	<0.1	<0.1	<0.1	< 0.10	0.0	2.7	2.75	2.8	2.46	2.8	2.69	2.7
MTBE	ASTM D 4815	vol %	0.0		<0.1			<0.10	0.0	0		<0.1		<0.1	<0.10	0.0
Uncorrected Composition																
Aromatics	ASTM D 1319	vol %	21.6		22.81			18.8	21.1	21.8					19.3	20.6
Olefins	ASTM D 1319	vol %	4.8		3.42			3	3.7	7.4					6.1	6.8
Saturates	ASTM D 1319	vol %	73.6		72.88			78.2	74.9	70.8					74.6	72.7
Corrected Composition																
Aromatics	ASTM D 1319	vol %	21.6		22.8			18.8	21.1	21.2		23.0			18.8	21.0
Olefins	ASTM D 1319	vol %	4.8		3.4			3.0	3.7	7.2		6.1			5.9	6.4
Saturates	ASTM D 1319	vol %	73.6		72.9			78.2	74.9	68.9		67.3			72.6	69.6
Benzene	ASTM D 3606	vol %	0.1		0.41			0.42	0.3	0.4	0.45	0.5			0.56	0.5
Solvent washed gum	ASTM D 381	mg/100ml	<1						<1	<1						<1
Research Octane Number	ASTM D 2699	ON	91.0						91.0	93.6						93.6
Motor Octane Number	ASTM D 2700	ON	84.0						84.0	85						85.0
(R+M)/2	D 2699/2700	ON	87.5						87.5	89.3						89.3

Table D-1 Cont'd
Individual Laboratory Fuel Inspections

Fuel Code			I 6							I 10						
Laboratory			A	B	C	D	E	F	Average	A	B	C	D	E	F	Average
Property	Method	Units														
TVL1-500	GM	°C	99.7						99.7	101.7						101.7
Temperature for V/L=20	ASTM D 5188	°F	109.4	109.94	110.3	104.2	109.9	109.9	108.9	112.4	114.08	114.6		114.3	114.4	114.0
DVPE	ASTM D 5191	psi	12.9	13.1	13.2	13.07	13.34	13.07	13.1	12.1	12.23	12.4	12.3	12.4	12.31	12.3
Distillation	ASTM D 86															
Initial Boiling Point		°F	82	85.3	84.9	82.5	84.0	90.2	84.8	78.0	86.7	85.2	83.9	84.0	93.7	85.2
5% Evaporated		°F	98	93.3	93.9	97.8	100.0	99.2	97.0	98.0	97.9	103.4	104.9	103.0	104.2	101.9
10% Evaporated		°F	105	105.7	103.2	105.4	107.0	106.3	105.4	107.0	110.1	111.0	112.3	112.0	112.3	110.8
20% Evaporated		°F	116	116.8	114.2	115.3	118.0	117.5	116.3	120.0	123.4	123.8	124.8	124.0	124.7	123.4
30% Evaporated		°F	127	127.5	124.8	126.7	129.0	127.8	127.1	132.0	134.8	135.5	136.2	136.0	135.5	135.0
40% Evaporated		°F	138	138.8	134.9	136.8	139.0	137.7	137.5	144.0	145.0	145.4	146.5	146.0	145.4	145.4
50% Evaporated		°F	170	164.8	161.4	158.0	162.0	162.4	163.1	153.0	157.3	154.0	154.3	155.0	153.4	154.5
60% Evaporated		°F	199	194.8	196.7	195.8	198.0	196.6	196.8	200.0	199.1	201.7	203.4	198.0	199.9	200.3
70% Evaporated		°F	221	219.6	219.0	217.5	220.0	220.2	219.5	225.0	228.3	228.9	227.0	229.0	227.6	227.6
80% Evaporated		°F	245	244.7	244.4	242.4	245.0	246.3	244.6	253.0	256.8	256.2	255.8	249.0	254.0	254.1
90% Evaporated		°F	300	300.2	298.5	298.7	298.0	299.8	299.2	312.0	311.0	312.2	314.2	311.0	312.2	312.1
95% Evaporated		°F	334	332.7	333.3	335.9	330.0	335.8	333.6	338.0	339.0	337.1	338.5	334.0	338.5	337.5
End Point		°F	376	379.4	372.0	365.2	386.0	369.4	374.7	372.0	376.0	372.3	365.6	370.0	367.6	370.6
Recovery		vol %	96.1	97.3	95.2	96.8	98.5	96.8	96.8	96.2	97.5	97.3	97.9	98.2	96.9	97.3
Residue		vol %	1.0	0.5	0.8	1.7	0.4	1.1	0.9	1.0	0.5	0.8	0.8	0.8	1.1	0.8
Loss		vol %	2.9	2.8	4.0	1.2	1.1	2.1	2.4	2.8	2.0	1.9	1.2	1.0	2.0	1.8
Gravity	ASTM D 4052	°API	65.2						65.2	62						62.0
Lead	ASTM D 3237	g/gal	<0.01						<0.01	<0.01						<0.01
Ethanol	ASTM D 4815	vol %	5.7	6.2	6.2	5.68	6	5.89	5.9	9.5	10.12	10.1	9.79	9.5	9.8	9.8
MTBE	ASTM D 4815	vol %	0.0		<0.1		<0.1	<0.10	0.0	0		<0.1		<0.1	< 0.10	0.0
Uncorrected Composition																
Aromatics	ASTM D 1319	vol %	21.0					18.6	19.8	25					22.2	23.6
Olefins	ASTM D 1319	vol %	7.8					6	6.9	5.8					4.3	5.1
Saturates	ASTM D 1319	vol %	71.2					75.4	73.3	69.2					73.4	71.3
Corrected Composition																
Aromatics	ASTM D 1319	vol %	19.9		20.8			17.6	19.4	22.8		23.8			20.2	22.3
Olefins	ASTM D 1319	vol %	7.4		6.3			5.7	6.4	5.3		4.2			3.9	4.5
Saturates	ASTM D 1319	vol %	67.4		66.6			71.2	68.4	63.2		61.7			66.8	63.9
Benzene	ASTM D 3606	vol %	0.4	0.46	0.48			0.59	0.5	0.2	0.38	0.39			0.52	0.4
Solvent washed gum	ASTM D 381	mg/100ml	<1						<1	<1						<1
Research Octane Number	ASTM D 2699	ON	92.0						92.0	95						95.0
Motor Octane Number	ASTM D 2700	ON	83.6						83.6	85.2						85.2
(R+M)/2	D 2699/2700	ON	87.8						87.8	90.1						90.1

Table D-1 Cont'd
Individual Laboratory Fuel Inspections

Fuel Code			H 0							H 3						
Laboratory			A	B	C	D	E	F	Average	A	B	C	D	E	F	Average
Property	Method	Units														
TVL1-500	GM	°C	96.2						96.2	93.2						93.2
Temperature for V/L=20	ASTM D 5188	°F	90.7	89.06	<93	84.9	88	89.8	88.5	95.1	94.46	95	91.58	94	95	94.2
DVPE	ASTM D 5191	psi	18.2	18.71	18.7	18.72	19.1	18.84	18.7	16.9	17.27	17.4	17.06	17.58	17.48	17.3
Distillation	ASTM D 86															
Initial Boiling Point		°F	69	72.1	72.5	72.9	74.0	76.7	72.9	72.0	74.1	73.9	77.0	73.0	79.4	74.9
5% Evaporated		°F	70	72.6	78.2	76.7	-	87.2	76.9	80.0	74.1	77.1	79.6	-	83.9	78.9
10% Evaporated		°F	81	80.6	84.7	82.7	82.0	83.5	82.4	89.0	85.6	88.8	89.0	86.0	91.5	88.3
20% Evaporated		°F	95	93.9	97.3	94.1	92.0	95.9	94.7	103.0	102.2	102.3	101.4	102.0	104.4	102.5
30% Evaporated		°F	112	110.5	113.9	110.2	110.0	110.8	111.2	119.0	118.4	118.2	116.8	117.0	119.1	118.1
40% Evaporated		°F	137	135.3	140.9	135.0	133.0	133.7	135.8	142.0	144.2	143.4	142.0	140.0	143.6	142.5
50% Evaporated		°F	174	171.3	177.2	171.7	167.0	166.8	171.3	180.0	177.4	179.7	177.7	177.0	176.3	178.0
60% Evaporated		°F	213	208.5	214.3	210.4	208.0	206.3	210.1	207.0	206.7	208.4	206.3	207.0	204.5	206.7
70% Evaporated		°F	228	235.8	238.1	234.7	236.0	233.2	234.3	231.0	231.4	231.9	230.1	231.0	228.8	230.7
80% Evaporated		°F	259	265.8	261.8	258.9	259.0	256.3	260.1	257.0	263.4	258.4	256.7	257.0	256.5	258.2
90% Evaporated		°F	314	314.9	314.2	315.5	311.0	312.8	313.7	315.0	313.0	316.7	317.6	315.0	317.7	315.8
95% Evaporated		°F	341	345.7	338.2	340.0	-	340.4	341.1	339.0	342.5	339.8	340.8	-	341.8	340.8
End Point		°F	385	390.6	373.8	383.8	373.0	369.9	379.3	378.0	386.6	372.0	366.1	380.0	366.7	374.9
Recovery		vol %	93.8	93.8	95.8	95.3	93.9	94.9	94.6	95.1	94.3	94.5	93.8	93.4	95.2	94.4
Residue		vol %	1.0	0.5	0.8	3.1	0.9	1.0	1.2	1.0	0.7	1.0	3.8	0.9	1.1	1.4
Loss		vol %	5.2	4.7	3.4	0.8	5.2	4.1	3.9	3.9	5.0	4.5	1.3	5.7	3.7	4.0
Gravity	ASTM D 4052	°API	69.0						69.0	67.4						67.4
Lead	ASTM D 3237	g/gal	<0.01		<0.1				<0.01	<0.01						<0.01
Ethanol	ASTM D 4815	vol %	0.0		<0.1	<0.1	<0.1	< 0.10	0.0	3	2.97	3	2.7	2.7	3.51	3.0
MTBE	ASTM D 4815	vol %	0.0		<0.1		<0.1	< 0.10	0.0	0		<0.1		<0.1	< 0.10	0.0
Uncorrected Composition																
Aromatics	ASTM D 1319	vol %	20.8		23.18			20.3	21.4	17.4					17.8	17.6
Olefins	ASTM D 1319	vol %	6.8		5.78			5.5	6.0	6.6					5.8	6.2
Saturates	ASTM D 1319	vol %	72.4		70.06			74.2	72.2	76					76.4	76.2
Corrected Composition					0.39											
Aromatics	ASTM D 1319	vol %	20.8		23.2			20.3	21.4	16.9		20.6			17.2	18.2
Olefins	ASTM D 1319	vol %	6.8		5.8			5.5	6.0	6.4		6.0			5.6	6.0
Saturates	ASTM D 1319	vol %	72.4		70.1			74.2	72.2	73.8		69.6			73.8	72.4
Benzene	ASTM D 3606	vol %	0.4	0.35	0.39			0.39	0.4	0.4	0.4	0.44			0.51	0.4
Solvent washed gum	ASTM D 381	mg/100ml	<1						<1	<1						<1
Research Octane Number	ASTM D 2699	ON	94.6						94.6	93.4						93.4
Motor Octane Number	ASTM D 2700	ON	86.2						86.2	85.4						85.4
(R+M)/2	D 2699/2700	ON	90.4						90.4	89.4						89.4

Table D-1 Cont'd
Individual Laboratory Fuel Inspections

Fuel Code			H 6							H 10						
Laboratory			A	B	C	D	E	F	Average	A	B	C	D	E	F	Average
Property	Method	Units														
TVL1-500	GM	°C	94.8						94.8	92.8						92.8
Temperature for V/L=20	ASTM D 5188	°F	97.8	97.7	97.7			98.1	97.8	98.6	99.7	100.9	98.6	99.2	100.2	99.5
DVPE	ASTM D 5191	psi	16.1	16.32	16.4	16.42	16.62	16.42	16.4	16.1	16.17	16	16.07	16.2	16.02	16.1
Distillation	ASTM D 86															
Initial Boiling Point		°F	72	73.7	78.4	78.1	75.0	81.6	76.5	75.0	77.4	80.4	77.4	76.0	80.4	77.8
5% Evaporated		°F	83	76.5	85.4	83.7	82.0	86.9	82.9	86.0	85.1	88.1	87.2	84.0	88.7	86.5
10% Evaporated		°F	92	89.2	94.4	92.5	92.0	95.9	92.7	97.0	93.3	98.0	96.0	96.0	97.9	96.4
20% Evaporated		°F	106	105.4	107.9	106.0	107.0	109.3	106.9	114.0	110.5	114.0	111.9	114.0	113.6	113.0
30% Evaporated		°F	123	121.4	123.0	121.1	123.0	123.9	122.6	131.0	128.3	131.3	129.8	132.0	130.5	130.5
40% Evaporated		°F	139	137.9	139.6	136.6	140.0	138.5	138.6	146.0	144.1	145.9	145.6	147.0	144.9	145.6
50% Evaporated		°F	163	172.3	168.2	157.6	163.0	168.6	165.5	155.0	156.3	155.4	154.6	156.0	154.6	155.3
60% Evaporated		°F	217	209.7	217.4	212.1	216.0	214.5	214.4	203.0	193.7	200.3	197.4	192.0	198.7	197.5
70% Evaporated		°F	235	235.0	238.8	232.8	238.0	237.4	236.2	233.0	228.5	234.3	231.1	234.0	233.5	232.4
80% Evaporated		°F	262	265.3	263.3	257.8	262.0	261.6	262.0	261.0	259.5	259.3	257.7	259.0	259.0	259.2
90% Evaporated		°F	324	315.4	322.7	321.5	321.0	322.5	321.2	310.0	307.4	308.6	306.9	306.0	308.9	308.0
95% Evaporated		°F	345	347.9	343.2	343.1	341.0	343.5	343.9	334.0	338.0	334.5	334.2	330.0	335.0	334.3
End Point		°F	381	385.2	381.0	374.5	388.0	376.9	381.1	370.0	374.4	370.0	363.6	386.0	365.0	371.5
Recovery		vol %	95.0	95.5	95.3	95.1	95.7	95.4	95.3	95.3	95.4	95.2	95.2	96.0	96.3	95.6
Residue		vol %	1.0	0.5	0.8	3.1	0.8	1.0	1.2	1.0	0.7	0.8	3.5	0.5	1.1	1.3
Loss		vol %	4.0	4.0	3.9	1.1	3.5	3.6	3.4	3.7	3.9	4.0	1.0	3.5	2.6	3.1
Gravity	ASTM D 4052	°API	66.2						66.2	62.6						62.6
Lead	ASTM D 3237	g/gal	<0.01						<0.01	<0.01						<0.01
Ethanol	ASTM D 4815	vol %	5.8	6.28	6.1	5.7	6	6.13	6.0	10	9.84	10.26	10.1	10	10.84	10.2
MTBE	ASTM D 4815	vol %	0.0		<0.1		<0.1	< 0.10	0.0	0		<0.1			< 0.10	0.0
Uncorrected Composition																
Aromatics	ASTM D 1319	vol %	17.8					17.8	17.8	23.9					23.3	23.6
Olefins	ASTM D 1319	vol %	4.8					5.1	5.0	4.6					3.8	4.2
Saturates	ASTM D 1319	vol %	77.4					77.1	77.3	71.5					72.9	72.2
Corrected Composition																
Aromatics	ASTM D 1319	vol %	16.8		20.9			16.8	18.2	21.7		23.9			21.0	22.2
Olefins	ASTM D 1319	vol %	4.5		5.2			4.8	4.8	4.2		3.6			3.4	3.7
Saturates	ASTM D 1319	vol %	73.2		67.1			72.6	71.0	65.0		61.5			65.8	64.1
Benzene	ASTM D 3606	vol %	0.1	0.21	0.25			0.33	0.2	0.8		0.87			1.04	0.9
Solvent washed gum	ASTM D 381	mg/100ml	<1						<1	<1						<1
Research Octane Number	ASTM D 2699	ON	96.7						96.7	94						94.0
Motor Octane Number	ASTM D 2700	ON	87.5						87.5	84						84.0
(R+M)/2	D 2699/2700	ON	92.1						92.1	89						89.0

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/9/01	12:23	New Barrel		H10	11:34	16.68	S		36.4	S	1:02
7/9/01	12:47	New Barrel		H0	11:28	19.11	S		31	S	1:27
7/9/01	4:59		33	H0	4:17	8.32	S	8.32	63.8	S	4:17
7/9/01	6:19		43	H0	5:57	14.2	S	14.20	42.8	S	5:57
7/9/01	6:05		6	H0	4:54	13.17	S	12.36			
7/9/01	4:03		11	H0	3:41	11.87	S	11.87			
7/9/01	2:32		20	H0	1:53	12.18	S	12.18			
7/9/01	4:44		84	H0	3:07	13.39	S	13.39			
7/9/01	3:50		19	H0	2:30	12.20	S				
7/9/01	4:31		44	H10	2:41	12.68	S				
7/9/01	3:03		46	H10	1:26	9.71	S				
7/9/01	5:12		47	H10	3:56	12.21	S				
7/9/01	5:38		55	H10	4:47	10.82	S				
7/9/01	2:48		61	H10	2:11	9.26	S				
7/9/01	5:52		83	H10	5:20	9.50	S				
7/9/01	3:14	New Barrel		H0	1:36	19.14	S				
7/9/01	3:28	New Barrel		H10	1:41	16.72	S				
7/10/01	3:05		22	H10	2:55	12.65	GR R	12.65	45	S	3:05
7/10/01	2:54		48	H10	2:27	8.68	GR L	8.68	56.7	GVL	5:30
7/10/01	5:57		82	H10	4:25	12.24	GR L	12.24	46.2	GVL	5:57
7/10/01	6:07	New Barrel	South	H10	12:51	16.72	GL		36.1	GVL	6:07
7/10/01	4:57		5	H10	12:35	13.17	GR L	13.17			
7/10/01	4:10		65	H10	3:07	11.08	GR L	11.08			
7/10/01	4:41		84	H10	4:05	13.28	GR L	13.28			
7/10/01	3:36	New Barrel	South	H10	10:58	16.61	GL				
7/10/01	3:38	New Barrel	Center	H10	11:01	16.62	GR				
7/10/01	4:15	drum partial		H10	12:55	16.30	GR				
7/11/01	2:56		58	H10	2:27	12.35	GR R	12.35	46.3	S	2:56
7/11/01	3:12	New Barrel	South	H10	2:07	16.62	GR		36.4	S	3:12
7/11/01	3:27	New Barrel	Center	H10	2:10	16.65	GR		36.5	S	3:27
7/11/01	5:41		27	H10	5:18	9.26	GR R	9.26	55.3	S	5:41
7/11/01	12:29	New Barrel	Center	H10	11:34	16.23	GR		36.6	S	12:29

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/11/01	4:24		1	H10	3:31	11.59	GR L	11.59	48.1	GVL	
7/11/01	12:34	New Barrel	South	H10	11:28	16.57	GL		36.5	GVL	
7/12/01	2:00	New Barrel	Center	H10	1:17	16.63	GL		36.3	GVL	2:06
7/12/01	3:15		54	H10	2:45	11.96	GR L	11.96	46.9	GVL	3:15
7/12/01	5:39		24	H10	4:15	12.43	GR L	12.43	57.4	GVL	5:39
7/12/01	11:48	New Barrel	Center	H10	11:11	16.65	GL		36.4	GVL	11:48
7/12/01	1:58		7	H10	1:34	12.41	GR L	12.41	46.1	S	
7/12/01	3:13		51	H10	2:55	9.33	GR R	9.33	54.6	S	
7/12/01	11:44	New Barrel	South	H10	10:25	16.54	GR		36.1	S	
7/12/01	11:57	drum partial		H10	10:32	16.41	GR		36.6	S	
7/13/01			1	L3	15:25	9.76	GR R	9.76			
7/13/01			5	L3	13:45	10.83	GR R	10.83			
7/13/01			22	L3	15:00	11.09	GR R	11.09			
7/13/01			82	L3	14:25	10.28	GR R	10.28			
7/13/01			84	L3	13:17	10.16	GR R	10.16			
7/13/01		New Barrel		L3	10:45	11.58	GR				
7/13/01		New Barrel		L3	12:55	11.74	GR				
7/14/01	11:18	New Barrel		L3	10:45	11.31	GR		48.7	S	11:20
7/14/01	11:16	New Barrel		L6	10:45	11.32	GR		48.7	S	11:20
7/14/01	11:45	New Barrel	South	L3	10:14	11.26	GR		51.1	GVL	11:24
7/14/01	12:03	New Barrel	Center	L3	11:50	11.53	GR		49.3	GVL	12:07
7/14/01	12:04	New Barrel	Center	L3	11:50	11.53	GR		49.3	S	12:10
7/14/01	14:02		7	L3	13:42	10.41	GR R	10.41	51.6	S	14:03
7/14/01	14:29		58	L3	14:05	10.76	GR R	10.76	50.5	S	14:27
7/14/01	14:45	New Barrel	Center	L3	13:57	11.41	GR		49.6	S	14:46
7/14/01	15:05		51	L3	14:45	9.44	GR R	9.44	56	S	15:05
7/14/01	15:26	New Barrel	South	L3	15:00	11.39	GR		49.2	S	15:26
7/14/01	16:53		65	L3	16:36	10.25	GR R	10.25	53.6	S	16:57
7/14/01	14:05		16	L3	13:35	10.71	GR R	10.71	51.4	GVL	
7/14/01	14:40		33	L3	14:15	9.19	GR R	9.19	56.7	GVL	
7/14/01	15:25		43	L3	13:52	10.94	GR R	10.94	53.5	GVL	
7/14/01	15:35		49	L3	15:22	10.57	GR R	10.57	51.7	GVL	

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/14/01	16:13		54	L3	15:50	10.84	GR R	10.84	50.6	GVL	
7/19/01	15:20	New Barrel		L3	14:43	11.64	GR		50	S	15:45
7/19/01	16:15	New Barrel	Center	H6	15:57	16.6	GR		36.3	S	16:17
7/19/01	16:30		8	L3	15:51	10.76	GR R	10.76	51.6	S	16:30
7/19/01	15:45	New Barrel	South	H6	15:20	16.54	GR		36.9	GVL	
7/19/01	15:15	partial drum		L3	14:42	11.58	GR		49.2	GVL	
7/22/01	16:00		1	H6	15:45	12.25	GR L	12.25	46	GVL 7/22	11:00
7/22/01	15:30	New Barrel	Center	H6	15:20	16.59	GR L		34.1	S 7/22/01	11:00
7/22/01	16:45		20	H6	14:15	13.64	GR L	13.64	42.3	GVL 7/22	11:11
7/22/01	16:35		48	H6	16:23	10.89	GR R	10.89	49.5	GVL 7/22	11:24
7/22/01	16:50		22	H6	16:40	14.16	GR R	14.16	41.6	GVL 7/22	11:45
7/22/01	13:00	New Barrel	Center	H6	12:37	16.59	GR L		38.1	GVL	13:00
7/22/01	13:20	New Barrel	Center	H6	12:37	16.41	GR L		37.7	GVL	13:20
7/22/01	13:04	New Barrel	South	H6	12:45	16.47	GR R		35.9	S	13:35
7/22/01	13:52		27	H6	13:40	11.19	GR L	11.19	49.8	GVL	13:52
7/22/01	13:55		16	H6	13:33	12.69	GR R	12.69	45.2	S	13:56
7/22/01	14:38		43	H6	14:20	12.71	GR L	12.71	46	GVL	14:38
7/22/01	14:55		82	H6	14:40	14.27	GR R	14.27	41.2	S	14:57
7/22/01	15:15		84	H6	15:00	13.29	GR L	13.29	43.5	GVL ***	15:15
7/22/01	15:20		24	H6	15:13	13.64	GR R	13.64	42.7	S	15:22
7/22/01	15:40		5	H6	15:33	13.11	GR R	13.11	43.8	S	15:44
7/22/01	17:10		54	H6	15:58	12.18	GR L	12.18	46.6	S	15:58
7/22/01	17:45		8	H6	17:35	13.72	GR L	13.72	42.3	S	17:23
7/22/01	17:20		11	H6	17:10	12.53	GR R	12.53	45.1	S	17:28
7/22/01	17:55		6	H6	17:45	12.37	GR R	12.37	45.6	S	18:08
7/22/01	13:20	New Barrel	South	H6	12:45	16.44	GR R				
7/23/01	12:25	New Barrell	Center	I10	11:40	12.44	GR L		45	GVL	12:00
7/23/01	13:43		33	H6	13:10	9.73	GR R		51.8	GVL	13:30
7/23/01	13:30		33	H6	13:10				51.8	GVL	13:30
7/23/01	13:55		33	H6	13:10	9.92	GR R	9.83	44.5	S	13:49
7/23/01	14:05		65	H6	13:37	11.76	GR R	11.76	40.8	S	13:59
7/23/01	14:13		51	H6	13:40	10.34	GR R	10.34	44.4	S	14:15

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/23/01	14:26		58	H6	14:08	11.99	GR R	11.99	43.1	S	14:30
7/23/01	14:41		6	I10	14:21	11.13	GR R	11.13	43.6	S	14:46
7/23/01	14:54		54	I10	14:40	10.55	GR R	10.55	45.7	S	15:01
7/23/01	15:11		84	I10	14:52	11.66	GR R	11.66	43.2	S	15:16
7/23/01	15:25		8	I10	15:10	11.28	GR R	11.28	38.7	S	15:38
7/23/01	15:51		43	I10	15:28	11.26	GR R	11.26	33.9	S	15:54
7/23/01	16:00		82	I10	15:47	11.29	GR R	11.29	33.7	S	16:10
7/23/01	16:22		22	I10	16:10	11.64	GR R	11.64	34.2	S	16:26
7/23/01	16:34		24	I10	16:20	11.55	GR R	11.55	36.4	S	16:55
7/23/01	16:53		11	I10	16:40	10.19	GR R	10.19	36.5	S	17:10
7/23/01	17:11		48	I10	16:58	9.05	GR R	9.05	37	S	17:26
7/23/01	17:37		51	I10	17:18	9.36	GR R	9.36	36.8	S	17:42
7/23/01	17:53		7	I10	17:42	10.7	GR R	10.70	37.6	S	17:57
7/23/01	13:14		7	H6	12:55	12.96	GR R	12.96			
7/23/01	12:40	New Barrell	South	I10	12:20	12.44	GR L				
7/24/01	17:14		33	I6	16:33	10.6	GR R	10.62	49.5	S	12:08
7/24/01	17:27		51	I6	17:10	10.54	GR R	10.59	49.80	S	12:24
7/24/01	17:41		48	I6	17:25	9.81	GR R	10.03	51.8	S	12:42
7/24/01	13:01		16	I10	12:42	11.43	GR R	11.38	48.3	S	13:01
7/24/01	13:12		33	H10	12:50	10.09	GR R	10.26	51.3	S	13:17
7/24/01	13:27	New Barrel		I6	13:00	13.44	GR R		42.8	S	13:32
7/24/01	13:39		65	I10	13:15	10.02	GR R	10.05	51.6	S	13:45
7/24/01	13:50		27	I10	13:25	10.06	GR R	10.06	51.5	S	14:01
7/24/01	14:14		58	H10	13.52	10.9	GR R	10.94	49.1	S	14:17
7/24/01	14:47		20	I10	14:17	11.55	GR R	11.59	47.4	S	14:47
7/24/01	14:57		1	I10	14:27	10.15	GR R	10.18	51.3	S	15:24
7/24/01	15:13		5	I10	14:37	11.34	GR R	11.37	48	S	15:39
7/24/01	15:21	New Barrel	South	I6	14:45	13.32	GR R		42.7	S	15:54
7/24/01	15:33	New Barrel	Center	I6	14:50	13.27	GR R		42.5	S	16:09
7/24/01	15:46		24	I6	15:12	11.35	GR R	11.42	47.4	S	16:23
7/24/01	15:56		84	I6	15:03	12.58	GR R	12.61	44.3	S	16:39
7/24/01	16:11		6	I6	15:35	12	GR R	11.98	45.9	S	16:53

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/24/01	16:20		82	I6	15:45	12.08	GR R	12.20	45.5	S	17:09
7/24/01	16:35		43	I6	16:12	11.05	GR R	11.07	48.4	S	17:24
7/24/01	16:47		8	I6	16:20	11.05	GR R	11.06	48.5	S	17:39
7/24/01	17:05		54	I6	16:45	10.28	GR R	10.41	50.3	S	17:54
7/24/01	13:11		33	H10	12:50	10.42	GR L				
7/24/01	14:15		58	H10	13.52	10.97	GR L				
7/24/01	14:56		1	I10	14.27	10.21	GR L				
7/24/01	15:12		5	I10	14:37	11.39	GR L				
7/24/01	13:01		16	I10	12:42	11.32	GR L				
7/24/01	14:46		20	I10	14.17	11.63	GR L				
7/24/01	13:49		27	I10	6:00	10.21	GR L	10.21			
7/24/01	13:39		65	I10	13:15	10.07	GR L				
7/24/01	16:12		6	I6	15:35	11.96	GR L				
7/24/01	16:47		8	I6	16:20	11.06	GR L				
7/24/01	15:44		24	I6	15:12	11.48	GR L				
7/24/01	17:16		33	I6	16:33	10.63	GR L				
7/24/01	16:36		43	I6	16:12	11.08	GR L				
7/24/01	17:42		48	I6	17:25	10.25	GR L				
7/24/01	17:28		51	I6	17:10	10.63	GR L				
7/24/01	17:05		54	I6	16:45	10.53	GR L				
7/24/01	16:22		82	I6	15:45	12.31	GR L				
7/24/01	15:57		84	I6	15:03	12.64	GR L				
7/24/01	15:32	New Barrel	Center	I6	14:50	13.38	GR L				
7/24/01	15:19	New Barrel	South	I6	14:45	13.45	GR L				
7/24/01	13:27	New Barrel		I6	13:00	13.47	GR L				
7/25/01	13:34	New barrel	South	I6	12.55	13.24	GR R		42.5	S	13:24
7/25/01	13:43	New barrel	Center	I3	13.12	14.16	GR R		40.6	S	13:39
7/25/01	14:12		27	I6	14	11.35	GR R	11.26	47.9	S	14:11
7/25/01	14:31		58	I6	14:08	11.73	GR R	11.75	46.3	S	14:26
7/25/01	14:47		1	I6	14:30	11.25	GR R	11.25	47.6	S	14:46
7/25/01	14:57		11	I6	14:38	11.83	GR R	11.85	46.2	S	15:01
7/25/01	15:17		20	I6	15.05	12.05	GR R	12.09	45.6	S	15:16

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/25/01	15:27		16	I6	15:13	11.05	GR R	11.08	48.3	S	15:29
7/25/01	15:51		43	I3	15:38	12.74	GR R	12.74	44.6	S	15:50
7/25/01	16:01		82	I3	15:46	12.38	GR R	12.43	45.5	S	16:05
7/25/01	16:21	New Barrel	Center	I3	16:00	14.24	GR R		40.5	S	16:20
7/25/01	16:33		5	I6	16:10	12.08	GR R	12.12	45.4	S	16:33
7/25/01	16:48		65	I6	16:20	10.64	GR R	10.29	51.6	S	16:48
7/25/01	17:04		22	I6	16:45	12.48	GR R	12.50	47.7	S	17:04
7/25/01	17:15		7	I6	16:50	11.32	GR R	11.33	47.7	S	17:18
7/25/01	17:28		33	I3	17:15	9.9	GR R	9.87	53.7	S	17:31
7/25/01	18:02		51	I3	17:43	10.61	GR R	11.07	50.7	S	17:43
7/25/01	17:52		24	I3	17:20	12.63	GR R	12.32	46.8	S	17:47
7/25/01	18:14		54	I3	17:55	11.31	GR R	11.30	48.7	S	17:55
7/25/01	17:41		24	I3	17:20	11.97	GR L				
7/25/01	17:52		24	I3	17:20	11.9	GR L				
7/25/01	17:40		24	I3	17:20	12.42	GR R				
7/25/01	17:28		33	I3	17:15	9.84	GR L				
7/25/01	15:52		43	I3	15:38	12.73	GR L				
7/25/01	18:03		51	I3	17:20	11.53	GR L				
7/25/01	18:14		54	I3	17:55	11.28	GR L				
7/25/01	16:02		82	I3	15.46	12.47	GR L				
7/25/01	14:48		1	I6	14:30	11.25	GR L				
7/25/01	16:35		5	I6	16:10	3:50	GR L				
7/25/01	17:16		7	I6	16:50	11.34	GR L				
7/25/01	14:58		11	I6	14.38	11.86	GR L				
7/25/01	15:28		16	I6	15:13	11.1	GR L				
7/25/01	15:18		20	I6	15:05	12.12	GR L				
7/25/01	17:05		22	I6	16:45	12.51	GR L				
7/25/01	14:23		27	I6	14:00	11.09	GR L				
7/25/01	14:22		27	I6	14:00	11.34	GR R				
7/25/01	14:32		58	I6	14:08	11.77	GR L				
7/25/01	16:50		65	I6	16:20	9.93	GR L				
7/25/01	13:40	New barrel	Center	I3	13:12	14.32	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/25/01	16:22	New barrel	Center	I3	16:00	14.28	GR L				
7/25/01	13:26	New barrel	South	I6	12:55	13.48	GR L				
7/26/01	14:55	New Barrel	South	I0	14:20	15.34	GR R		38.7	S	12:01
7/26/01	15:51	New Barrel	Center	I3	15:00	14.15	GR R		41	S	12:16
7/26/01	16:48	New Barrel	Center	I0	16:05	14.99	GR R		39.4	S	12:31
7/26/01	12:15	New Barrel		I3	15:55	14,41	GR R		40.3	S	12:32
7/26/01	16:38	New Barrel	South	I0	16:11	15.19	GR R		38.6	S	12:46
7/26/01	12:50	New Barrel		I3	12:05	14.4	GR R		40.6	S	12:48
7/26/01	13:20	New Barrel	Center	I3	13:10	14.32	GR R		40.5	S	13:20
7/26/01	13:50		27	I3	13.33	10.84	GR R	10.84	49.9	S	13:49
7/26/01	14:09		16	I3	13:41	10.86	GR R	10.93	49.6	S	14:07
7/26/01	14:25		6	I3	14:05	11.32	GR R	11.35	48.5	S	14:21
7/26/01	14:35		48	I3	14.13	10.31	GR R	10.38	54.3	S	15:05
7/26/01	15:23		11	I3	14:47	11.71	GR R	11.74	47.47	S	15:35
7/26/01	15:37		1	I3	15:10	11.16	GR R	11.18	49.5	S	15:50
7/26/01	16:06		20	I3	15:25	12.05	GR R	12.07	46.2	S	16:19
7/26/01	16:29		22	I3	15:57	12.25	GR R	12.27	45.8	S	16:34
7/26/01	16:17		58	I3	15:45	11.84	GR R	11.82	46.8	S	16:34
7/26/01	16:58		5	I3	16:17	12.16	GR R	12.19	45.8	S	16:54
7/26/01	17:14		8	I3	16:30	11.58	GR R	11.61	47.5	S	17:10
7/26/01	17:22		7	I3	16:43	11.71	GR R	11.77	47.1	S	17:25
7/26/01	17:30		84	I3	16:55	12.25	GR R	12.27	45.8	S	17:42
7/26/01	17:40		51	I0	17:25	10.13	GR R	10.16	54.4	S	17:56
7/26/01	17:50		16	I0	17:31	10.07	GR R	10.10	54.1	S	18:11
7/26/01	18:04		11	I0	17:55	11.53	GR R	11.57	49.1	S	18:29
7/26/01	15:14		65	I3	14:37	10.47	GR R	10.48	51.2	S	15.21
7/26/01	18:16		65	I0	18:00	9.03	GR R	9.03	58.6	S	!8:44
7/26/01	18:05		11	I0	17:55	11.6	GR L				
7/26/01	17:51		16	I0	17:31	10.13	GR L				
7/26/01	17:40		51	I0	17:25	10.19	GR L				
7/26/01	18:17		65	I0	18:00	9.03	GR L				
7/26/01	15:38		1	I3	15:10	11.19	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/26/01	17:06		5	I3	16:17	12.21	GR L				
7/26/01	14:26		6	I3	14:05	11.37	GR L				
7/26/01	17:22		7	I3	16:43	11.83	GR L				
7/26/01	17:14		8	I3	16:30	11.64	GR L				
7/26/01	15:24		11	I3	14:47	11.77	GR L				
7/26/01	14:10		16	I3	13;41	11	GR L				
7/26/01	16:07		20	I3	15:25	12.08	GR L				
7/26/01	16:30		22	I3	15:57	12.29	GR L				
7/26/01	13:51		27	i3	13:33	10.84	GR L				
7/26/01	14:36		48	I3	14:13	10.44	GR L				
7/26/01	16:18		58	I3	15:45	11.79	GR L				
7/26/01	15:15		65	I3	14:37	10.48	GR L				
7/26/01	17:32		84	I3	16:55	12.28	GR L				
7/26/01	14:55	New Barrel	South	i0	14.2	15.34	GR L				
7/26/01	16:38	New Barrel	South	I0	16:11	15.31	GR L				
7/26/01	13:23	New Barrel	Center	i3	13:10	14.38	GR L				
7/26/01	15:53	New Barrel	Center	I3	15:00	14.24	GR L				
7/26/01	12:20	New Barrel		I3	15:55	14.5	GR L				
7/26/01	12:51	New Barrel		i3	12:05	14.83	GR L				
7/27/01	13:05	New barrel	Center	I0	12:42	15.31	GR R		38.4	S	13:04
7/27/01	13:46		6	I0	13:30	11.74	GR R	11.77	48.5	S	13:44
7/27/01	14:00		48	I0	13:40	9.74	GR R	9.80	55.9	S	13:58
7/27/01	14.18		24	I0	14:06	12.51	GR R	12.58	46.2	S	14:16
7/27/01	14:31		27	I0	14:16	9.03	GR R	9.17	57.7	S	14:31
7/27/01	14:44	New barrel	South	H0	14:22	18.39	GR R		30.9	S	14:47
7/27/01	15:03		20	I0	14:45	11.89	GR R	11.96	47.7	S	15:02
7/27/01	15:22		82	I0	15:00	11.55	GR R	11.61	48.7	S	15:17
7/27/01	15:32	New barrel	Center	I0	15:07	15.31	GR R		38.3	S	15:32
7/27/01	15:39		1	I0	15:13	10.52	GR R	10.60	52.9	S	15:46
7/27/01	15:51		43	I0	15:22	11.76	GR R	11.85	48.3	S	16:00
7/27/01	16:04		58	I0	15:50	12.29	GR R	12.37	46.4	S	16:15
7/27/01	16:14		5	I0	16:00	12.12	GR R	12.22	46.9	S	16:32

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/27/01	16:40		22	I0	16:30	12.8	GR R	12.85	45.6	S	16:48
7/27/01	16:54		8	I0	16:40	10.71	GR R	10.82	51.9	S	17:03
7/27/01	17:09		84	I0	16:55	12.57	GR R	12.67	45.8	S	17:19
7/27/01	17:22		7	I0	17:00	11.54	GR R	11.61	48.7	S	17:34
7/27/01	17:33		33	I0	17:25	9.63	GR R	9.65	55.8	S	17:49
7/27/01	17:47		54	I0	17:35	10.32	GR R	10.45	53	S	18.06
7/27/01	15:39		1	I0	15:13	10.68	GR L				
7/27/01	16:14		5	I0	16:00	12.32	GR L				
7/27/01	13.46		6	I0	13:30	11.79	GR L				
7/27/01	17:22		7	I0	17:00	11.67	GR L				
7/27/01	16:54		8	I0	16:40	10.93	GR L				
7/27/01	15:03		20	I0	14:45	12.03	GR L				
7/27/01	16:41		22	I0	16:30	12.89	GR L				
7/27/01	14:18		24	I0	14:06	12.64	GR L				
7/27/01	14:31		27	I0	14:16	9.31	GR L				
7/27/01	17:33		33	I0	17.25	9.67	GR L				
7/27/01	15:51		43	I0	15:22	11.93	GR L				
7/27/01	14:00		48	I0	13:40	9.86	GR L				
7/27/01	17:46		54	I0	17:35	10.57	GR L				
7/27/01	16:04		58	I0	15:50	12.45	GR L				
7/27/01	15:22		82	I0	15:00	11.67	GR L				
7/27/01	17:09		84	I0	16:55	12.76	GR L				
7/27/01	14:44	New Barrel	South	H0	14:22	18.56	GR L				
7/27/01	14:54	New Barrel	South	H0	14:22	18.37	GR L		Note:repeat run		
7/27/01	15:13	New Barrel	South	H0	14:22	18.4	GR L				
7/27/01	14:54	New barrel	South	H0	14:22	18.08	GR R			S	
7/27/01	15:13	New barrel	South	H0	14:22	18.17	GR R			S	
7/27/01	13:05	New Barrel	Center	I0	12:42	15.3	GR L				
7/27/01	15:32	New Barrel	Center	I0	15:07	15.48	GR L				
7/30/01	14:09	New barrel	South	H0	13:50	18.43	GR R		29.1	S	14:04
7/30/01	14.26		11	H0	14:08	14.11	GR R	14.11	41.1	S	14:24
7/30/01	14:55	New barrel	Center	H0	14:26	18.23	GR R		30.8	S	14:53

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/30/01	15:15		24	H0	14:48	14.85	GR R	14.85	39	S	15:12
7/30/01	15:28		43	H0	14:50	14.25	GR R	14.22	41.2	S	15:27
7/30/01	15:46		20	H0	15:23	14.99	GR R	15.00	38.8	S	15:46
7/30/01	16:00		16	H0	15:35	12.95	GR R	12.93	45.6	S	16:00
7/30/01	16:19		33	H0	15:56	10.41	GRR	10.46	53.8	S	16:19
7/30/01	16:36		58	H0	16:05	13.95	GRR	13.98	41.8	S	16:36
7/30/01	17:22		7	H0	16:40	14.37	GRR	14.35	40.9	S	16:40
7/30/01	17:07		22	H0	16:30	16.85	GRR	16.84	34.7	S	17:07
7/30/01	17:38		5	H0	17:05	15.15	GRR	15.17	38.4	S	17:38
7/30/01	17:52		1	H0	17:07	12.82	GR R	12.83	43.4	S	17:52
7/30/01	14:40		65	H0	14:16	12.63	GR R	12.61	45.6	S	14.38
7/30/01	17:52		1	H0	17:07	12.83	GR L				
7/30/01	17:38		5	H0	17:05	15.18	GR L				
7/30/01	17:22		7	H0	16:40	14.32	GR L				
7/30/01	14:27		11	H0	14:08	14.11	GR L				
7/30/01	16:00		16	H0	15:35	12.9	GR L				
7/30/01	15:46		20	H0	15.23	15.01	GR L				
7/30/01	17:07		22	H0	16:30	16.83	GR L				
7/30/01	15:14		24	H0	14:48	14.85	GR L				
7/30/01	16:19		33	H0	15:56	10.5	GR L				
7/30/01	15:28		43	H0	14:50	14.19	GR L				
7/30/01	16:36		58	H0	16:05	14.01	GR L				
7/30/01	14:39		65	H0	14:16	12.58	GR L				
7/30/01	14.54	New barrel	Center	H0	14:26	18.36	GR L				
7/30/01	14:10	New barrel	South	H0	13:50	18.28	GR L				
7/31/01	13:07	New Barrel	Center	H3	11:55	17.24	GR R		34.3	S	13:07
7/31/01	14:00	New Barrel	South	H0	13:33	18.46	GR R		30.6	S	14:00
7/31/01	14:40		54	H0	14:21	14.09	GR R	14.13	41.2	S	14:40
7/31/01	14:55		27	H0	14:32	11.95	GR R	11.94	48.4	S	14:55
7/31/01	15:10	New Barrel	South	H0	14:50	17.34	GR R		34.5	S	15:10
7/31/01	15:26		82	H0	15:02	15.03	GR R	15.02	39.3	S	15:26
7/31/01	15:40		51	H0	15:15	11.39	GR R	11.41	50.0	S	15:40

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
7/31/01	15:55		8	H0	15:35	14.19	GR R	14.20	41.3	S	15:55
7/31/01	16:15		84	H0	15:50	13.38	GR R	13.40	43.7	S	16:15
7/31/01	16:30	New Barrel	Center	H3	16:00	17.18	GR R		34.4	S	16:30
7/31/01	16:45		48	H0	16:16	12.35	GR R	12.35	47.3	S	16:45
7/31/01	17:00		6	H0	16:27	13.24	GR R	13.23	44.8	S	17:00
7/31/01	17:15		1	H3	16:55	12.50	GR R	12.49	45.9	S	17:15
7/31/01	17:30		22	H3	17:05	14.66	GR R	14.62	40.1	S	17:30
7/31/01	17:44		7	H3	17:20	14.02	GR R	13.99	41.9	S	17:44
7/31/01	18:01		5	H3	17:30	14.32	GR R	14.28	41.1	S	18:01
7/31/01	17:00		6	H0	16:27	13.22	GR L				
7/31/01	15:55		8	H0	15:35	14.21	GR L				
7/31/01	14:55		27	H0	14:32	11.93	GR L				
7/31/01	16:45		48	H0	16:16	12.34	GR L				
7/31/01	15:40		51	H0	15:15	11.42	GR L				
7/31/01	14:40		54	H0	14:21	14.16	GR L				
7/31/01	15:26		82	H0	15:02	15.01	GR L				
7/31/01	16:15		84	H0	15:50	13.41	GR L				
7/31/01	17:15		1	H3	16:55	12.47	GR L				
7/31/01	18:01		5	H3	17:30	14.24	GR L				
7/31/01	17:44		7	H3	17:20	13.96	GR L				
7/31/01	17:30		22	H3	17:05	14.57	GR L				
7/31/01	14:00	New Barrel	South	H0	13:33	18.56	GR L				
7/31/01	15:10	New Barrel	South	H0	14:50	17.15	GR L				
7/31/01	13:07	New Barrel	Center	H3	11:55	17.30	GR L				
7/31/01	16:30	New Barrel	Center	H3	16:00	17.15	GR L				
8/1/01	11:34		20	H3	18:05	14.31	GR R	14.27	41.1	S	11:34
8/1/01	11:50		16	H0	18:12	11.97	GR R	11.95	47.7	S	11:50
8/1/01	12:51	New Barrel	South	H3	12:35	16.76	GR R		35.4	S	12:51
8/1/01	13:14	New Barrel	Center	H3	13:00	17.14	GR R		34.4	S	13:14
8/1/01	14:17		51	H3	13:55	11.64	GR R	11.59	48.1	S	14:17
8/1/01	14:32		58	H3	14:05	12.83	GR R	12.84	44.5	S	14:32
8/1/01	14:48		54	H3	14:15	13.87	GR R	13.81	42.4	S	14:48

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/1/01	15:03		33	H3	14:21	11.44	GR R	11.42	49.6	S	15:03
8/1/01	15:18		43	H3	14:55	14.57	GR R	14.53	40.3	S	15:18
8/1/01	15:34		82	H3	15:00	14.37	GR R	14.34	40.8	S	15:34
8/1/01	11:50		16	H0	18:12	11.93	GR L				
8/1/01	11:34		20	H3	18:05	14.22	GR L				
8/1/01	15:03		33	H3	14:21	11.39	GR L				
8/1/01	15:18		43	H3	14:55	14.48	GR L				
8/1/01	14:17		51	H3	13:55	11.54	GR L				
8/1/01	14:48		54	H3	14:15	13.74	GR L				
8/1/01	14:32		58	H3	14:05	12.84	GR L				
8/1/01	15:34		82	H3	15:00	14.30	GR L				
8/1/01	13:14	New Barrel	Center	H3	13:00	17.07	GR L				
8/1/01	12:51	New Barrel	South	H3	12:35	16.64	GR L				
8/2/01	12:22	New Barrel	South	L10	11:47	8.26	GR R		55.3	S	12:22
8/2/01	12:56		48	H3	12:35	11.58	GR R	11.61	48.1	S	12:56
8/2/01	13:12		84	H3	12:47	14.77	GR R	14.77	39.9	S	13:12
8/2/01	13:34		8	H3	13:13	13.90	GR R	13.86	41.6	S	13:34
8/2/01	13:49		27	H3	13:21	11.74	GR R	11.70	46.0	S	13:49
8/2/01	14:04		6	H3	13:46	12.99	GR R	13.02	43.8	S	14:04
8/2/01	14:20	New Barrel	South	L10	13:32	8.26	GR R		55.1	S	14:20
8/2/01	14:35		65	H3	13:55	12.26	GR R	12.24	46.3	S	14:35
8/2/01	14:52		24	H3	14:17	14.30	GR R	14.29	41.0	S	14:52
8/2/01	15:06		11	H3	14:27	13.44	GR R	13.41	43.5	S	15:06
8/2/01	15:23		51	L10	14:56	7.87	GR R	7.86	56.8	S	15:23
8/2/01	15:40		1	L10	15:15	7.91	GR R	7.87	56.7	S	15:40
8/2/01	15:56		58	L10	15:25	8.20	GR R	8.17	55.7	S	15:56
8/2/01	16:15		22	L10	15:33	8.20	GR R	8.18	55.8	S	16:15
8/2/01	16:44		5	L10	16:10	8.07	GR R	8.01	56.3	S	16:44
8/2/01	16:59		7	L10	16:20	8.16	GR R	8.13	55.9	S	16:59
8/2/01	17:15		43	L10	16:42	7.84	GR R	7.81	57.0	S	17:15
8/2/01	17:30		16	L10	16:50	8.22	GR R	8.24	55.9	S	17:30
8/2/01	17:47		33	L10	17:20	8.00	GR R	8.00	56.5	S	17:47

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/2/01	18:03		54	L10	17:47	8.36	GR R	8.34	56.3	S	18:03
8/2/01	18:18		20	L10	17:55	8.23	GR R	8.21	56.4	S	18:18
8/2/01	18:34		82	L10	18:02	8.15	GR R	8.13	55.8	S	18:34
8/2/01	14:04		6	H3	13:46	13.05	GR L				
8/2/01	13:34		8	H3	13:13	13.82	GR L				
8/2/01	15:06		11	H3	14:27	13.37	GR L				
8/2/01	14:52		24	H3	14:17	14.27	GR L				
8/2/01	13:49		27	H3	13:21	11.66	GR L				
8/2/01	12:56		48	H3	12:35	11.63	GR L				
8/2/01	14:35		65	H3	13:55	12.21	GR L				
8/2/01	13:12		84	H3	12:47	14.76	GR L				
8/2/01	15:40		1	L10	15:15	7.83	GR L				
8/2/01	16:44		5	L10	16:10	7.94	GR L				
8/2/01	16:59		7	L10	16:20	8.10	GR L				
8/2/01	17:30		16	L10	16:50	8.26	GR L				
8/2/01	18:18		20	L10	17:55	8.19	GR L				
8/2/01	16:15		22	L10	15:33	8.15	GR L				
8/2/01	17:47		33	L10	17:20	8.00	GR L				
8/2/01	17:15		43	L10	16:42	7.78	GR L				
8/2/01	15:23		51	L10	14:56	7.84	GR L				
8/2/01	18:03		54	L10	17:47	8.31	GR L				
8/2/01	15:56		58	L10	15:25	8.13	GR L				
8/2/01	18:34		82	L10	18:02	8.10	GR L				
8/2/01	12:22	New Barrel	South	L10	11:47	8.19	GR L				
8/2/01	14:20	New Barrel	South	L10	13:32	8.22	GR L	* FUEL DIRTY COLOR			
8/4/01	12:56	New Barrel	Center	L10	12:30	8.26	GR R		55.7	S	12:56
8/4/01	13:13	New Barrel	South	L10	12:33	8.13	GR R		55.7	S	13:13
8/4/01	13:54	New Barrel	Center	L6	13:23	8.22?	GR R		55.6?	S	13:54
8/4/01	14:11		84	L10	13:43	8.06	GR R	8.04	55.9	S	14:11
8/4/01	14:25		8	L10	13:50	8.15	GR R	8.09	55.9	S	14:25
8/4/01	14:41	New Barrel	South	L6	14:01	10.99	GR R		48.8	S	14:41
8/4/01	14:56		27	L10	14:17	8.15	GR R	8.13	56.0	S	15:09

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/4/01	15:23		24	L10	14:22	8.09	GR R	8.07	55.9	S	15:23
8/4/01	15:38	New Barrel	Center	L6	14:38	11.10	GR R		49.1	S	15:38
8/4/01	15:53		65	L10	14:50	8.06	GR R	8.04	56.3	S	15:53
8/4/01	16:07		11	L10	15:00	8.15	GR R	8.13	56.0	S	16:07
8/4/01	16:22		6	L10	15:32	8.23	GR R	8.22	55.7	S	16:32
8/4/01	16:46		48	L10	15:40	7.91	GR R	7.84	56.8	S	16:46
8/4/01	17:01		58	L6	16:17	10.90	GR R	10.90	49.5	S	17:01
8/4/01	17:16		22	L6	16:25	10.71	GR R	10.73	50.0	S	17:16
8/4/01	17:31		43	L6	16:36	10.60	GR R	10.60	50.3	S	17:31
8/4/01	17:45		1	L6	16:42	10.13	GR R	10.13	51.6	S	17:45
8/4/01	16:22		6	L10	15:32	8.20	GR L				
8/4/01	14:25		8	L10	13:50	8.02	GR L				
8/4/01	16:07		11	L10	15:00	8.10	GR L				
8/4/01	15:23		24	L10	14:22	8.04	GR L				
8/4/01	14:56		27	L10	14:17	8.10	GR L				
8/4/01	16:46		48	L10	15:40	7.77	GR L				
8/4/01	15:53		65	L10	14:50	8.02	GR L				
8/4/01	14:11		84	L10	13:43	8.02	GR L				
8/4/01	17:45		1	L6	16:42	10.13	GR L				
8/4/01	17:16		22	L6	16:25	10.74	GR L				
8/4/01	17:31		43	L6	16:36	10.60	GR L				
8/4/01	17:01		58	L6	16:17	10.90	GR L				
8/4/01	12:56	New Barrel	Center	L10	12:30	8.13	GR L				
8/4/01	13:13	New Barrel	South	L10	12:33	8.15	GR L				
8/4/01	13:54	New Barrel	Center	L6	13:23	8.1?	GR L				
8/4/01	14:41	New Barrel	South	L6	14:01	11.02	GR L				
8/4/01	15:38	New Barrel	Center	L6	14:38	11.06	GR L				
8/5/01	12:17	New Barrel	South	L6	16:55	11.18	GR R		48.9	S	12:17
8/5/01	12:32		20	L6	17:06	10.76	GR R	10.75	49.8	S	12:32
8/5/01	12:47		7	L6	17:17	10.73	GR R	10.74	49.6	S	12:47
8/5/01	13:02		33	L6	17:40	9.99	GR R	9.92	51.9	S	13:02
8/5/01	13:17		54	L6	17:45	10.38	GR R	10.35	50.7	S	13:17

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/5/01	12:17	New Barrel	Center	L6	12:12	11.12	GR R		49.1	S	13:32
8/5/01	14:29		11	L6	13:44	10.19	GR R	10.11	51.2	S	14:29
8/5/01	14:44		65	L6	13:55	9.39	GR R	9.31	54.2	S	14:44
8/5/01	14:59		84	L6	14:15	10.47	GR R	10.39	52.3	S	14:59
8/5/01	15:14		8	L6	14:25	10.51	GR R	10.45	52.8	S	15:14
8/5/01	15:29		5	L6	14:50	10.55	GR R	10.46	52.5	S	15:29
8/5/01	15:44		82	L6	15:00	10.52	GR R	10.46	52.5	S	15:44
8/5/01	15:59	New Barrel	South	H3	15:07	17.07	GR R		34.6	S	15:59
8/5/01	16:13	New Barrel	Center	H3	15:10	17.21	GR R		34.6	S	16:13
8/5/01	16:28		27	L6	15:20	9.60	GR R	9.56	53.2	S	16:28
8/5/01	16:43		48	L6	15:35	9.35	GR R	9.27	54.4	S	16:43
8/5/01	15:29		5	L6	14:50	10.36	GR L				
8/5/01	12:47		7	L6	17:17	10.74	GR L				
8/5/01	15:14		8	L6	14:25	10.39	GR L				
8/5/01	14:29		11	L6	13:44	10.02	GR L				
8/5/01	12:32		20	L6	17:06	10.74	GR L				
8/5/01	16:28		27	L6	15:20	9.51	GR L				
8/5/01	13:02		33	L6	17:40	9.84	GR L				
8/5/01	16:43		48	L6	15:35	9.19	GR L				
8/5/01	13:17		54	L6	17:45	10.31	GR L				
8/5/01	14:44		65	L6	13:55	9.23	GR L				
8/5/01	15:44		82	L6	15:00	10.39	GR L				
8/5/01	14:59		84	L6	14:15	10.31	GR L				
8/5/01	16:13	New Barrel	Center	H3	15:10	17.20	GR L				
8/5/01	15:59	New Barrel	South	H3	15:07	17.08	GR L				
8/5/01	12:17	New Barrel	Center	L6	12:12	10.92	GR L				
8/5/01	12:17	New Barrel	South	L6	16:55	11.12	GR L				
8/6/01	11:44		51	L6	15:55	9.34	GR R	9.28	53.7	S	11:44
8/6/01	11:59		16	L6	16:02	10.22	GR R	10.12	51.2	S	11:59
8/6/01	12:14		6	L6	16:33	10.25	GR R	10.14	51.6	S	12:14
8/6/01	12:30		24	L6	16:40	10.52	GR R	10.40	50.9	S	12:30
8/6/01	13:45	New Barrel	South	H3	13:16	17.34	GR R		34.6	S	13:45

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/6/01	14:13		20	H3	13:50	13.66	GR R	13.60	43.1	S	14:13
8/6/01	14:32	New Barrel	Center	H3	14:05	17.28	GR R		34.6	S	14:32
8/6/01	14:48		65	H3	14:20	11.02	GR R	10.96	51.0	S	14:48
8/6/01	15:06		22	H3	14:30	13.87	GR R	13.76	42.5	S	15:06
8/6/01	15:24		54	H3	14:55	12.37	GR R	12.30	46.7	S	15:24
8/6/01	15:39		43	H3	15:05	13.29	GR R	13.22	44.2	S	15:39
8/6/01	16:05		11	H3	15:42	12.95	GR R	12.81	45.1	S	16:05
8/6/01	16:24		8	H3	15:50	12.90	GR R	12.84	45.3	S	16:24
8/6/01	16:41		84	H3	16:20	13.48	GR R	13.40	43.7	S	16:41
8/6/01	16:56		24	H3	16:21	13.05	GR R	13.00	44.5	S	16:56
8/6/01	17:11		5	H3	16:50	13.29	GR R	13.23	44.1	S	17:11
8/6/01	17:31		16	H3	17:00	10.96	GR R	10.90	50.5	S	17:31
8/6/01	17:46		6	H3	17:20	12.26	GR R	12.19	46.9	S	17:46
8/6/01	18:01		7	H3	17:25	13.05	GR R	12.91	44.6	S	18:01
8/6/01	18:16		27	H3	17:55	10.94	GR R	10.80	51.5	S	18:16
8/6/01	17:11		5	H3	16:50	13.16	GR L				
8/6/01	17:46		6	H3	17:20	12.11	GR L				
8/6/01	18:01		7	H3	17:25	12.77	GR L				
8/6/01	16:24		8	H3	15:50	12.77	GR L				
8/6/01	16:05		11	H3	15:42	12.66	GR L				
8/6/01	17:31		16	H3	17:00	10.84	GR L				
8/6/01	14:13		20	H3	13:50	13.53	GR L				
8/6/01	15:06		22	H3	14:30	13.64	GR L				
8/6/01	16:56		24	H3	16:21	12.95	GR L				
8/6/01	18:16		27	H3	17:55	10.65	GR L				
8/6/01	15:39		43	H3	15:05	13.15	GR L				
8/6/01	15:24		54	H3	14:55	12.22	GR L				
8/6/01	14:48		65	H3	14:20	10.90	GR L				
8/6/01	16:41		84	H3	16:20	13.31	GR L				
8/6/01	12:14		6	L6	16:33	10.02	GR L				
8/6/01	11:59		16	L6	16:02	10.02	GR L				
8/6/01	12:30		24	L6	16:40	10.28	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/6/01	11:44		51	L6	15:55	9.22	GR L				
8/6/01	14:32	New Barrel	Center	H3	14:05	17.04	GR L				
8/6/01	13:45	New Barrel	South	H3	13:16	16.96	GR L				
8/7/01	11:43		1	H3	18:00	11.64	GR R	11.66	48.0	S	11:43
8/7/01	14:46	New Barrel	Center	H0	14:17	18.43	GR R		31.3	S	14:46
8/7/01	15:02		48	H3	14:31	9.68	GR R	9.62	56.2	S	15:02
8/7/01	15:18		51	H3	14:35	10.60	GR R	10.48	52.4	S	15:18
8/7/01	15:32		33	H3	14:50	9.96	GR R	9.93	54.7	S	15:32
8/7/01	15:58		82	H3	14:56	13.47	GR R	13.32	43.2	S	15:58
8/7/01	16:12		8	H0	15:27	13.06	GR R	12.95	45.3	S	16:12
8/7/01	16:27		58	H3	15:35	11.87	GR R	11.79	48.1	S	16:27
8/7/01	16:45		1	H0	16:16	10.84	GR R	10.75	53.2	S	16:45
8/7/01	17:01		27	H0	16:28	11.06	GR R	10.97	52.3	S	17:01
8/7/01	17:17		7	H0	16:55	12.28	GR R	12.14	48.2	S	17:17
8/7/01	16:45		1	H0	16:16	10.65	GR L				
8/7/01	17:17		7	H0	16:55	12.00	GR L				
8/7/01	16:12		8	H0	15:27	12.84	GR L				
8/7/01	17:01		27	H0	16:28	10.87	GR L				
8/7/01	11:43		1	H3	18:00	11.68	GR L				
8/7/01	15:32		33	H3	14:50	9.90	GR L				
8/7/01	15:02		48	H3	14:31	9.55	GR L				
8/7/01	15:18		51	H3	14:35	10.36	GR L				
8/7/01	16:27		58	H3	15:35	11.71	GR L				
8/7/01	15:58		82	H3	14:56	13.16	GR L				
8/7/01	14:46	New Barrel		H0	14:17	18.14	GR L				
8/8/01	11:27		22	H0	17:25	13.56	GR R	13.44	44.2	S	11:27
8/8/01	11:43		51	H0	17:35	9.45	GR R	9.29	59.2	S	11:43
8/8/01	11:59		16	H0	17:42	10.38	GR R	10.28	56.1	S	11:59
8/8/01	12:16		48	H0	18:12	9.60	GR R	9.51	57.7	S	12:16
8/8/01	13:56	New Barrel	South	H0	13:23	18.46	GR R		31.1	S	13:56
8/8/01	14:14	New Barrel	Center	H6	13:27	16.28	GR R		36.3	S	14:14
8/8/01	14:29		24	H0	13:45	14.32	GR R	14.23	41.2	S	14:29

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/8/01	14:44		5	H0	13:53	12.89	GR R	12.81	46.0	S	14:44
8/8/01	14:59		82	H0	14:14	14.45	GR R	14.30	41.3	S	14:59
8/8/01	15:14		58	H0	14:18	12.64	GR R	12.60	45.7	S	15:14
8/8/01	15:30		65	H0	14:55	11.76	GR R	11.70	49.6	S	15:30
8/8/01	15:45		6	H6	15:00	11.86	GR R	11.78	47.4	S	15:45
8/8/01	16:00	New Barrel	Center	H6	15:16	16.22	GR R		36.5	S	16:00
8/8/01	16:14		33	H6	15:25	8.12	GR R	8.07	59.5	S	16:14
8/8/01	16:35		54	H0	15:35	12.13	GR R	11.89	48.1	S	16:35
8/8/01	16:50		51	H6	16:00	10.84	GR R	10.76	50.4	S	16:50
8/8/01	17:05		7	H6	16:16	12.70	GR R	12.67	44.8	S	17:05
8/8/01	17:20		8	H6	16:50	12.82	GR R	12.77	44.6	S	17:20
8/8/01	14:44		5	H0	13:53	12.73	GR L				
8/8/01	11:59		16	H0	17:42	10.18	GR L				
8/8/01	11:27		22	H0	17:25	13.31	GR L				
8/8/01	14:29		24	H0	13:45	14.14	GR L				
8/8/01	12:16		48	H0	18:12	9.41	GR L				
8/8/01	11:43		51	H0	17:35	9.13	GR L				
8/8/01	16:35		54	H0	15:35	11.64	GR L				
8/8/01	15:14		58	H0	14:18	12.55	GR L				
8/8/01	15:30		65	H0	14:55	11.63	GR L				
8/8/01	14:59		82	H0	14:14	14.15	GR L				
8/8/01	15:45		6	H6	15:00	11.70	GR L				
8/8/01	17:05		7	H6	16:16	12.63	GR L				
8/8/01	17:20		8	H6	16:50	12.71	GR L				
8/8/01	16:14		33	H6	15:25	8.02	GR L				
8/8/01	16:50		51	H6	16:00	10.67	GR L				
8/8/01	13:56	New Barrel	South	H0	13:23	18.04	GR L				
8/8/01	14:14	New Barrel	Center	H6	13:27	16.04	GR L				
8/8/01	16:00	New Barrel	Center	H6	15:16	16.09	GR L				
8/9/01	11:20		84		17:00	12.50	GR R	12.47	45.7	S	11:06
8/9/01	11:34		27	H0	17:07	11.64	GR R	11.53	48.2	S	11:20
8/9/01	11:49		48	L10	17:30	10.23	GR R	10.14	52.1	S	11:34

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/9/01	13:05	New Barrel	North	H6	12:28	16.24	GR R		36.4	S	13:05
8/9/01	13:20		16	H6	13:00	11.39	GR R	11.36	48.7	S	13:20
8/9/01	13:35		5	H6	13:05	13.32	GR R	13.22	43.6	S	13:35
8/9/01	13:50	New Barrel	Center	L10	13:20	8.25	GR R		55.7	S	13:50
8/9/01	14:05		82	H6	13:30	13.79	GR R	13.68	42.5	S	14:05
8/9/01	14:21		11	H6	13:38	12.18	GR R	12.11	46.4	S	14:21
8/9/01	14:36	New Barrel	South	H6	13:45	16.30	GR R		36.5	S	14:36
8/9/01	14:50		54	H6	14:08	12.24	GR R	12.18	46.5	S	14:50
8/9/01	15:04		20	H6	14:22	12.51	GR R	12.43	45.8	S	15:04
8/9/01	15:19		22	H6	14:48	13.44	GR R	13.38	43.3	S	15:19
8/9/01	15:34		58	H6	15:00	11.68	GR R	11.50	47.8	S	15:34
8/9/01	15:49	New Barrel		L10	15:08	8.23	GR R		55.9	S	15:49
8/9/01	16:04		43	H6	15:20	12.21	GR R	12.12	46.6	S	16:04
8/9/01	16:18		65	H6	15:30	11.67	GR R	11.66	47.7	S	16:18
8/9/01	16:33		33	L10	15:58	7.36	GR R	7.31	58.7	S	16:33
8/9/01	16:48		24	H6	16:05	12.37	GR R	12.28	45.9	S	16:48
8/9/01	17:02		6	L10	16:30	8.19	GR R	8.02	55.9	S	17:02
8/9/01	11:34		27	H0	17:07	11.42	GR L				
8/9/01	13:35		5	H6	13:05	13.12	GR L				
8/9/01	14:21		11	H6	13:38	12.03	GR L				
8/9/01	13:20		16	H6	13:00	11.32	GR L				
8/9/01	15:04		20	H6	14:22	12.34	GR L				
8/9/01	15:19		22	H6	14:48	13.32	GR L				
8/9/01	16:48		24	H6	16:05	12.18	GR L				
8/9/01	16:04		43	H6	15:20	12.03	GR L				
8/9/01	14:50		54	H6	14:08	12.12	GR L				
8/9/01	15:34		58	H6	15:00	11.31	GR L				
8/9/01	16:18		65	H6	15:30	11.64	GR L				
8/9/01	14:05		82	H6	13:30	13.57	GR L				
8/9/01	17:02		6	L10	16:30	7.84	GR L				
8/9/01	16:33		33	L10	15:58	7.25	GR L				
8/9/01	11:49		48	L10	17:30	10.05	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/9/01	11:20		84		17:00	12.44	GR L				
8/9/01	13:05	New Barrel	North	H6	12:28	15.88	GR L				
8/9/01	14:36	New Barrel	South	H6	13:45	16.04	GR L				
8/9/01	13:50	New Barrel	Center	L10	13:20	8.16	GR L				
8/9/01	15:49	New Barrel		L10	15:08	8.07	GR L				
8/10/01	11:05	New Barrel	South	L10	16:45	8.33	GR R		55.6	S	11:05
8/10/01	11:21		1	L10	16:40	10.97	GR R	10.97	50.1	S	11:21
8/10/01	11:35	New Barrel	Center	L10	17:00	8.31	GR R		55.6	S	11:35
8/10/01	11:50		27	H0	17:05	13.60	GR R	13.46	43.7	S	11:50
8/10/01	12:05		51	L10	17:10	7.46	GR R	7.25	58.3	S	12:05
8/10/01	12:20		48	L10	17:20	7.51	GR R	7.48	57.9	S	12:20
8/10/01	12:36		7	L10	17:54	8.09	GR R	7.85	56.8	S	12:36
8/10/01	12:55		5	L10	12:30	8.20	GR R	8.09	56.5	S	12:55
8/10/01	13:11		24	L10	12:33	8.26	GR R	8.13	55.8	S	13:11
8/10/01	13:25	New Barrel	South	L10	12:45	8.29	GR R		55.7	S	13:25
8/10/01	13:40		11	L10	13:00	8.10	GR R	8.02	56.3	S	13:40
8/10/01	13:54		65	L10	13:05	8.04	GR R	7.96	56.6	S	13:54
8/10/01	14:09		27	L10	13:35	8.02	GR R	7.89	56.9	S	14:09
8/10/01	14:23		1	L10	13:40	8.04	GR R	7.81	56.6	S	14:23
8/10/01	14:38		22	L10	14:07	8.22	GR R	8.13	55.9	S	14:38
8/10/01	14:54		8	L10	14:25	8.13	GR R	8.03	56.3	S	14:54
8/10/01	15:14		84	L10	14:40	8.12	GR R	8.01	56.4	S	15:14
8/10/01	15:32		82	L10	14:50	8.09	GR R	7.98	56.5	S	15:32
8/10/01	11:50		27	H0	17:05	13.31	GR L				
8/10/01	11:21		1	L10	16:40	10.96	GR L				
8/10/01	14:23		1	L10	13:40	7.57	GR L				
8/10/01	12:55		5	L10	12:30	7.97	GR L				
8/10/01	12:36		7	L10	17:54	7.61	GR L				
8/10/01	14:54		8	L10	14:25	7.93	GR L				
8/10/01	13:40		11	L10	13:00	7.93	GR L				
8/10/01	14:38		22	L10	14:07	8.03	GR L				
8/10/01	13:11		24	L10	12:33	7.99	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/10/01	14:09		27	L10	13:35	7.75	GR L				
8/10/01	12:20		48	L10	17:20	7.44	GR L				
8/10/01	12:05		51	L10	17:10	7.03	GR L				
8/10/01	13:54		65	L10	13:05	7.87	GR L				
8/10/01	15:32		82	L10	14:50	7.87	GR L				
8/10/01	15:14		84	L10	14:40	7.90	GR L				
8/10/01	11:35	New Barrel	Center	L10	17:00	8.13	GR L				
8/10/01	11:05	New Barrel	South	L10	16:45	8.36	GR L				
8/10/01	13:25	New Barrel	South	L10	12:45	8.06	GR L				
8/12/01	11:31	New Barrel	South	L10	10:50	8.35	GR R		55.3	S	11:31
8/12/01	11:46	New Barrel	Center	L10	10:57	8.33	GR R		55.5	S	11:46
8/12/01	12:32	New Barrel	South	L6	11:50	11.28	GR R		48.7	S	12:32
8/12/01	12:54		20	L10	12:25	8.19	GR R	7.97	56.0	S	12:54
8/12/01	13:09		54	L10	12:35	8.17	GR R	8.10	56.1	S	13:09
8/12/01	13:25	New Barrel	Center	L6	12:41	11.18	GR R		49.1	S	13:25
8/12/01	13:41		58	L10	13:21	8.17	GR R	8.07	55.9	S	13:41
8/12/01	14:22	New Barrel	South	L6	13:55	11.22	GR R		49.9	S	14:22
8/12/01	15:03		16	L10	14:01	8.17	GR R	8.12	57.0	S	15:03
8/12/01	15:18		8	L6	14:42	10.06	GR R	9.97	52.1	S	15:18
8/12/01	15:32		51	L6	14:50	8.25	GR R	8.15	57.9	S	15:32
8/12/01	15:48		11	L6	15:15	10.19	GR R	10.10	51.7	S	15:48
8/12/01	16:03		7	L6	15:17	9.81	GR R	9.77	52.7	S	16:03
8/12/01	16:17		48	L6	15:55	8.36	GR R	8.28	57.7	S	16:17
8/12/01	16:31		22	L6	16:00	10.23	GR R	10.10	51.5	S	16:31
8/12/01	16:46		33	L6	16:27	7.65	GR R	7.39	60.3	S	16:46
8/12/01	17:17		65	L6	16:57	8.78	GR R	8.70	55.9	S	17:17
8/12/01	17:33		5	L6	17:02	9.92	GR R	9.82	52.5	S	17:33
8/12/01	15:03		16	L10	14:01	8.06	GR L				
8/12/01	12:54		20	L10	12:25	7.75	GR L				
8/12/01	13:09		54	L10	12:35	8.02	GR L				
8/12/01	13:41		58	L10	13:21	7.96	GR L				
8/12/01	17:33		5	L6	17:02	9.71	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/12/01	16:03		7	L6	15:17	9.73	GR L				
8/12/01	15:18		8	L6	14:42	9.87	GR L				
8/12/01	15:48		11	L6	15:15	10.00	GR L				
8/12/01	16:31		22	L6	16:00	9.97	GR L				
8/12/01	16:46		33	L6	16:27	7.13	GR L				
8/12/01	16:17		48	L6	15:55	8.19	GR L				
8/12/01	15:32		51	L6	14:50	8.04	GR L				
8/12/01	17:17		65	L6	16:57	8.62	GR L				
8/12/01	11:46	New Barrel	Center	L10	10:57	7.90	GR L				
8/12/01	11:31	New Barrel	South	L10	10:50	8.03	GR L				
8/12/01	12:32	New Barrel	South	L6	11:50	10.86	GR L				
8/12/01	13:25	New Barrel	Center	L6	12:41	11.00	GR L				
8/12/01	14:22	New Barrel	South	L6	13:55	10.84	GR L				
8/13/01	11:31	New Barrel	Center	L6	17:13	11.25	GR R		48.8	S	11:31
8/13/01	11:50		54	L6	17:30	9.49	GR R	9.51	54.0	S	11:50
8/13/01	12:05		6	L6	17:35	9.52	GR R	9.63	53.5	S	12:05
8/13/01	12:22		27	L6	18:08	7.99	GR R	8.56	58.7	S	12:22
8/13/01	12:37		1	L6	18:11	8.78	GR R	8.81	56.1	S	12:37
8/13/01	13:42	New Barrel	Center	L0	10:45	12.57	GR R		47.6	S	13:42
8/13/01	13:59		20	L6	12:17	10.54	GR R	10.68	50.6	S	13:59
8/13/01	14:30		24	L6	12:31	10.03	GR R	10.08	52.1	S	14:30
8/13/01	14:45		82	L6	13:00	10.12	GR R	10.16	52.0	S	14:45
8/13/01	15:01		84	L6	13:07	10.13	GR R	10.20	52.0	S	15:01
8/13/01	15:18	New Barrel	South	L0	13:30	12.51	GR R		45.0	S	15:18
8/13/01	15:33		16	L6	13:40	8.94	GR R	8.97	55.7	S	15:33
8/13/01	15:50	New Barrel		L0	13:42	12.53	GR R		47.2	S	15:50
8/13/01	16:05		27	L6	13:46	8.25	GR R	8.34	58.1	S	16:05
8/13/01	16:23		51	L6	14:17	8.71	GR R	8.71	61.1	S	16:23
8/13/01	12:37		1	L6	18:11	8.84	GR L				
8/13/01	12:05		6	L6	17:35	9.74	GR L				
8/13/01	15:33		16	L6	13:40	8.99	GR L				
8/13/01	13:59		20	L6	12:17	10.81	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/13/01	14:30		24	L6	12:31	10.13	GR L				
8/13/01	12:22		27	L6	18:08	9.13	GR L				
8/13/01	16:05		27	L6	13:46	8.42	GR L				
8/13/01	16:23		51	L6	14:17	8.71	GR L				
8/13/01	11:50		54	L6	17:30	9.52	GR L				
8/13/01	14:45		82	L6	13:00	10.19	GR L				
8/13/01	15:01		84	L6	13:07	10.26	GR L				
8/13/01	13:42	New Barrel	Center	L0	10:45	12.55	GR L				
8/13/01	15:18	New Barrel	South	L0	13:30	12.48	GR L				
8/13/01	15:50	New Barrel		L0	13:42	13.11	GR L				
8/13/01	11:31	New Barrel	Center	L6	17:13	11.28	GR L				
8/14/01	10:40		58	L6	14:23	10.07	GR R	9.98	52.2	S	10:40
8/14/01	10:55		5	L0	14:52	10.60	GR R	10.70	53.5	S	10:55
8/14/01	11:11		1	L0	15:05	9.13	GR R	9.00	60.6	S	11:11
8/14/01	11:27		33	L0	15:35	6.81	GR R	6.91	68.6	S	11:27
8/14/01	11:56		48	L0	15:50	8.25	GR R	8.31	62.8	S	11:56
8/14/01	12:11		11	L0	16:10	9.09	GR R	9.15	58.5	S	12:11
8/14/01	12:28		8	L0	16:20	10.48	GR R	10.53	53.4	S	12:28
8/14/01	12:45		6	L0	16:35	10.28	GR R	10.36	53.9	S	12:45
8/14/01	13:00		7	L0	17:01	10.31	GR R	10.36	54.1	S	13:00
8/14/01	13:35	New Barrel	Center	I10	11:40	12.32	GR R		45.3	S	13:35
8/14/01	13:50		82	L0	12:05	11.15	GR R	11.22	50.9	S	13:50
8/14/01	14:08		20	L0	12:15	11.32	GR R	11.55	50.6	S	14:08
8/14/01	14:25		22	L0	12:45	11.60	GR R	11.55	50.3	S	14:25
8/14/01	14:41		54	L0	12:52	9.90	GR R	9.95	55.3	S	14:41
8/14/01	14:57	New Barrel	South	L0	13:00	12.40	GR R		47.1	S	14:57
8/14/01	15:11		27	L0	13:17	9.02	GR R	9.09	58.4	S	15:11
8/14/01	15:29		65	L0	13:25	9.83	GR R	9.89	55.9	S	15:29
8/14/01	15:45	New Barrel	Center	L0	13:25	12.34	GR R		45.4	S	15:45
8/14/01	16:02	New Barrel	South	I10	13:42	12.22	GR R		45.6	S	16:02
8/14/01	16:16		84	L0	13:57	10.93	GR R	11.04	52.0	S	16:16
8/14/01	16:31		16	L0	14:03	10.23	GR R	10.27	54.3	S	16:31

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/14/01	16:45		6	L0	14:25	10.42	GR R	10.42	50.4	S	16:45
8/14/01	11:11		1	L0	15:05	8.87	GR L				
8/14/01	10:55		5	L0	14:52	10.79	GR L				
8/14/01	16:45		6	L0	14:25	10.42	GR L				
8/14/01	12:45		6	L0	16:35	10.44	GR L				
8/14/01	13:00		7	L0	17:01	10.41	GR L				
8/14/01	12:28		8	L0	16:20	10.58	GR L				
8/14/01	12:11		11	L0	16:10	9.20	GR L				
8/14/01	16:31		16	L0	14:03	10.31	GR L				
8/14/01	14:08		20	L0	12:15	11.77	GR L				
8/14/01	14:25		22	L0	12:45	11.50	GR L				
8/14/01	15:11		27	L0	13:17	9.16	GR L				
8/14/01	11:27		33	L0	15:35	7.00	GR L				
8/14/01	11:56		48	L0	15:50	8.36	GR L				
8/14/01	14:41		54	L0	12:52	10.00	GR L				
8/14/01	15:29		65	L0	13:25	9.94	GR L				
8/14/01	13:50		82	L0	12:05	11.29	GR L				
8/14/01	16:16		84	L0	13:57	11.15	GR L				
8/14/01	10:40		58	L6	14:23	9.89	GR L				
8/14/01	13:35	New Barrel	Center	I10	11:40	12.57	GR L				
8/14/01	16:02	New Barrel	South	I10	13:42	12.31	GR L				
8/14/01	15:45	New Barrel	Center	L0	13:25	12.41	GR L				
8/14/01	14:57	New Barrel	South	L0	13:00	12.42	GR L				
8/15/01	8:33	New Barrel	North	H0	15:40	18.43	GR R		31.0	S	8:33
8/15/01	9:17		58	I10	15:50	10.68	GR R	10.74	49.4	S	9:17
8/15/01	9:54		6	I6	16:01	10.57	GR R	10.61	49.5	S	9:54
8/15/01	10:14		33	I6	16:30	9.06	GR R	9.08	54.3	S	10:14
8/15/01	10:29		16	I10	16:37	9.78	GR R	9.81	52.2	S	10:29
8/15/01	10:44		7	I6	17:05	11.18	GR R	11.41	47.8	S	10:44
8/15/01	10:51		24	L0	14:45	10.79	GR R	10.84	52.4	S	10:51
8/15/01	11:00		27	I6	17:20	8.13	GR R	8.21	57.5	S	11:00
8/15/01	11:06		51	L0	15:00	8.84	GR R	8.92	55.1	S	11:06

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/15/01	11:14		84	I6	17:45	11.76	GR R	11.78	46.4	S	11:14
8/15/01	11:20		58	L0	15:25	10.35	GR R	10.40	53.2	S	11:20
8/15/01	11:29		1	I6	17:50	10.35	GR R	10.38	50.2	S	11:29
8/15/01	11:35	New Barrel	Center	I10	15:30	12.16	GR R		45.6	S	11:35
8/15/01	11:42		20	I6	18:15	12.74	GR R	12.41	45.8	S	11:42
8/15/01	11:49		11	I10	15:35	10.25	GR R	10.30	50.6	S	11:49
8/15/01	12:03		5	I10	16:10	10.28	GR R	10.37	51.0	S	12:03
8/15/01	12:17		7	I10	16:17	10.44	GR R	10.56	50.0	S	12:17
8/15/01	12:31		3	I10	16:42	7.45	GR R	7.45	59.7	S	12:31
8/15/01	12:45		1	I10	16:47	9.48	GR R	9.53	52.8	S	12:45
8/15/01	13:02	New Barrel	South	I10	10:50	12.13	GR R		46.0	S	13:02
8/15/01	13:20	New Barrel	Center	I6	11:35	13.24	GR R		43.1	S	13:20
8/15/01	13:34		27	I10	12:00	9.89	GR R	9.93	51.9	S	13:34
8/15/01	14:03		54	I10	12:07	10.65	GR R	10.72	49.8	S	14:03
8/15/01	14:19		82	I10	12:36	11.13	GR R	11.16	48.7	S	14:19
8/15/01	14:33		84	I10	12:45	11.24	GR R	11.33	48.0	S	14:33
8/15/01	14:55	New Barrel	South	I10	12:55	13.08	GR R		45.7	S	14:55
8/15/01	15:09		20	I10	13:15	11.05	GR R	11.10	48.6	S	15:09
8/15/01	15:24		48	I10	13:20	8.78	GR R	8.84	55.0	S	15:24
8/15/01	15:40	New Barrel	South	I10	13:25	12.25	GR R		45.7	S	15:40
8/15/01	15:55		22	I10	13:46	11.15	GR R	11.22	48.5	S	15:55
8/15/01	16:10		8	I10	13:55	11.00	GR R	10.95	49.1	S	16:10
8/15/01	16:25	New Barrel	Center	I6	14:00	13.05	GR R		43.3	S	16:25
8/15/01	16:40		51	I6	14:17	9.29	GR R	9.34	53.5	S	16:40
8/15/01	16:54		65	I10	14:31	10.15	GR R	10.21	51.0	S	16:54
8/15/01	17:09		11	I10	14:55	10.93	GR R	11.01	48.5	S	17:09
8/15/01	17:24		24	I10	15:10	11.02	GR R	11.09	48.7	S	17:24
8/15/01	17:38		5	I6	15:25	11.03	GR R	11.07	48.4	S	17:38
8/15/01	12:45		1	I10	16:47	9.58	GR L				
8/15/01	12:31		3	I10	16:42	7.45	GR L				
8/15/01	12:03		5	I10	16:10	10.45	GR L				
8/15/01	12:17		7	I10	16:17	10.67	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/15/01	16:10		8	I10	13:55	10.89	GR L				
8/15/01	11:49		11	I10	15:35	10.34	GR L				
8/15/01	17:09		11	I10	14:55	11.09	GR L				
8/15/01	10:29		16	I10	16:37	9.83	GR L				
8/15/01	15:09		20	I10	13:15	11.15	GR L				
8/15/01	15:55		22	I10	13:46	11.29	GR L				
8/15/01	17:24		24	I10	15:10	11.15	GR L				
8/15/01	13:34		27	I10	12:00	9.96	GR L				
8/15/01	15:24		48	I10	13:20	8.90	GR L				
8/15/01	14:03		54	I10	12:07	10.79	GR L				
8/15/01	9:17		58	I10	15:50	10.80	GR L				
8/15/01	16:54		65	I10	14:31	10.26	GR L				
8/15/01	14:19		82	I10	12:36	11.19	GR L				
8/15/01	14:33		84	I10	12:45	11.41	GR L				
8/15/01	11:29		1	I6	17:50	10.41	GR L				
8/15/01	17:38		5	I6	15:25	11.10	GR L				
8/15/01	9:54		6	I6	16:01	10.64	GR L				
8/15/01	10:44		7	I6	17:05	11.64	GR L				
8/15/01	11:42		20	I6	18:15	12.08	GR L				
8/15/01	11:00		27	I6	17:20	8.28	GR L				
8/15/01	10:14		33	I6	16:30	9.09	GR L				
8/15/01	16:40		51	I6	14:17	9.38	GR L				
8/15/01	11:14		84	I6	17:45	11.80	GR L				
8/15/01	10:51		24	L0	14:45	10.89	GR L				
8/15/01	11:06		51	L0	15:00	8.99	GR L				
8/15/01	11:20		58	L0	15:25	10.44	GR L				
8/15/01	8:33	New Barrel	North	H0	15:40	18.54	GR L				
8/15/01	11:35	New Barrel	Center	I10	15:30	12.29	GR L				
8/15/01	13:02	New Barrel	South	I10	10:50	12.25	GR L				
8/15/01	14:55	New Barrel	South	I10	12:55	12.38	GR L				
8/15/01	15:40	New Barrel	South	I10	13:25	12.37	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/15/01	13:20	New Barrel	Center	I6	11:35	13.40	GR L				
8/15/01	16:25	New Barrel	Center	I6	14:00	13.27	GR L				
8/16/01	12:55		8	I6	12:15	12.02	GR R	12.06	45.7	S	12:55
8/16/01	13:09		43	I6	12:22	11.28	GR R	11.51	47.9	S	13:09
8/16/01	13:25		22	H0	12:32	15.12	GR R	15.25	38.9	S	13:25
8/16/01	13:40		54	I6	12:50	11.38	GR R	11.46	47.5	S	13:40
8/16/01	13:54		48	I6	13:26	10.16	GR R	10.13	51.2	S	13:54
8/16/01	14:13		27	H0	13:33	9.34	GR R	9.38	59.2	S	14:13
8/16/01	14:29	New Barrel	South	I6	13:43	13.24	GR R		42.9	S	14:29
8/16/01	14:45		11	I3	14:05	11.02	GR R	11.24	49.5	S	14:45
8/16/01	15:00		65	I6	14:10	10.80	GR R	10.90	49.1	S	15:00
8/16/01	15:14		51	I3	14:40	10.80	GR R	10.42	50.1	S	15:14
8/16/01	15:23		82	I6	14:50	10.80	GR R	11.35	51.1	S	15:23
8/16/01	15:45		43	I3	15:13	10.80	GR R	10.78	52.1	S	15:45
8/16/01	15:59		24	I3	15:25	10.80	GR R	11.40	53.1	S	15:59
8/16/01	16:14	New Barrel	South	H3	15:32	10.8?	GR R		54.1?	S	16:14
8/16/01	16:27		5	I3	15:50	10.80	GR R	11.38	55.1	S	16:27
8/16/01	16:42	New Barrel	Center	I3	16:00	10.80	GR R		56.1	S	16:42
8/16/01	16:56		22	I6	16:01	10.80	GR R	11.77	57.1	S	16:56
8/16/01	17:10		58	I6	16:15	10.80	GR R	10.58	58.1	S	17:10
8/16/01	17:24	New Barrel	North	H6	16:26	10.8?	GR R		59.1?	S	17:24
8/16/01	17:38		16	I6	16:40	10.80	GR R	10.53	60.1	S	17:38
8/16/01	17:55		27	I3	17:05	10.80	GR R	10.47	61.1	S	17:55
8/16/01	13:25		22	H0	12:32	15.37	GR L				
8/16/01	14:13		27	H0	13:33	9.42	GR L				
8/16/01	16:27		5	I3	15:50	11.96	GR L				
8/16/01	14:45		11	I3	14:05	11.45	GR L				
8/16/01	15:59		24	I3	15:25	11.99	GR L				
8/16/01	17:55		27	I3	17:05	10.13	GR L				
8/16/01	15:45		43	I3	15:13	10.76	GR L				
8/16/01	15:14		51	I3	14:40	10.03	GR L				
8/16/01	12:55		8	I6	12:15	12.09	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/16/01	17:38		16	I6	16:40	10.25	GR L				
8/16/01	16:56		22	I6	16:01	12.73	GR L				
8/16/01	13:09		43	I6	12:22	11.74	GR L				
8/16/01	13:54		48	I6	13:26	10.09	GR L				
8/16/01	13:40		54	I6	12:50	11.54	GR L				
8/16/01	17:10		58	I6	16:15	10.36	GR L				
8/16/01	15:00		65	I6	14:10	11.00	GR L				
8/16/01	15:23		82	I6	14:50	11.89	GR L				
8/16/01	16:14	New Barrel	South	H3	15:32	14.41	GR L				
8/16/01	17:24	New Barrel	North	H6	16:26	16.24	GR L				
8/16/01	16:42	New Barrel	Center	I3	16:00	14.35	GR L				
8/16/01	14:29	New Barrel	South	I6	13:43	13.40	GR L				
8/17/01	10:31		7	I3	17:16	11.66	GR R	11.70	47.6	S	10:31
8/17/01	10:46		6	I3	17:35	11.26	GR R	11.35	48.6	S	10:46
8/17/01	11:04		1	I3	17:55	11.13	GR R	10.83	51.1	S	11:04
8/17/01	11:22		33	I3	18:05	8.99	GR R	9.11	57.0	S	11:22
8/17/01	11:39	New Barrel	North	I10	10:45	12.35	GR R		45.7	S	11:39
8/17/01	12:38	New Barrel	South	I3	12:05	14.01	GR R		40.6	S	12:38
8/17/01	13:10	New Barrel	Center	L3	12:42	11.28	GR R		49.5	S	13:10
8/17/01	13:35		84	I3	12:50	12.02	GR R	12.17	46.0	S	13:35
8/17/01	13:50		24	I3	13:00	13.18	GR R	12.81	45.5	S	13:50
8/17/01	14:08		20	I3	13:35	12.12	GR R	12.31	45.9	S	14:08
8/17/01	14:27		8	I3	13:28	12.15	GR R	12.22	45.6	S	14:27
8/17/01	14:47		22	I3	14:05	13.74	GR R	13.03	45.7	S	14:47
8/17/01	15:43		82	I3	14:15	12.55	GR R	12.62	45.5	S	15:43
8/17/01	15:58		43	I10	14:30	10.54	GR R	10.61	50.1	S	15:58
8/17/01	16:16		58	I3	14:45	11.48	GR R	11.53	48.0	S	16:16
8/17/01	16:31		11	L3	15:07	9.86	GR R	9.98	54.0	S	16:31
8/17/01	16:46		65	I3	15:21	11.48	GR R	11.22	50.4	S	16:46
8/17/01	17:01	New Barrel	Center	L3	15:37	11.35	GR R		49.6	S	17:01
8/17/01	17:16		27	H6	15:49	9.80	GR R	9.87	53.0	S	17:16
8/17/01	17:34		16	I3	16:10	10.26	GR R	10.37	51.4	S	17:34

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/17/01	17:49		51	L3	16:12	8.77	GR R	8.81	59.7	S	17:49
8/17/01	18:03		54	I3	16:35	10.97	GR R	11.03	49.6	S	18:03
8/17/01	17:16		27	H6	15:49	9.94	GR L				
8/17/01	15:58		43	I10	14:30	10.68	GR L				
8/17/01	11:04		1	I3	17:55	10.52	GR L				
8/17/01	10:46		6	I3	17:35	11.44	GR L				
8/17/01	10:31		7	I3	17:16	11.74	GR L				
8/17/01	14:27		8	I3	13:28	12.28	GR L				
8/17/01	17:34		16	I3	16:10	10.48	GR L				
8/17/01	14:08		20	I3	13:35	12.50	GR L				
8/17/01	14:47		22	I3	14:05	12.32	GR L				
8/17/01	13:50		24	I3	13:00	12.44	GR L				
8/17/01	11:22		33	I3	18:05	9.23	GR L				
8/17/01	18:03		54	I3	16:35	11.08	GR L				
8/17/01	16:16		58	I3	14:45	11.58	GR L				
8/17/01	16:46		65	I3	15:21	10.96	GR L				
8/17/01	15:43		82	I3	14:15	12.69	GR L				
8/17/01	13:35		84	I3	12:50	12.31	GR L				
8/17/01	16:31		11	L3	15:07	10.09	GR L				
8/17/01	17:49		51	L3	16:12	8.84	GR L				
8/17/01	11:39	New Barrel	North	I10	10:45	12.16	GR L				
8/17/01	12:38	New Barrel	South	I3	12:05	14.30	GR L				
8/17/01	13:10	New Barrel	Center	L3	12:42	11.66	GR L				
8/17/01	17:01	New Barrel	Center	L3	15:37	11.55	GR L				
8/18/01	12:25		43	L3	16:45	9.74	GR R	9.76	55.5	S	12:25
8/18/01	12:40		22	H6	16:51	14.77	GR R	14.81	39.7	S	12:40
8/18/01	13:00		48	I3	17:17	9.09	GR R	9.13	56.7	S	13:00
8/18/01	13:15		7	L3	17:47	10.31	GR R	10.38	52.6	S	13:15
8/18/01	13:30		5	L3	18:00	10.77	GR R	10.91	51.5	S	13:30
8/18/01	13:45		65	H6	18:23	10.96	GR R	11.00	49.6	S	13:45
8/18/01	14:00		43	L6	18:50	10.39	GR R	10.47	51.3	S	14:00
8/18/01	14:15		24	L3	19:02	10.21	GR R	10.22	52.8	S	14:15

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/18/01	14:49	New Barrel	South	L3	13:08	11.39	GR R		49.5	S	14:49
8/18/01	15:23	New Barrel	Center	L3	13:20	11.31	GR R		49.7	S	15:23
8/18/01	15:38		27	L3	14:03	9.77	GR R	9.86	54.3	S	15:38
8/18/01	16:03		1	L3	14:08	9.68	GR R	9.78	55.0	S	16:03
8/18/01	16:18		33	L3	14:25	9.20	GR R	9.34	56.5	S	16:18
8/18/01	16:54		54	L3	14:35	10.57	GR R	10.63	51.3	S	16:54
8/18/01	17:08		22	L3	15:00	10.92	GR R	10.99	50.8	S	17:08
8/18/01	17:23		16	L3	15:11	9.92	GR R	9.99	53.4	S	17:23
8/18/01	12:40		22	H6	16:51	14.85	GR L				
8/18/01	13:45		65	H6	18:23	11.03	GR L				
8/18/01	13:00		48	I3	17:17	9.16	GR L				
8/18/01	16:03		1	L3	14:08	9.87	GR L				
8/18/01	13:30		5	L3	18:00	11.05	GR L				
8/18/01	13:15		7	L3	17:47	10.44	GR L				
8/18/01	17:23		16	L3	15:11	10.05	GR L				
8/18/01	17:08		22	L3	15:00	11.06	GR L				
8/18/01	14:15		24	L3	19:02	10.23	GR L				
8/18/01	15:38		27	L3	14:03	9.94	GR L				
8/18/01	16:18		33	L3	14:25	9.48	GR L				
8/18/01	12:25		43	L3	16:45	9.77	GR L				
8/18/01	16:54		54	L3	14:35	10.68	GR L				
8/18/01	14:00		43	L6	18:50	10.54	GR L				
8/18/01	15:23	New Barrel	Center	L3	13:20	11.51	GR L				
8/18/01	14:49	New Barrel	South	L3	13:08	11.61	GR L				
8/19/01	12:15	New Barrel	Center	I0	15:20	15.41	GR R		38.8	S	12:15
8/19/01	12:30		20	L3	15:30	10.73	GR R	10.79	50.9	S	12:30
8/19/01	13:09		8	L3	15:47	10.60	GR R	10.61	52.0	S	13:09
8/19/01	13:23		84	L3	16:08	10.42	GR R	10.47	52.4	S	13:23
8/19/01	13:38		65	L3	16:25	10.23	GR R	10.31	53.0	S	13:38
8/19/01	13:53		6	L3	16:40	10.97	GR R	11.08	50.6	S	13:53
8/19/01	14:13		82	L3	16:55	10.74	GR R	10.80	51.6	S	14:13
8/19/01	14:50		58	L3	17:35	11.24	GR R	11.17	50.7	S	14:50

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/19/01	15:24	New Barrel	South	I0	13:45	15.24	GR R		38.9	S	15:24
8/19/01	15:38	New Barrel	Center	I0	13:51	15.15	GR R		39.2	S	15:38
8/19/01	15:52		51	I0	14:55	11.50	GR R	11.56	50.1	S	15:52
8/19/01	16:06		48	L3	15:02	9.60	GR R	9.67	54.7	S	16:06
8/19/01	16:22		11	I0	15:33	12.69	GR R	12.78	46.3	S	16:22
8/19/01	12:47		27	I0	16:45	9.58	GR R	9.61	56.6	S	16:45
8/19/01	16:52		33	I0	16:00	10.73	GR R	10.77	52.8	S	16:52
8/19/01	13:03		8	I0	17:00	13.09	GR R	13.17	44.5	S	17:00
8/19/01	13:20		20	I0	17:12	13.08	GR R	13.20	44.5	S	17:12
8/19/01	13:35		84	I0	17:40	12.58	GR R	12.63	45.7	S	17:40
8/19/01	13:03		8	I0	17:00	13.24	GR L				
8/19/01	16:22		11	I0	15:33	12.86	GR L				
8/19/01	13:20		20	I0	17:12	13.32	GR L				
8/19/01	12:47		27	I0	16:45	9.64	GR L				
8/19/01	16:52		33	I0	16:00	10.80	GR L				
8/19/01	15:52		51	I0	14:55	11.61	GR L				
8/19/01	13:49		65	I0	17:45	7.74	GR L	7.74			
8/19/01	13:35		84	I0	17:40	12.67	GR L				
8/19/01	13:53		6	L3	16:40	11.18	GR L				
8/19/01	13:09		8	L3	15:47	10.61	GR L				
8/19/01	12:30		20	L3	15:30	10.84	GR L				
8/19/01	16:06		48	L3	15:02	9.73	GR L				
8/19/01	14:50		58	L3	17:35	11.10	GR L				
8/19/01	13:38		65	L3	16:25	10.39	GR L				
8/19/01	14:13		82	L3	16:55	10.86	GR L				
8/19/01	13:23		84	L3	16:08	10.52	GR L				
8/19/01	12:15	New Barrel	Center	I0	15:20	15.56	GR L				
8/19/01	15:38	New Barrel	Center	I0	13:51	15.27	GR L				
8/19/01	15:24	New Barrel	South	I0	13:45	15.50	GR L				
8/20/01	8:50		82	I0	16:37	12.61	GR R	12.68	46.0	S	8:50
8/20/01	9:05		48	I0	17:12	10.16	GR R	10.25	53.9	S	9:05
8/20/01	9:22		43	I0	17:50	7.96	GR R	7.98	56.6	S	9:22

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/20/01	9:37		65	I0	17:55	11.12	GR R	11.18		S	9:37
8/20/01	14:48		6	I0	14:05	12.35	GR R	12.44	46.1	S	14:48
8/20/01	15:03		58	I0	14:11	12.47	GR R	12.51	46.1	S	15:03
8/20/01	15:27		5	I0	14:35	13.21	GR R	13.26	45.1	S	15:27
8/20/01	15:41		7	I0	14:40	12.54	GR R	12.61	46.5	S	15:41
8/20/01	15:57	New Barrel	North	L0	14:55	8.2?	GR R		55.9?	S	15:57
8/20/01	16:12		43	I0	14:55	12.38	GR R	12.38	46.6	S	16:12
8/20/01	16:27		54	I0	15:20	11.82	GR R	11.86	48.5	S	16:27
8/20/01	16:42		22	I0	15:42	13.41	GR R	13.49	43.5	S	16:42
8/20/01	16:57		16	I0	16:00	10.68	GR R	10.74	52.3	S	16:57
8/20/01	15:27		5	I0	14:35	13.31	GR L				
8/20/01	14:48		6	I0	14:05	12.53	GR L				
8/20/01	15:41		7	I0	14:40	12.67	GR L				
8/20/01	16:57		16	I0	16:00	10.80	GR L				
8/20/01	16:42		22	I0	15:42	13.57	GR L				
8/20/01	9:22		43	I0	17:50	8.00	GR L				
8/20/01	16:12		43	I0	15:13	12.44	GR L	12.44			
8/20/01	9:05		48	I0	17:12	10.34	GR L				
8/20/01	16:27		54	I0	15:20	11.89	GR L				
8/20/01	15:03		58	I0	14:11	12.54	GR L				
8/20/01	9:37		65	I0	17:55	11.24	GR L				
8/20/01	8:50		82	I0	16:37	12.74	GR L				
8/20/01	15:57	New Barrel	North	L0	14:55	8.29?	GR L				
8/27/01	13:15		20	H10	12:55	13.83	GR R	13.87	42.6	S	13:15
8/27/01	13:29		16	H10	13:00	10.83	GR R	10.88	50.2	S	13:29
8/27/01	13:45	New Barrel	South	H10	13:20	16.47	GR R		37.9	S	13:45
8/27/01	13:59		11	H10	13:25	13.31	GR R	13.38	44.2	S	13:59
8/27/01	14:14	New Barrel	Center	H10	13:32	16.44	GR R		36.7	S	14:14
8/27/01	14:28		8	H10	13:41	12.44	GR R	12.46	46.0	S	14:28
8/27/01	14:43		5	H10	14:05	13.29	GR R	13.34	44.0	S	14:43
8/27/01	14:58		22	H10	14:15	14.61	GR R	14.66	40.4	S	14:58
8/27/01	15:12		48	H10	14:23	9.36	GR R	9.42	54.6	S	15:12

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/27/01	15:27		82	H10	15:00	13.21	GR R	13.25	43.9	S	15:27
8/27/01	15:44		27	H10	15:10	12.70	GR R	12.73	45.1	S	15:44
8/27/01	15:59		58	H10	15:35	12.40	GR R	12.47	45.5	S	15:59
8/27/01	16:17		33	H10	15:43	8.87	GR R	8.90	56.1	S	16:17
8/27/01	16:33		7	H10	16:10	11.64	GR R	11.69	48.0	S	16:33
8/27/01	16:47	New Barrel	Center	L0	16:15	12.53	GR R		47.2	S	16:47
8/27/01	14:43		5	H10	14:05	13.38	GR L				
8/27/01	16:33		7	H10	16:10	11.73	GR L				
8/27/01	14:28		8	H10	13:41	12.48	GR L				
8/27/01	13:59		11	H10	13:25	13.44	GR L				
8/27/01	13:29		16	H10	13:00	10.92	GR L				
8/27/01	13:15		20	H10	12:55	13.90	GR L				
8/27/01	14:58		22	H10	14:15	14.70	GR L				
8/27/01	15:44		27	H10	15:10	12.76	GR L				
8/27/01	16:17		33	H10	15:43	8.93	GR L				
8/27/01	15:12		48	H10	14:23	9.48	GR L				
8/27/01	15:59		58	H10	15:35	12.53	GR L				
8/27/01	15:27		82	H10	15:00	13.28	GR L				
8/27/01	14:14	New Barrel	Center	H10	13:32	16.57	GR L				
8/27/01	13:45	New Barrel	South	H10	13:20	16.56	GR L				
8/27/01	16:47	New Barrel	Center	L0	16:15	12.61	GR L				
8/28/01	11:17		5	L0	16:26	10.81	GR R	10.86	52.9	S	11:17
8/28/01	11:31		8	L0	16:40	10.84	GR R	10.89	52.2	S	11:31
8/28/01	11:45		51	L0	17:05	9.28	GR R	9.32	58.3	S	11:45
8/28/01	12:16		16	L0	17:15	9.71	GR R	9.76	56.3	S	12:16
8/28/01	13:08		84	H10	12:45	14.03	GR R	14.11	42.0	S	13:08
8/28/01	13:21		1	H10	12:55	10.99	GR R	11.06	49.9	S	13:21
8/28/01	13:45		20	L0	13:20	11.51	GR R	11.58	50.3	S	13:45
8/28/01	14:00		48	L0	13:32	9.15	GR R	9.21	58.6	S	14:00
8/28/01	14:16		11	L0	14:00	10.99	GR R	11.06	51.8	S	14:16
8/28/01	14:34		82	L0	14:10	11.34	GR R	11.41	51.5	S	14:34
8/28/01	14:49		6	L0	14:35	11.09	GR R	11.15	51.6	S	14:49

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/28/01	15:03	New Barrel	South	L0	14:40	12.42	GR R		48.1	S	15:03
8/28/01	15:17	New Barrel	Center	L0	14:45	12.38	GR R		48.8	S	15:17
8/28/01	15:32		58	L0	14:50	10.99	GR R	11.06	52.9	S	15:32
8/28/01	15:48		22	L0	15:20	11.67	GR R	11.74	49.8	S	15:48
8/28/01	16:02		65	L0	15:30	9.6	GR R	9.67	56.9	S	16:02
8/28/01	10:52		51	H10	16:25	9.47	GR R	9.51	54.2	S	16:25
8/28/01	16:27		33	L0	15:45	8.97	GR R	9.04	59.4	S	16:27
8/28/01	11:07		65	H10	16:42	11.13	GR R	11.19	49.4	S	16:42
8/28/01	16:42		7	L0	16:05	10.71	GR R	10.78	53.2	S	16:42
8/28/01	11:22		43	H10	16:50	13.51	GR R	13.59	43.1	S	16:50
8/28/01	16:59	New Barrel	Center	L0	16:10	12.41	GR R		47.5	S	16:59
8/28/01	11:36		54	H10	17:20	11.03	GR R	11.08	49.6	S	17:20
8/28/01	12:06		6	H10	17:25	12.16	GR R	12.23	46.7	S	17:25
8/28/01	13:21		1	H10	12:55	11.12	GR L				
8/28/01	11:51		6	H10	17:25	12.29	GR L				
8/28/01	11:22		43	H10	16:50	13.67	GR L				
8/28/01	10:52		51	H10	16:25	9.55	GR L				
8/28/01	11:36		54	H10	17:20	11.12	GR L				
8/28/01	11:07		65	H10	16:42	11.25	GR L				
8/28/01	13:08		84	H10	12:45	14.19	GR L				
8/28/01	11:17		5	L0	16:26	10.9	GR L				
8/28/01	14:49		6	L0	14:35	11.21	GR L				
8/28/01	16:42		7	L0	16:05	10.84	GR L				
8/28/01	11:31		8	L0	16:40	10.94	GR L				
8/28/01	14:16		11	L0	14:00	11.13	GR L				
8/28/01	12:16		16	L0	17:15	9.81	GR L				
8/28/01	13:45		20	L0	13:20	11.64	GR L				
8/28/01	15:48		22	L0	15:20	11.8	GR L				
8/28/01	16:27		33	L0	15:45	9.1	GR L				
8/28/01	14:00		48	L0	13:32	9.26	GR L				
8/28/01	11:45		51	L0	17:05	9.36	GR L				
8/28/01	15:32		58	L0	14:50	11.13	GR L				

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
8/28/01	16:02		65	L0	15:30	9.74	GR L				
8/28/01	14:34		82	L0	14:10	11.48	GR L				
8/28/01	15:17	New Barrel	Center	L0	14:45	12.54	GR L				
8/28/01	16:59	New Barrel	Center	L0	16:10	12.6	GR L				
8/28/01	15:03	New Barrel	South	L0	14:40	12.57	GR L				
8/29/01	10:12		24	I0	16:35	12.57	GR R	12.61	46.8	S	10:12
8/29/01	13:14		54	L0	12:45	11.28	GR R	11.33	51.3	S	13:14
8/29/01	13:28		43	L0	12:51	11	GR R	11.05	52.0	S	13:28
8/29/01	13:43		27	L0	13:13	9.7	GR R	9.73	56.4	S	13:43
8/29/01	13:59		1	L0	13:25	10.52	GR R	10.57	53.7	S	13:59
8/29/01	14:14		84	L0	13:55	11.31	GR R	11.35	50.9	S	14:14
8/29/01	14:40		24	L0	14:05	10.73	GR R	10.77	53.3	S	14:40
8/29/01	15:45		43	L0	15:15	10.74	GR R	10.79	53.0	S	15:45
8/29/01	16:09		1	I0	15:55	10.89	GR R	10.93	52.4	S	16:09
8/29/01	16:09		1	I0	15:55	10.97	GR L				
8/29/01	10:12		24	I0	16:35	12.64	GR L				
8/29/01	13:59		1	L0	13:25	10.61	GR L				
8/29/01	14:40		24	L0	14:05	10.81	GR L				
8/29/01	13:43		27	L0	13:13	9.76	GR L				
8/29/01	13:28		43	L0	12:51	11.09	GR L				
8/29/01	15:45		43	L0	15:15	10.83	GR L				
8/29/01	13:14		54	L0	12:45	11.38	GR L				
8/29/01	14:14		84	L0	13:55	11.39	GR L				
8/30/01	12:21		24	H10	12:00	13.13	GR R	13.19	44.4	S	12:00
8/30/01	13:01		42	L10	12:45	8.06	GR R	8.08	57.0	S	12:45
8/30/01	12:21		24	H10	12:00	13.25	GR L				
8/30/01	13:01		42	L10	12:45	8.09	GR L				
Average						10.85			52.57		
Average						10.91			51.87		
Average						10.90			52.08		
Average						10.91			51.72		
Average						10.80			51.61		

Table D-2
Summary of DVPE and TVL20 Inspections on Site

Run Date	DVPE Run Time	Can Label	Vehicle	Fuel	Draw Time	Corrected DVPE (PSI)	DVPE Instrument	DVPE Average	TVL 20 (°C)	TVL Instrument	TVL Run Time
Average						10.80			51.61		
Average						10.81			51.61		
Average						10.86			51.61		
Average						10.89			51.61		
Average						10.90			51.61		
Average						10.88			51.61		
Average						10.88			51.61		

Table D-3
Inspections of On-Site CRC Test Fuels
Laboratory G Inspections

Sample ID	L0	L3	L6	L10	I0	I3	I6
Sample Date	13-Aug-01	18-Aug-01	4-Aug-01	2-Aug-01	26-Jul-01	25-Jul-01	25-Jul-01
Spec. Gravity	0.7228	0.7315	0.7315	0.7344	0.7085	0.716	0.7187
Density, g/ml	0.7221	0.7308	0.7307	0.7337	0.7078	0.7153	0.718
API Gravity	64.3	61.9	62	61.2	68.2	66.1	65.4
Oxygenates by OFID							
Ethanol, mass%	0.04	3.42	6.75	10.49	0.03	2.89	6.32
O (ETOH) mass%	0.01	1.19	2.34	3.64	0.01	1	2.19
MTBE, mass %	0.03	0.05	0.04	0.04	0.02	0.04	0.03
O (MTBE) mass%	0.01	0.01	0.01	0.01	0	0.01	0.01
MTBE Vol%	0.03	0.05	0.04	0.04	0.02	0.04	0.03
Ethanol,Vol%	0.04	3.15	6.22	9.7	0.03	2.61	5.72
TBA,mass%	0	0	0	0	0	0	0
TBA (vol %)	0	0	0	0	0	0	0
O (TBA) mass%	0	0	0	0	0	0	0
SBME, mass %	0	0	0	0	0	0	0
SBME (vol %)	0	0	0	0	0	0	0
O (SBME) mass%	0	0	0	0	0	0	0
TAME (mass %)	0	0	0	0	0	0	0
TAME (vol %)	0	0	0	0	0	0	0
O (TAME) mass%	0	0	0	0	0	0	0
Total O, mass%	0.02	1.2	2.35	3.65	0.01	1.01	2.2
Vol % Oxygenates	0.07	3.2	6.26	9.74	0.05	2.64	5.75
EPA DVPE,psi	12.44	10.88	11.15	8.24	15.2	14.2	13.2
ASTM DVPE,psi	12.37	10.79	11.05	8.12	15.14	14.13	13.13
D86 Distillation °F							
IBP	81.1	92.9	90.2	106.4	78.8	82.5	87.1
10% Evaporated	107.1	117	116.3	130.3	96.3	100.1	107.4
30% Evaporated	146.8	157	141.8	146.2	130.6	125.8	128.8
50% Evaporated	189.7	202.1	198.9	185	179.2	177	162.3
70% Evaporated	227.1	234.8	237.6	233.8	230.9	231.7	221.2
90% Evaporated	313.5	317.7	316.9	309.7	307.4	306.1	302.2
EP	371.5	377	379.2	382.8	368.2	378.2	370.9
Recovery, %	95.4	97.9	97.5	98.4	94.7	97.3	98.5
Residue, %	1	0.7	0.8	0.7	1.1	0.6	0.6
Loss, %	3.6	1.4	1.7	0.9	4.2	2.1	0.9
E 200, %	55.5	48.9	50.4	53.1	57.6	57.2	61
E 300, %	88.2	87.5	87.5	89	88.9	89.1	89.9

Table D-3
Inspections of On-Site CRC Test Fuels
Laboratory G Inspections

Sample ID	I10	H0	H3	~~H6~~H0	H10	76
Sample Date	14-Aug-01	30-Jul-01	31-Jul-01	27-Jul-01	26-Aug-01	18-Aug-01
Spec. Gravity	0.7315	0.7051	0.71	0.7049	0.7263	0.749
Density, g/ml	0.7307	0.7045	0.7093	0.7042	0.7256	0.7483
API Gravity	62	69.2	67.8	69.2	63.3	57.4
Oxygenates by OFID						
Ethanol, mass%	10.48	0.05	3.20	0.01	10.56	0.07
O (ETOH) mass%	3.64	0.02	1.11	0	3.67	0.02
MTBE, mass %	0.02	0	0.04	0.04	0	0
O (MTBE) mass%	0	0	0.01	0.01	0	0
MTBE Vol%	0.02	0	0.04	0.04	0	0
Ethanol,Vol%	9.66	0.04	2.86	0.01	9.66	0.07
TBA,mass%	0	0	0.00	0	0	0
TBA (vol %)	0	0	0.00	0	0	0
O (TBA) mass%	0	0	0.00	0	0	0
SBME, mass %	0	0	0.00	0	0	0
SBME (vol %)	0	0	0.00	0	0	0
O (SBME) mass%	0	0	0.00	0	0	0
TAME (mass %)	0	0	0.00	0	0.06	0
TAME (vol %)	0	0	0.00	0	0.06	0
O (TAME) mass%	0	0	0.00	0	0.01	0
Total O, mass%	3.64	0.02	1.12	0.01	3.68	0.02
Vol % Oxygenates	9.68	0.04	2.90	0.05	9.72	0.07
EPA DVPE,psi	12.08	18.41	17.23	18.57	16.17	7.37
ASTM DVPE,psi	12	18.39	17.2	18.54	16.12	7.23
D86 Distillation °F						
IBP	85.6	73.8	76.4	73.1	78.1	99.1
10% Evaporated	108.6	84.3	90.5	84.9	95	136.6
30% Evaporated	134.7	114.5	119.7	114.2	127.9	172.8
50% Evaporated	153.5	168.5	179.1	170.2	154.4	213.6
70% Evaporated	229.6	235.7	231.7	235.6	232.2	261.9
90% Evaporated	316.5	316.5	318.6	315.5	307.8	331.4
EP	374	374.9	375.7	376.2	364.3	407.7
Recovery, %	95.6	95.7	96.5	96.5	95.6	97.8
Residue, %	0.7	0.8	0.7	0.6	0.8	1.2
Loss, %	3.7	3.5	2.8	2.9	3.6	1
E 200, %	59.9	57.7	56.8	57.7	61.3	43.6
E 300, %	87.6	87.7	87.4	87.9	88.8	81.5

Table D-4
Inspections to Determine Flushing Efficiency
L0 Following H10
Laboratory G Inspections

Vehicle No.	1	5	6	7	8	11	16	20	22	24	27
Spec. Gravity	0.7301	0.7295	0.7281	0.7299	0.7291	0.7282	0.7366	0.7267	0.7263	0.7299	0.7355
Density, g/ml	0.7294	0.7288	0.7274	0.7292	0.7284	0.7274	0.7359	0.726	0.7256	0.7292	0.7348
API Gravity	62.3	62.5	62.8	62.4	62.6	62.8	60.6	63.2	63.3	62.4	60.9
Oxygenates by OFID											
Ethanol, mass%	0.03	0.03	0.11	0.13	0.04	0.05	0.85	0.08	0.08	0	0.41
O (ETOH) mass%	0.01	0.01	0.04	0.05	0.01	0.02	0.3	0.03	0.03	0	0.14
MTBE, mass %	0.03	0.03	0.04	0.03	0.02	0.03	0.03	0.02	0.03	0.04	0.03
O (MTBE) mass%	0.01	0.01	0.01	0.01	0	0.01	0.01	0	0.01	0.01	0.01
MTBE Vol%	0.03	0.03	0.04	0.03	0.02	0.03	0.03	0.02	0.03	0.04	0.03
Ethanol,Vol%	0.03	0.03	0.1	0.12	0.04	0.05	0.79	0.07	0.07	0	0.38
TBA,mass%	0	0	0	0	0	0	0	0	0	0	0
TBA (vol %)	0	0	0	0	0	0	0	0	0	0	0
O (TBA) mass%	0	0	0	0	0	0	0	0	0	0	0
SBME, mass %	0	0	0	0	0	0	0	0	0	0	0
SBME (vol %)	0	0	0	0	0	0	0	0	0	0	0
O (SBME) mass%	0	0	0	0	0	0	0	0	0	0	0
TAME (mass %)	0	0	0	0	0	0	0	0	0	0	0
TAME (vol %)	0	0	0	0	0	0	0	0	0	0	0
O (TAME) mass%	0	0	0	0	0	0	0	0	0	0	0
Total O, mass%	0.02	0.02	0.05	0.05	0.02	0.02	0.3	0.03	0.03	0.01	0.15
Vol % Oxygenates	0.06	0.06	0.14	0.15	0.06	0.08	0.82	0.09	0.1	0.04	0.41
EPA DVPE,psi	10.46	10.62	10.94	10.78	10.78	10.99	9.85	11.37	11.55	10.5	9.63
ASTM DVPE,psi	10.36	10.52	10.85	10.67	10.67	10.9	9.74	11.28	11.46	10.4	9.53

Table D-4
Inspections to Determine Flushing Efficiency
L0 Following H10
Laboratory G Inspections

Vehicle No.	33	43	48	51	54	58	65	82	84
Spec. Gravity	0.7368	0.7289	0.7351	0.7353	0.7292	0.7275	0.7348	0.7266	0.7276
Density, g/ml	0.7361	0.7282	0.7344	0.7346	0.7285	0.7268	0.7341	0.7259	0.7269
API Gravity	60.5	62.6	61.0	60.9	62.5	63.0	61.1	63.2	63.0
Oxygenates by OFID									
Ethanol, mass%	0.03	0.06	0.04	0.03	0.46	0.04	0.19	0.03	0.06
O (ETOH) mass%	0.01	0.02	0.01	0.01	0.16	0.01	0.07	0.01	0.02
MTBE, mass %	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03
O (MTBE) mass%	0.01	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01
MTBE Vol%	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Ethanol,Vol%	0.03	0.06	0.04	0.03	0.42	0.04	0.18	0.03	0.05
TBA,mass%	0	0	0	0	0	0	0	0	0
TBA (vol %)	0	0	0	0	0	0	0	0	0
O (TBA) mass%	0	0	0	0	0	0	0	0	0
SBME, mass %	0	0	0	0	0	0	0	0	0
SBME (vol %)	0	0	0	0	0	0	0	0	0
O (SBME) mass%	0	0	0	0	0	0	0	0	0
TAME (mass %)	0	0	0	0	0	0	0	0	0
TAME (vol %)	0	0	0	0	0	0	0	0	0
O (TAME) mass%	0	0	0	0	0	0	0	0	0
Total O, mass%	0.02	0.03	0.02	0.02	0.17	0.02	0.07	0.02	0.03
Vol % Oxygenates	0.06	0.08	0.06	0.06	0.45	0.07	0.21	0.06	0.08
EPA DVPE,psi	8.93	10.81	9.31	9.24	11.14	10.89	9.57	11.34	11.12
ASTM DVPE,psi	8.81	10.7	9.21	9.12	11.04	10.8	9.47	11.25	11.02

APPENDIX E

VEHICLE TOTAL WEIGHTED DEMERIT SUMMARY

Table E-1
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
1	65	H10	DON	11-Jul-01	2:15 PM	91	48.5	11.59	16.54	4.95
1	105	L3	ARCH	13-Jul-01	2:13 PM	94	8.5	9.76	11.48	1.72
1	135	H6	DON	22-Jul-01	2:30 PM	86	15.0	12.25	16.31	4.06
1	167	I10	DON	24-Jul-01	1:10 PM	92	10.5	10.18	12.36	2.18
1	181	I6	DON	25-Jul-01	1:18 PM	86	14.0	11.25	13.33	2.08
1	205	I3	DON	26-Jul-01	2:00 PM	90	11.5	11.18	14.09	2.91
1	219	I0	DON	27-Jul-01	2:00 PM	89	9.5	10.60	15.31	4.71
1	239	H0	DON	30-Jul-01	3:55 PM	81	16.5	12.83	18.24	5.42
1	251	H3	DON	31-Jul-01	4:20 PM	80	15.5	12.49	16.95	4.46
1	268	L10	DON	2-Aug-01	1:35 PM	85	9.0	7.87	8.20	0.33
1	290	L6	DON	4-Aug-01	3:15 PM	83	13.5	10.13	11.10	0.97
1	322	H3	DON	6-Aug-01	4:47 PM	94	16.5	11.66	16.95	5.29
1	329	H0	DON	7-Aug-01	3:03 PM	91	43.0	10.75	18.24	7.50
1	363	H6	DON	9-Aug-01	3:23 PM	95	65.0			
1	373	L10	DON	10-Aug-01	12:25 PM	94	5.5	7.81	8.20	0.40
1	392	L6	DON	12-Aug-01	4:47 PM	100	8.5	8.81	11.10	2.29
1	405	L0	DON	13-Aug-01	1:48 PM	103	14.5	9.00	12.52	3.52
1	426	I10	DON	14-Aug-01	3:23 PM	101	37.0	9.53	12.36	2.83
1	446	I6	DON	15-Aug-01	4:34 PM	99	33.0	10.38	13.33	2.95
1	466	I3	DON	16-Aug-01	4:42 PM	98	22.0	10.83	14.09	3.26
1	494	L3	DON	18-Aug-01	12:38 PM	80	7.5	9.78	11.48	1.70
1	548	H10	DON	28-Aug-01	11:30 AM	83	46.0	11.06	16.54	5.48
1	566	L0	DON	29-Aug-01	12:04 PM	85	7.0	10.57	12.52	1.96
1	570	I0	DON	29-Aug-01	2:43 PM	91	12.0	10.93	15.31	4.38

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
5	41	H10	ARCH	10-Jul-01	11:16 AM	98	84.5	13.17	16.54	3.37
5	98	L3	DON	13-Jul-01	12:28 PM	87	15.0	10.83	11.48	0.65
5	134	H6	ARCH	22-Jul-01	2:05 PM	86	83.5	13.11	16.31	3.20
5	168	I10	ARCH	24-Jul-01	1:10 PM	92	20.0	11.37	12.36	0.99
5	189	I6	ARCH	25-Jul-01	3:55 PM	90	32.0	12.12	13.33	1.21
5	208	I3	ARCH	26-Jul-01	3:02 PM	95	34.0	12.19	14.09	1.90
5	221	I0	ARCH	27-Jul-01	2:35 PM	93	38.0	12.22	15.31	3.09
5	238	H0	ARCH	30-Jul-01	3:45 PM	82	73.5	15.17	18.24	3.08
5	249	H3	ARCH	31-Jul-01	4:13 PM	84	58.5	14.28	16.95	2.67
5	273	L10	ARCH	2-Aug-01	2:48 PM	88	20.0	8.01	8.20	0.20
5	301	L6	ARCH	5-Aug-01	1:35 PM	88	24.5	10.46	11.10	0.65
5	317	H3	ARCH	6-Aug-01	3:28 PM	95	51.0	13.23	16.95	3.72
5	336	H0	ARCH	8-Aug-01	12:17 PM	92	44.0	12.81	18.24	5.43
5	351	H6	ARCH	9-Aug-01	11:42 AM	92	76.0	13.22	16.31	3.09
5	368	L10	ARCH	10-Aug-01	11:08 AM	93	20.5	8.09	8.20	0.12
5	390	L6	ARCH	12-Aug-01	3:40 PM	102	57.0	9.82	11.10	1.29
5	404	L0	ARCH	13-Aug-01	1:30 PM	103	38.5	10.70	12.52	1.83
5	425	I10	ARCH	14-Aug-01	2:51 PM	101	78.0	10.37	12.36	1.99
5	440	I6	ARCH	15-Aug-01	2:11 PM	101	75.5	11.07	13.33	2.27
5	461	I3	ARCH	16-Aug-01	2:30 PM	99	64.5	11.38	14.09	2.71
5	486	L3	ARCH	17-Aug-01	4:47 PM	96	41.0	10.91	11.48	0.57
5	521	I0	ARCH	20-Aug-01	1:15 PM	84	22.0	13.26	15.31	2.05
5	534	H10	ARCH	27-Aug-01	12:35 PM	92	84.5	13.34	16.54	3.20
5	559	L0	ARCH	28-Aug-01	2:50 PM	92	38.5	10.86	12.52	1.67

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
6	10	H10	ARCH	7-Jul-01	3:21 PM	93	37.0			
6	38	H0	ARCH	9-Jul-01	3:29 PM	98	38.0	12.36	18.24	5.88
6	94	L3	DON	13-Jul-01	11:20 AM	87	5.0	11.08	11.48	0.40
6	142	H6	ARCH	22-Jul-01	4:25 PM	88	68.0	12.37	16.31	3.94
6	150	I10	ARCH	23-Jul-01	1:00 PM	88	11.0	11.13	12.36	1.23
6	171	I6	ARCH	24-Jul-01	2:20 PM	92	24.5	11.98	13.33	1.35
6	200	I3	ARCH	26-Jul-01	12:50 PM	90	24.0	11.35	14.09	2.74
6	212	I0	ARCH	27-Jul-01	12:15 PM	88	22.0	11.77	15.31	3.55
6	246	H0	ARCH	31-Jul-01	3:03 PM	82	31.0	13.23	18.24	5.01
6	264	H3	ARCH	2-Aug-01	12:28 PM	85	28.0	13.02	16.95	3.93
6	286	L10	ARCH	4-Aug-01	2:09 PM	81	23.0	8.22	8.20	-0.01
6	306	L6	ARCH	5-Aug-01	3:15 PM	88	28.5	10.14	11.10	0.97
6	319	H3	ARCH	6-Aug-01	4:03 PM	95	21.0	12.19	16.95	4.76
6	340	H6	ARCH	8-Aug-01	1:41 PM	92	30.0	11.78	16.31	4.53
6	362	L10	ARCH	9-Aug-01	3:06 PM	95	24.0	8.02	8.20	0.19
6	391	L6	ARCH	12-Aug-01	4:20 PM	102	31.0	9.63	11.10	1.47
6	410	L0	ARCH	13-Aug-01	3:15 PM	104	23.0	10.36	12.52	2.16
6	419	I10	ARCH	14-Aug-01	1:09 PM	99	28.5	10.42	12.36	1.94
6	442	I6	ARCH	15-Aug-01	2:44 PM	101	41.0	10.61	13.33	2.73
6	465	I3	ARCH	16-Aug-01	4:23 PM	98	39.5	11.35	14.09	2.74
6	503	L3	ARCH	18-Aug-01	3:23 PM	85	16.0	11.18	11.48	0.30
6	519	I0	ARCH	20-Aug-01	12:40 PM	83	21.0	12.44	15.31	2.87
6	544	H10	ARCH	27-Aug-01	4:05 PM	96	37.0	12.23	16.54	4.31
6	553	L0	ARCH	28-Aug-01	1:05 PM	90	21.0	11.15	12.52	1.37

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
7	73	H10	DON	12-Jul-01	12:20 PM	88	37.0	12.41	16.54	4.13
7	108	L3	ARCH	14-Jul-01	12:21 PM	88	12.0	10.41	11.48	1.07
7	144	I10	DON	23-Jul-01	4:29 PM	90	12.0	10.70	12.36	1.66
7	145	H6	DON	23-Jul-01	11:40 AM	84	24.0	12.96	16.31	3.35
7	188	I6	DON	25-Jul-01	3:35 PM	88	13.5	11.33	13.33	2.00
7	211	I3	DON	26-Jul-01	3:40 PM	91	19.0	11.77	14.09	2.32
7	224	I0	DON	27-Jul-01	3:43 PM	91	12.5	11.61	15.31	3.71
7	237	H0	DON	30-Jul-01	3:17 PM	84	28.5	14.35	18.24	3.90
7	250	H3	DON	31-Jul-01	4:10 PM	81	16.5	13.99	16.95	2.96
7	272	L10	DON	2-Aug-01	2:45 PM	88	9.0	8.13	8.20	0.07
7	292	L6	DON	4-Aug-01	3:50 PM	86	24.5	10.74	11.10	0.37
7	320	H3	DON	6-Aug-01	4:00 PM	91	11.0	12.91	16.95	4.04
7	331	H0	DON	7-Aug-01	3:59 PM	92	25.0	12.14	18.24	6.10
7	349	H6	DON	8-Aug-01	2:56 PM	91	38.5	12.67	16.31	3.65
7	367	L10	DON	9-Aug-01	4:42 PM	96	7.5	7.85	8.20	0.35
7	385	L6	DON	12-Aug-01	1:56 PM	98	13.0	9.77	11.10	1.33
7	396	L0	DON	13-Aug-01	3:45 PM	102	10.0	10.36	12.52	2.16
7	424	I10	DON	14-Aug-01	2:44 PM	101	22.0	10.56	12.36	1.80
7	445	I6	DON	15-Aug-01	3:54 PM	99	16.0	11.41	13.33	1.92
7	464	I3	DON	16-Aug-01	4:04 PM	100	15.0	11.70	14.09	2.39
7	485	L3	DON	17-Aug-01	4:32 PM	95	10.0	10.38	11.48	1.10
7	522	I0	DON	20-Aug-01	1:16 PM	87	11.0	12.61	15.31	2.71
7	541	H10	DON	27-Aug-01	2:51 PM	91	53.0	11.69	16.54	4.85
7	558	L0	DON	28-Aug-01	2:44 PM	91	10.0	10.78	12.52	1.75

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
8	8	H10	ARCH	7-Jul-01	2:43 PM	93	18.0	12.46	16.54	4.08
8	121	L3	DON	19-Jul-01	2:30 PM	82	7.5	10.76	11.48	0.72
8	138	H6	DON	22-Jul-01	3:19 PM	87	19.0	13.72	16.31	2.59
8	153	I10	DON	23-Jul-01	1:59 PM	88	27.0	11.28	12.36	1.08
8	174	I6	DON	24-Jul-01	12:56 PM	89	20.0	11.06	13.33	2.28
8	209	I3	DON	26-Jul-01	3:06 PM	92	34.0	11.61	14.09	2.48
8	222	I0	DON	27-Jul-01	3:07 PM	90	21.0	10.82	15.31	4.49
8	244	H0	DON	31-Jul-01	2:19 PM	79	13.0	14.20	18.24	4.04
8	263	H3	DON	2-Aug-01	11:53 AM	83	12.0	13.86	16.95	3.09
8	281	L10	DON	4-Aug-01	12:26 PM	80	10.0	8.09	8.20	0.12
8	298	L6	DON	5-Aug-01	1:01 PM	80	14.0	10.45	11.10	0.65
8	313	H3	DON	6-Aug-01	2:19 PM	90	14.0	12.84	16.95	4.11
8	327	H0	ARCH	7-Aug-01	2:12 PM	92	32.0	12.95	18.24	5.29
8	346	H6	DON	8-Aug-01	3:37 PM	90	24.0	12.77	16.31	3.55
8	375	L10	DON	10-Aug-01	1:00 PM	97	19.0	8.03	8.20	0.17
8	383	L6	D0N	12-Aug-01	1:22 PM	97	31.5	9.97	11.10	1.14
8	409	L0	DON	13-Aug-01	3:06 PM	103	60.0	10.53	12.52	1.99
8	435	I10	DON	15-Aug-01	12:43 PM	98	18.5	10.95	12.36	1.41
8	451	I6	DON	16-Aug-01	11:02 AM	90	13.0	12.06	13.33	1.28
8	473	I3	DON	17-Aug-01	12:13 PM	88	22.0	12.22	14.09	1.87
8	500	L3	DON	18-Aug-01	2:28 PM	87	19.0	10.61	11.48	0.87
8	515	I0	DON	19-Aug-01	3:43 PM	82	18.0	13.17	15.31	2.15
8	533	H10	DON	27-Aug-01	12:13 PM	88	28.0			
8	560	L0	DON	28-Aug-01	3:23 PM	89	16.0	10.89	12.52	1.63

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
11	4	H10	ARCH	7-Jul-01	1:25 PM	91	30.0			
11	34	H0	ARCH	9-Jul-01	2:20 PM	97	47.0	11.87	18.24	6.37
11	100	L3	DON	13-Jul-01	1:02 PM	91	8.0			
11	141	H6	ARCH	22-Jul-01	3:55 PM	88	14.0	12.53	16.31	3.78
11	158	I10	ARCH	23-Jul-01	3:20 PM	93	15.0	10.19	12.36	2.17
11	180	I6	ARCH	25-Jul-01	1:18 PM	90	16.0	11.85	13.33	1.49
11	195	I0	ARCH	26-Jul-01	4:48 PM	94	26.0	11.57	15.31	3.75
11	202	I3	ARCH	26-Jul-01	1:23 PM	92	15.5	11.74	14.09	2.35
11	228	H0	ARCH	30-Jul-01	12:45 PM	81	45.5	14.11	18.24	4.13
11	266	H3	ARCH	2-Aug-01	1:02 PM	86	36.0	13.41	16.95	3.54
11	284	L10	ARCH	4-Aug-01	1:34 PM	81	17.0	8.13	8.20	0.08
11	297	L6	ARCH	5-Aug-01	12:28 PM	83	14.0	10.11	11.10	1.00
11	314	H3	ARCH	6-Aug-01	2:21 PM	96	46.0	12.81	16.95	4.14
11	352	H6	ARCH	9-Aug-01	12:15 PM	94	47.0	12.11	16.31	4.21
11	370	L10	ARCH	10-Aug-01	11:41 AM	98	14.0	8.02	8.20	0.19
11	384	L6	ARCH	12-Aug-01	1:50 PM	100	25.0	10.10	11.10	1.01
11	408	L0	ARCH	13-Aug-01	2:40 PM	104	50.0	9.15	12.52	3.38
11	423	I10	ARCH	14-Aug-01	2:17 PM	100	42.0	10.30	12.36	2.06
11	438	I6	ARCH	15-Aug-01	1:36 PM	101	64.0	11.01	13.33	2.32
11	456	I3	ARCH	16-Aug-01	12:46 PM	96	52.0	11.24	14.09	2.85
11	478	L3	ARCH	17-Aug-01	1:49 PM	95	24.0	9.98	11.48	1.50
11	510	I0	ARCH	19-Aug-01	2:10 PM	81	28.0	12.78	15.31	2.54
11	532	H10	ARCH	27-Aug-01	12:05 PM	91	38.0	13.38	16.54	3.16
11	551	L0	ARCH	28-Aug-01	12:25 PM	89	24.0	11.06	12.52	1.46

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
16	2	H10	ARCH	7-Jul-01	12:34 PM	90	27.0			
16	109	L3	DON	14-Jul-01	12:23 PM	84	16.0	10.71	11.48	0.77
16	129	H6	DON	22-Jul-01	12:18 PM	81	28.5	12.69	16.31	3.62
16	161	I10	DON	24-Jul-01	11:28 AM	83	10.5	11.38	12.36	0.98
16	182	I6	DON	25-Jul-01	1:55 PM	88	34.0	11.08	13.33	2.26
16	194	I0	DON	26-Jul-01	4:14 PM	91	33.0	10.10	15.31	5.21
16	198	I3	DON	26-Jul-01	12:16 PM	86	29.5	10.93	14.09	3.16
16	233	H0	DON	30-Jul-01	2:10 PM	81	10.5	12.93	18.24	5.32
16	252	H3	DON	31-Jul-01	4:49 PM	82	37.0			
16	274	L10	DON	2-Aug-01	2:20 PM	89	14.0	8.24	8.20	-0.04
16	305	L6	DON	5-Aug-01	2:46 PM	87	12.0	10.12	11.10	0.98
16	318	H3	DON	6-Aug-01	3:31 PM	92	32.5	10.90	16.95	6.05
16	333	H0	DON	7-Aug-01	4:16 PM	91	21.0	10.28	18.24	7.96
16	350	H6	DON	9-Aug-01	11:27 AM	90	28.5	11.36	16.31	4.96
16	381	L10	DON	12-Aug-01	12:43 PM	98	33.5	8.12	8.20	0.09
16	400	L6	DON	13-Aug-01	12:23 PM	100	50.5	8.97	11.10	2.14
16	418	L0	DON	14-Aug-01	12:47 PM	96	18.5	10.27	12.52	2.25
16	443	I10	DON	15-Aug-01	3:17 PM	99	36.5	9.81	12.36	2.55
16	463	I6	DON	16-Aug-01	3:26 PM	101	41.5	10.53	13.33	2.81
16	481	I3	DON	17-Aug-01	2:43 PM	93	21.0	10.37	14.09	3.72
16	498	L3	DON	18-Aug-01	1:51 PM	82	20.0	9.99	11.48	1.49
16	513	PG	DON	19-Aug-01	3:02 PM	79	19.5			
16	526	I0	DON	20-Aug-01	2:33 PM	89	28.0	10.74	15.31	4.57
16	531	H10	DON	27-Aug-01	11:33 AM	85	35.0	10.88	16.54	5.66
16	562	L0	DON	28-Aug-01	4:01 PM	88	29.0	9.76	12.52	2.76

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
20	14	H10	ARCH	7-Jul-01	4:28 PM	93	41.0			
20	28	H0	ARCH	9-Jul-01	12:17 PM	95	14.0	12.18	18.24	6.06
20	95	L3	ARCH	13-Jul-01	11:25 AM	90	6.0			
20	136	H6	ARCH	22-Jul-01	2:45 PM	87	42.5	13.64	16.31	2.67
20	166	I10	ARCH	24-Jul-01	12:40 PM	90	12.0	11.59	12.36	0.77
20	183	I6	ARCH	25-Jul-01	1:50 PM	89	19.0	12.09	13.33	1.25
20	204	I3	ARCH	26-Jul-01	1:55 PM	95	18.0	12.07	14.09	2.02
20	216	I0	ARCH	27-Jul-01	1:20 PM	93	13.0	11.96	15.31	3.35
20	232	H0	ARCH	30-Jul-01	1:55 PM	81	48.0	15.00	18.24	3.24
20	253	H3	ARCH	31-Jul-01	4:41 PM	83	29.0	14.27	16.95	2.68
20	278	L10	ARCH	2-Aug-01	4:33 PM	90	9.0	8.21	8.20	-0.01
20	293	L6	ARCH	4-Aug-01	3:56 PM	84	6.5	10.75	11.10	0.35
20	308	H3	ARCH	6-Aug-01	12:28 PM	90	42.0	13.60	16.95	3.35
20	354	H6	ARCH	9-Aug-01	12:49 PM	93	27.5	12.43	16.31	3.89
20	378	L10	ARCH	12-Aug-01	11:05 AM	95	6.0	7.97	8.20	0.23
20	397	L6	ARCH	13-Aug-01	11:00 AM	100	11.5	10.68	11.10	0.43
20	411	L0	ARCH	14-Aug-01	10:50 AM	95	18.0	11.55	12.52	0.98
20	431	I10	ARCH	15-Aug-01	11:57 AM	98	21.0	11.10	12.36	1.26
20	449	I6	ARCH	15-Aug-01	5:08 PM	99	84.0	12.41	13.33	0.92
20	472	I3	ARCH	17-Aug-01	12:07 PM	90	34.0	12.31	14.09	1.78
20	499	L3	ARCH	18-Aug-01	2:17 PM	86	18.5	10.79	11.48	0.69
20	516	I0	ARCH	19-Aug-01	3:53 PM	81	20.0	13.20	15.31	2.11
20	530	H10	ARCH	27-Aug-01	11:30 AM	89	66.0	13.87	16.54	2.67
20	549	L0	ARCH	28-Aug-01	11:55 AM	88	24.0	11.58	12.52	0.95

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
22	49	H10	ARCH	10-Jul-01	1:34 PM	100	82.0	12.65	16.54	3.89
22	103	L3	ARCH	13-Jul-01	1:39 PM	95	14.0	11.09	11.48	0.39
22	139	H6	ARCH	22-Jul-01	3:20 PM	88	15.0	14.16	16.31	2.15
22	156	I10	ARCH	23-Jul-01	2:47 PM	93	27.0	11.64	12.36	0.72
22	187	I6	ARCH	25-Jul-01	3:30 PM	90	24.0	12.50	13.33	0.84
22	206	I3	ARCH	26-Jul-01	2:37 PM	94	82.0	12.27	14.09	1.82
22	223	I0	ARCH	27-Jul-01	3:05 PM	93	23.0	12.85	15.31	2.47
22	236	H0	ARCH	30-Jul-01	3:05 PM	80	98.5	16.84	18.24	1.40
22	248	H3	ARCH	31-Jul-01	3:40 PM	84	92.0	14.62	16.95	2.33
22	271	L10	ARCH	2-Aug-01	2:12 PM	89	15.0	8.18	8.20	0.03
22	288	L6	ARCH	4-Aug-01	2:44 PM	83	27.0	10.73	11.10	0.38
22	310	H3	ARCH	6-Aug-01	1:12 PM	94	87.0	13.76	16.95	3.19
22	332	H0	ARCH	7-Aug-01	3:44 PM	94	90.0	13.44	18.24	4.81
22	355	H6	ARCH	9-Aug-01	1:23 PM	94	192.0	13.38	16.31	2.93
22	374	L10	ARCH	10-Aug-01	12:47 PM	101	24.0	8.13	8.20	0.08
22	387	L6	ARCH	12-Aug-01	2:35 PM	102	27.0	10.10	11.10	1.00
22	413	L0	ARCH	14-Aug-01	11:26 AM	97	24.0	11.55	12.52	0.97
22	434	I10	ARCH	15-Aug-01	12:32 PM	100	43.0	11.22	12.36	1.14
22	452	H0	ARCH	16-Aug-01	11:37 AM	92	192.0	15.25	18.24	3.00
22	469	I6	ARCH	16-Aug-01	3:15 PM	99	192.0	11.77	13.33	1.57
22	474	I3	ARCH	17-Aug-01	12:41 PM	93	59.0	13.03	14.09	1.06
22	489	H6	ARCH	17-Aug-01	4:13 PM	98	192.0	14.81	16.31	1.50
22	497	L3	ARCH	18-Aug-01	1:43 PM	83	17.0	10.99	11.48	0.49
22	507	PG	ARCH	18-Aug-01	4:31 PM	85	16.0			
22	525	I0	ARCH	20-Aug-01	2:25 PM	86	53.0	13.49	15.31	1.82
22	546	H10	ARCH	27-Aug-01	1:10 PM	92	192.0	14.66	16.54	1.88
22	555	L0	ARCH	28-Aug-01	1:45 PM	91	41.0	11.74	12.52	0.79

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
24	87	H10	DON	12-Jul-01	3:46 PM	93	192	12.43	16.54	4.11
24	104	L3	DON	13-Jul-01	2:08 PM	91	48.5			
24	133	H6	DON	22-Jul-01	2:50 PM	85	68	13.64	16.31	2.67
24	157	I10	DON	23-Jul-01	3:03 PM	92	82	11.55	12.36	0.81
24	169	I6	DON	24-Jul-01	1:45 PM	88	98.5	11.42	13.33	1.92
24	191	I3	DON	25-Jul-01	4:11 PM	90	101	12.32	14.09	1.77
24	215	I0	DON	27-Jul-01	12:52 PM	89	82	12.58	15.31	2.74
24	231	H0	DON	30-Jul-01	1:35 PM	78	96.5	14.85	18.24	3.39
24	267	H3	DON	2-Aug-01	1:02 PM	85	99.5	14.29	16.95	2.66
24	283	L10	DON	4-Aug-01	1:07 PM	81	9	8.07	8.20	0.14
24	307	L6	DON	5-Aug-01	3:21 PM	89	22	10.40	11.10	0.70
24	315	H3	DON	6-Aug-01	2:55 PM	90	84	13.00	16.95	3.95
24	337	H0	DON	8-Aug-01	12:18 PM	90	99.5	14.23	18.24	4.01
24	360	H6	DON	9-Aug-01	2:45 PM	94.9	48	12.28	16.31	4.04
24	369	L10	DON	10-Aug-01	11:12 AM	93	6	8.13	8.20	0.08
24	398	L6	DON	13-Aug-01	11:03 AM	96	75	10.08	11.10	1.02
24	420	L0	DON	14-Aug-01	1:29 PM	100	83	10.84	12.52	1.68
24	439	I10	DON	15-Aug-01	2:02 PM	101	90	11.09	12.36	1.27
24	460	I6	DON	16-Aug-01	2:11 PM	96	95	11.40	13.33	1.93
24	471	I3	DON	17-Aug-01	11:35 AM	88	100.5	12.81	14.09	1.28
24	492	L3	DON	17-Aug-01	5:51 PM	95	5	10.22	11.48	1.26
24	511	PG	DON	19-Aug-01	2:24 PM	83	12	10.77	15.31	4.55
24	568	L0	DON	29-Aug-01	12:45 PM	86	13	10.77	12.52	1.75
24	571	I0	DON	29-Aug-01	3:26 PM	90	50	12.61	15.31	2.71
24	572	H10	DON	30-Aug-01	10:40 AM	84	47	13.19	16.54	3.35

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
27	72	H10	ARCH	11-Jul-01	4:06 PM	94	74.5	9.26	16.54	7.28
27	99	L3	ARCH	13-Jul-01	12:32 PM	91	7			
27	128	H6	ARCH	22-Jul-01	12:10 PM	84	23	11.19	16.31	5.12
27	164	I10	ARCH	24-Jul-01	12:05 PM	89	11.5	10.06	12.36	2.30
27	178	I6	ARCH	25-Jul-01	12:45 PM	86	10	11.26	13.33	2.07
27	199	I3	ARCH	26-Jul-01	12:18 PM	89	10.5	10.84	14.09	3.25
27	214	I0	ARCH	27-Jul-01	12:47 PM	90	25	9.17	15.31	6.14
27	241	H0	ARCH	31-Jul-01	1:07 PM	80	14	11.94	18.24	6.30
27	262	H3	ARCH	2-Aug-01	11:54 AM	85	36	11.70	16.95	5.25
27	282	L10	ARCH	4-Aug-01	12:59 PM	81	17	8.13	8.20	0.07
27	302	L6	ARCH	5-Aug-01	2:00 PM	88	20.5	9.56	11.10	1.55
27	321	H3	ARCH	6-Aug-01	4:40 PM	95	42.5	10.80	16.95	6.15
27	330	H0	ARCH	7-Aug-01	3:10 PM	94	35	10.97	18.24	7.28
27	347	H6	ARCH	8-Aug-01	4:01 PM	92	192			
27	366	H0	ARCH	9-Aug-01	4:26 PM	96	192	11.53	18.24	6.71
27	372	L10	ARCH	10-Aug-01	12:13 PM	97	21.5	7.89	8.20	0.32
27	393	L6	ARCH	12-Aug-01	2:50 PM	102	47.5	8.34	11.10	2.77
27	401	L6	ARCH	13-Aug-01	12:20 PM	102	42.5	8.56	11.10	2.54
27	415	L0	ARCH	14-Aug-01	11:57 AM	97	21.5	9.09	12.52	3.43
27	428	I10	ARCH	15-Aug-01	10:47 AM	94	22	9.93	12.36	2.43
27	447	I6	ARCH	15-Aug-01	3:58 PM	100	192	8.21	13.33	5.13
27	454	H0	ARCH	16-Aug-01	12:11 PM	97	26.5	9.38	18.24	8.86
27	470	I3	ARCH	16-Aug-01	3:47 PM	100	192	10.47	14.09	3.62
27	480	H6	ARCH	17-Aug-01	2:22 PM	96	56	9.87	16.31	6.44
27	493	L3	ARCH	18-Aug-01	12:36 PM	81	21	9.86	11.48	1.62
27	506	PG	ARCH	18-Aug-01	3:57 PM	84	28			
27	514	I0	ARCH	19-Aug-01	3:19 PM	81	22	9.61	15.31	5.70
27	537	H10	ARCH	27-Aug-01	1:45 PM	94	39.5	12.73	16.54	3.81
27	565	L0	ARCH	29-Aug-01	11:55 AM	88	13	9.73	12.52	2.79

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
33	3	H10	DON	7-Jul-01	1:13 PM	88	31.5	10.26	16.54	6.28
33	36	H0	ARCH	9-Jul-01	2:55 PM	97	10.5	8.32	18.24	9.92
33	111	L3	ARCH	14-Jul-01	12:55 PM	90	8	9.19	11.48	2.29
33	146	H6	ARCH	23-Jul-01	11:45 AM	87	12	9.83	16.31	6.49
33	160	I6	ARCH	24-Jul-01	3:30 PM	93	11	10.62	13.33	2.72
33	162	I10	ARCH	24-Jul-01	11:35 AM	87	8			
33	190	I3	ARCH	25-Jul-01	4:00 PM	90	15.5	9.87	14.09	4.22
33	226	I0	ARCH	27-Jul-01	4:13 PM	93	19	9.65	15.31	5.66
33	234	H0	ARCH	30-Jul-01	2:35 PM	81	19.5	10.46	18.24	7.79
33	256	H3	ARCH	1-Aug-01	1:09 PM	83	16	11.42	16.95	5.53
33	276	L10	ARCH	2-Aug-01	4:00 PM	90	8	8.00	8.20	0.20
33	294	L6	ARCH	4-Aug-01	4:30 PM	82	11	9.92	11.10	1.19
33	325	H3	ARCH	7-Aug-01	1:34 PM	92	13	9.93	16.95	7.02
33	342	H6	ARCH	8-Aug-01	2:05 AM	92	15	8.07	16.31	8.24
33	359	L10	ARCH	9-Aug-01	2:32 PM	93	18	7.31	8.20	0.90
33	388	L6	ARCH	12-Aug-01	3:10 PM	102	20.5	7.39	11.10	3.71
33	406	L0	ARCH	13-Aug-01	2:05 PM	104	22	6.91	12.52	5.62
33	427	I10	ARCH	14-Aug-01	6:44 PM	100	18.5			
33	444	I6	ARCH	15-Aug-01	3:17 PM	100	17.5	9.08	13.33	4.26
33	467	I3	ARCH	16-Aug-01	4:56 PM	98	14	9.11	14.09	4.98
33	495	L3	ARCH	18-Aug-01	1:08 PM	82	9	9.34	11.48	2.14
33	512	I0	ARCH	19-Aug-01	2:44 PM	82	15			
33	539	H10	ARCH	27-Aug-01	2:15 PM	94	25	8.90	16.54	7.64
33	557	L0	ARCH	28-Aug-01	2:15 PM	91	16	9.04	12.52	3.49

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
43	19	H10	ARCH	8-Jul-01	1:19 PM	95	23.0	13.59	16.54	2.95
43	40	H0	ARCH	9-Jul-01	4:43 PM	99	49.0	14.2	18.24	4.04
43	113	L3	DON	14-Jul-01	1:30 PM	88	9.0	10.94	11.48	0.54
43	130	H6	ARCH	22-Jul-01	1:00 PM	84	29.5	12.71	16.31	3.60
43	154	I10	ARCH	23-Jul-01	2:12 PM	93	18.5	11.26	12.36	1.10
43	173	I6	ARCH	24-Jul-01	2:55 PM	91	19.0	11.07	13.33	2.27
43	184	I3	ARCH	25-Jul-01	2:25 PM	90	12.0	12.74	14.09	1.35
43	218	I0	ARCH	27-Jul-01	2:00 PM	92	20.0	11.85	15.31	3.47
43	230	H0	ARCH	30-Jul-01	1:15 PM	80	25.0	14.22	18.24	4.02
43	259	H3	ARCH	1-Aug-01	1:43 PM	81	33.0	14.53	16.95	2.42
43	275	L10	ARCH	2-Aug-01	3:26 PM	90	17.0	7.81	8.20	0.39
43	291	L6	ARCH	4-Aug-01	3:21 PM	81	18.0	10.60	11.10	0.50
43	312	H3	ARCH	6-Aug-01	1:45 PM	94	26.0	13.22	16.95	3.73
43	357	H6	ARCH	9-Aug-01	1:58 PM	94	29.0	12.12	16.31	4.19
43	450	I6	ARCH	16-Aug-01	11:01 AM	92	28.0	11.51	13.33	1.82
43	468	I3	ARCH	16-Aug-01	1:57 PM	97	25.0	10.78	14.09	3.31
43	476	I10	ARCH	17-Aug-01	1:15 PM	93	26.0	10.61	12.36	1.75
43	488	L3	ARCH	17-Aug-01	3:37 PM	96	22.5	9.76	11.48	1.72
43	491	L6	ARCH	17-Aug-01	5:40 PM	95	19.5	10.47	11.10	0.64
43	524	I0	ARCH	20-Aug-01	1:50 PM	85	17.0	12.38	15.31	2.93
43	542	H10	ARCH	27-Aug-01	3:25 PM	95	28.0			
43	563	L0	ARCH	29-Aug-01	11:25 AM	87	20.0	10.79	12.52	1.74
43	569	L0	ARCH	29-Aug-01	2:00 PM	92	20.0	11.05	12.52	1.48
43	573	L10	ARCH	30-Aug-01	11:30 AM	91	17.0			

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
48	48	H10	DON	10-Jul-01	1:10 PM	94	44.0	8.68	16.54	7.85
48	102	L3	DON	13-Jul-01	1:35 PM	90	8.5			
48	137	H6	DON	22-Jul-01	3:08 PM	87	66.5	10.89	16.31	5.42
48	159	I10	DON	23-Jul-01	3:41 PM	92	33.0	9.05	12.36	3.31
48	176	I6	DON	24-Jul-01	4:05 PM	89	31.0	10.03	13.33	3.30
48	201	I3	DON	26-Jul-01	12:47 PM	88	12.0	10.38	14.09	3.71
48	213	I0	DON	27-Jul-01	12:15 PM	85	8.0	9.80	15.31	5.51
48	247	H0	DON	31-Jul-01	3:01 PM	82	20.5	12.35	18.24	5.90
48	260	H3	DON	2-Aug-01	11:18 AM	83	66.0	11.61	16.95	5.34
48	287	L10	DON	4-Aug-01	2:05 PM	83	10.0	7.84	8.20	0.36
48	303	L6	DON	5-Aug-01	2:12 PM	85	12.5	9.27	11.10	1.83
48	324	H3	DON	7-Aug-01	1:02 PM	88	34.0	9.62	16.95	7.33
48	335	H0	ARCH	7-Aug-01	4:56 PM	94	27.5	9.51	18.24	8.74
48	348	H6	DON	8-Aug-01	4:15 PM	91	16.5			
48	365	L10	DON	9-Aug-01	4:00 PM	94	10.0	7.48	8.20	0.73
48	386	L6	DON	12-Aug-01	2:38 PM	100	9.5	8.28	11.10	2.83
48	407	L0	DON	13-Aug-01	2:27 PM	99	10.5	8.31	12.52	4.22
48	432	I10	DON	15-Aug-01	12:05 PM	95	30.0	8.84	12.36	3.52
48	455	I6	DON	16-Aug-01	12:17 PM	94	22.5	10.13	13.33	3.21
48	484	I3	DON	17-Aug-01	3:56 PM	95	18.5	9.13	14.09	4.96
48	509	L3	DON	19-Aug-01	1:35 PM	81	15.0	9.67	11.48	1.81
48	528	I0	DON	20-Aug-01	3:48 PM	90	16.0	10.25	15.31	5.06
48	535	H10	DON	27-Aug-01	12:55 PM	90	101.0	9.42	16.54	7.12
48	550	L0	DON	28-Aug-01	12:11 PM	84	17.5	9.21	12.52	3.32

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
51	82	H10	ARCH	12-Jul-01	1:28 PM	93	109.5	9.33	16.54	7.21
51	112	L3	ARCH	14-Jul-01	1:28 PM	87	10.5	9.44	11.48	2.04
51	143	I10	ARCH	23-Jul-01	4:05 PM	94	11.0	9.36	12.36	3.00
51	148	H6	ARCH	23-Jul-01	12:15 PM	88	19.5	10.34	16.31	5.97
51	177	I6	ARCH	24-Jul-01	4:00 PM	92	10.0	10.59	13.33	2.75
51	192	I3	ARCH	25-Jul-01	4:37 PM	90	23.0	11.07	14.09	3.02
51	197	I0	ARCH	26-Jul-01	4:10 PM	94	23.0	10.16	15.31	5.15
51	240	H0	ARCH	31-Jul-01	1:45 PM	83	27.0	11.41	18.24	6.84
51	255	H3	ARCH	1-Aug-01	12:31 PM	82	48.5	11.59	16.95	5.36
51	269	L10	ARCH	2-Aug-01	1:38 PM	87	15.0	7.86	8.20	0.35
51	304	L6	ARCH	5-Aug-01	2:35 PM	90	22.0	9.28	11.10	1.82
51	323	H3	ARCH	7-Aug-01	1:00 PM	90	26.5	10.48	16.95	6.47
51	334	H0	ARCH	7-Aug-01	4:16 PM	94	16.5	9.29	18.24	8.95
51	344	H6	ARCH	8-Aug-01	2:41 PM	92	32.5	10.76	16.31	5.56
51	364	L10	ARCH	9-Aug-01	3:42 PM	96	18.5	7.25	8.20	0.96
51	382	L6	ARCH	12-Aug-01	1:20 PM	100	15.5	8.15	11.10	2.96
51	402	L0	ARCH	13-Aug-01	12:55 PM	103	18.5	8.92	12.52	3.61
51	421	I10	ARCH	14-Aug-01	1:43 PM	100	27.5			
51	436	I6	ARCH	15-Aug-01	1:04 PM	101	37.0	9.34	13.33	4.00
51	458	I3	ARCH	16-Aug-01	1:20 PM	98	35.5	10.42	14.09	3.67
51	482	L3	ARCH	17-Aug-01	2:57 PM	98	24.0	8.81	11.48	2.67
51	508	I0	ARCH	19-Aug-01	1:37 PM	82	16.0	11.56	15.31	3.76
51	540	H10	ARCH	27-Aug-01	2:50 PM	94	57.0	9.51	16.54	7.03
51	561	L0	ARCH	28-Aug-01	3:45 PM	92	15.0	9.32	12.52	3.20

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
54	83	H10	DON	12-Jul-01	1:32 PM	92	20.5	11.96	16.54	4.57
54	115	L3	ARCH	14-Jul-01	2:35 PM	91	13.5	10.84	11.48	0.64
54	140	H6	DON	22-Jul-01	3:45 PM	86	20.0	12.18	16.31	4.13
54	151	I10	DON	23-Jul-01	1:27 PM	90	8.0	10.55	12.36	1.81
54	175	I6	DON	24-Jul-01	3:31 PM	91	13.0	10.41	13.33	2.93
54	193	I3	DON	25-Jul-01	4:44 PM	90	21.0	11.30	14.09	2.79
54	227	I0	DON	27-Jul-01	4:21 PM	90	10.0	10.45	15.31	4.87
54	242	H0	DON	31-Jul-01	1:05 PM	79	14.5	14.13	18.24	4.12
54	257	H3	DON	1-Aug-01	1:03 PM	81	27.0	13.81	16.95	3.14
54	277	L10	DON	2-Aug-01	4:02 PM	88	13.0	8.34	8.20	-0.14
54	295	L6	DON	4-Aug-01	4:25 PM	83	10.5	10.35	11.10	0.76
54	311	H3	DON	6-Aug-01	1:39 PM	90	18.0	12.30	16.95	4.65
54	343	H0	DON	8-Aug-01	2:18 PM	91	17.0	11.89	18.24	6.36
54	361	H6	DON	9-Aug-01	12:52 PM	92	15.0	12.18	16.31	4.13
54	379	L10	DON	12-Aug-01	11:09 AM	92	10.0	8.10	8.20	0.11
54	394	L6	DON	12-Aug-01	4:10 PM	100	17.0	9.51	11.10	1.60
54	414	L0	DON	14-Aug-01	11:32 AM	95	15.0	9.95	12.52	2.57
54	429	I10	DON	15-Aug-01	10:49 AM	93	16.0	10.72	12.36	1.64
54	453	I6	DON	16-Aug-01	11:39 AM	94	17.0	11.46	13.33	1.87
54	483	I3	DON	17-Aug-01	3:19 PM	95	10.0	11.03	14.09	3.06
54	496	L3	DON	18-Aug-01	1:14 PM	86	12.0	10.63	11.48	0.85
54	523	I0	DON	20-Aug-01	1:55 PM	88	21.0	11.86	15.31	3.46
54	545	H10	DON	27-Aug-01	4:07 PM	94	18.0	11.08	16.54	5.46
54	564	L0	DON	29-Aug-01	11:27 AM	82	9.0	11.33	12.52	1.19

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
58	63	H10	ARCH	11-Jul-01	12:12 PM	92	30.0	12.35	16.54	4.19
58	110	L3	DON	14-Jul-01	12:54 PM	86	8.0	10.76	11.48	0.72
58	149	H6	DON	23-Jul-01	12:45 PM	86	23.5	11.99	16.31	4.32
58	165	I10	DON	24-Jul-01	12:30 PM	88	13.0			
58	179	I6	DON	25-Jul-01	12:48 PM	88	15.0	11.75	13.33	1.58
58	207	I3	DON	26-Jul-01	2:33 PM	91	24.0	11.82	14.09	2.27
58	220	I0	DON	27-Jul-01	2:34 PM	88	12.5	12.37	15.31	2.94
58	235	H0	DON	30-Jul-01	2:45 PM	82	20.0	13.98	18.24	4.26
58	254	H3	DON	1-Aug-01	12:30 PM	79	17.5	12.84	16.95	4.11
58	270	L10	DON	2-Aug-01	2:10 PM	91	12.5	8.17	8.20	0.04
58	289	L6	DON	4-Aug-01	2:45 PM	82	9.0	10.90	11.10	0.20
58	328	H3	DON	7-Aug-01	2:20 PM	90	23.0	11.79	16.95	5.16
58	338	H0	ARCH	8-Aug-01	12:58 PM	92	16.0	12.60	18.24	5.65
58	356	H6	DON	9-Aug-01	1:31 PM	92	19.0	11.50	16.31	4.82
58	380	L10	DON	12-Aug-01	12:04 PM	93	14.0	8.07	8.20	0.14
58	403	L6	DON	13-Aug-01	1:05 PM	101	12.0	9.98	11.10	1.12
58	422	L0	DON	14-Aug-01	2:06 PM	100	12.5	10.40	12.52	2.13
58	441	I10	DON	15-Aug-01	2:39 PM	99	15.0	10.74	12.36	1.62
58	462	I6	DON	16-Aug-01	2:48 PM	97	23.0	10.58	13.33	2.75
58	477	I3	DON	17-Aug-01	1:27 PM	92	16.0	11.53	14.09	2.56
58	505	L3	DON	18-Aug-01	4:18 PM	84	17.0	11.17	11.48	0.31
58	520	I0	DON	20-Aug-01	12:38 PM	84	12.0	12.51	15.31	2.81
58	538	H10	DON	27-Aug-01	2:12 PM	93	18.0	12.47	16.54	4.07
58	554	L0	DON	28-Aug-01	1:27 PM	88	17.0	11.06	12.52	1.46

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
65	50	H10	DON	10-Jul-01	1:50 PM	96	20.0	11.08	16.54	5.46
65	117	L3	ARCH	14-Jul-01	3:25 PM	91	11.0	10.25	11.48	1.23
65	147	H6	DON	23-Jul-01	12:10 PM	85	14.0	11.76	16.31	4.55
65	163	I10	DON	24-Jul-01	12:00 PM	86	8.5	10.05	12.36	2.31
65	186	I6	DON	25-Jul-01	3:03 PM	87	24.0	10.29	13.33	3.05
65	196	I0	DON	26-Jul-01	4:44 PM	92	8.5	9.03	15.31	6.28
65	203	I3	DON	26-Jul-01	1:23 PM	88	9.5	10.48	14.09	3.61
65	229	H0	DON	30-Jul-01	12:50 PM	79	20.0	12.61	18.24	5.64
65	265	H3	DON	2-Aug-01	12:27 PM	85	12.0	12.24	16.95	4.71
65	285	L10	DON	4-Aug-01	1:30 PM	82	17.0	8.04	8.20	0.16
65	296	L6	DON	5-Aug-01	12:27 PM	81	15.0	9.31	11.10	1.79
65	309	H3	DON	6-Aug-01	1:05 PM	90	15.0	10.96	16.95	5.99
65	341	H0	DON	8-Aug-01	1:38 PM	90	21.0	11.70	18.24	6.55
65	358	H6	DON	9-Aug-01	2:10 PM	95	192.0	11.66	16.31	4.66
65	371	L10	DON	10-Aug-01	11:47 AM	94	16.0	7.96	8.20	0.25
65	389	L6	DON	12-Aug-01	3:30 PM	100	15.0	8.70	11.10	2.40
65	416	L0	DON	14-Aug-01	12:10 PM	96	12.0	9.89	12.52	2.64
65	437	I10	DON	15-Aug-01	1:21 PM	99	18.0	10.21	12.36	2.15
65	457	I6	DON	16-Aug-01	12:55 PM	95	15.0	10.90	13.33	2.43
65	479	I3	DON	17-Aug-01	2:04 PM	92	21.5	11.22	14.09	2.87
65	490	H6	DON	17-Aug-01	5:09 PM	95	25.0	11.00	16.31	5.32
65	502	L3	DON	18-Aug-01	3:03 PM	86	8.0	10.31	11.48	1.17
65	518	PG	DON	19-Aug-01	6:18 PM	83	17.0			
65	529	I0	DON	20-Aug-01	4:31 PM	88	18.0	11.18	15.31	4.13
65	543	H10	DON	27-Aug-01	3:30 PM	93	192.0	11.19	16.54	5.35
65	556	L0	DON	28-Aug-01	2:05 PM	87	14.0	9.67	12.52	2.85

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
82	53	H10	DON	10-Jul-01	3:05 PM	100	103.0	12.24	16.54	4.29
82	101	L3	ARCH	13-Jul-01	1:05 PM	92	6.5	10.28	11.48	1.20
82	131	H6	DON	22-Jul-01	1:20 PM	84	52.5	14.27	16.31	2.04
82	155	I10	DON	23-Jul-01	2:32 PM	91	1.0	11.29	12.36	1.07
82	172	I6	DON	24-Jul-01	2:20 PM	92	26.0	12.20	13.33	1.14
82	185	I3	DON	25-Jul-01	2:26 PM	88	9.0	12.43	14.09	1.66
82	217	I0	DON	27-Jul-01	1:27 PM	89	9.0	11.61	15.31	3.70
82	243	H0	DON	31-Jul-01	1:45 PM	77	27.0	15.02	18.24	3.22
82	258	H3	DON	1-Aug-01	1:40 PM	80	53.0	14.34	16.95	2.61
82	279	L10	DON	2-Aug-01	4:36 PM	89	3.5	8.13	8.20	0.08
82	300	L6	DON	5-Aug-01	1:34 PM	82	14.0	10.46	11.10	0.65
82	326	H3	DON	7-Aug-01	1:39 PM	88	70.0	13.32	16.95	3.63
82	339	H0	DON	8-Aug-01	12:57 PM	90	28.5	14.30	18.24	3.94
82	353	H6	DON	9-Aug-01	12:13 PM	90	74.0	13.68	16.31	2.63
82	377	L10	DON	10-Aug-01	1:35 PM	98	4.0	7.98	8.20	0.22
82	395	L6	DON	13-Aug-01	11:41 AM	96	13.0	10.16	11.10	0.95
82	412	L0	DON	14-Aug-01	10:52 AM	93	5.5	11.22	12.52	1.30
82	430	I10	DON	15-Aug-01	11:27 AM	96	13.0	11.16	12.36	1.20
82	459	I6	DON	16-Aug-01	1:33 PM	97	43.0	11.35	13.33	1.99
82	475	I3	DON	17-Aug-01	12:49 PM	90	17.0	12.62	14.09	1.47
82	504	L3	DON	18-Aug-01	3:41 PM	86	8.0	10.80	11.48	0.68
82	527	I0	DON	20-Aug-01	3:10 PM	88	9.0	12.68	15.31	2.64
82	536	H10	DON	27-Aug-01	1:34 PM	91	82.0	13.25	16.54	3.29
82	552	L0	DON	28-Aug-01	12:48 PM	84	12.0	11.41	12.52	1.11

Table E-1 (Continued)
2001 CRC Test Program Data Summary

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits	DVPE Average	DVPE Initial	DVPE Loss
84	23	H10	ARCH	8-Jul-01	2:35 PM	95	129.5			
84	32	H0	ARCH	9-Jul-01	1:40 PM	97	31.5	13.39	18.24	4.85
84	54	H10	ARCH	10-Jul-01	4:43 PM	96	35.0	13.28	16.54	3.26
84	97	L3	ARCH	13-Jul-01	12:00 PM	91	11.0	10.16	11.48	1.32
84	132	H6	ARCH	22-Jul-01	1:30 PM	83	18.0	13.29	16.31	3.02
84	152	I10	ARCH	23-Jul-01	1:35 PM	91	8.0	11.66	12.36	0.70
84	170	I6	ARCH	24-Jul-01	1:48 PM	90	13.5	12.61	13.33	0.72
84	210	I3	ARCH	26-Jul-01	3:38 PM	94	20.0	12.27	14.09	1.82
84	225	I0	ARCH	27-Jul-01	3:42 PM	95	10.0	12.67	15.31	2.65
84	245	H0	ARCH	31-Jul-01	2:19 PM	81	13.0	13.40	18.24	4.85
84	261	H3	ARCH	2-Aug-01	11:19 AM	85	18.0	14.77	16.95	2.18
84	280	L10	ARCH	4-Aug-01	12:25 PM	80	15.0	8.04	8.20	0.16
84	299	L6	ARCH	5-Aug-01	1:02 PM	86	8.0	10.39	11.10	0.71
84	316	H3	ARCH	6-Aug-01	2:56 PM	95	19.0	13.40	16.95	3.55
84	345	H6	ARCH	8-Aug-01	3:23 PM	92	19.5			
84	376	L10	ARCH	10-Aug-01	1:20 PM	99	12.5	8.01	8.20	0.19
84	399	L6	ARCH	13-Aug-01	11:30 AM	100	13.0	10.20	11.10	0.91
84	417	L0	ARCH	14-Aug-01	12:35 PM	97	16.5	11.04	12.52	1.48
84	433	I10	ARCH	15-Aug-01	11:26 AM	97	10.0	11.33	12.36	1.03
84	448	I6	ARCH	15-Aug-01	4:43 PM	99	28.0	11.78	13.33	1.55
84	487	I3	ARCH	17-Aug-01	11:34 AM	90	21.0	12.17	14.09	1.92
84	501	L3	ARCH	18-Aug-01	2:50 PM	84	8.0	10.47	11.48	1.01
84	517	I0	ARCH	19-Aug-01	4:26 PM	82	12.0	12.63	15.31	2.69
84	547	H10	ARCH	28-Aug-01	11:20 AM	88	29.0	14.11	16.54	2.43
84	567	L0	ARCH	29-Aug-01	12:35 PM	90	10.0	11.35	12.52	1.17

Table E-2
2001 CRC Test Program Data Summary
Non-Sensitive Vehicles

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits
2	33	H10	DON	9-Jul-01	2:00 PM	95	5.50
3	26	H10	DON	8-Jul-01	3:20 PM	95	13.00
4	21	H10	ARCH	8-Jul-01	1:53 PM	94	5.50
9	88	H10	DON	12-Jul-01	4:25 PM	95	11.50
10	43	H10	DON	10-Jul-01	11:45 AM	94	11.50
12	20	H10	DON	8-Jul-01	1:30 PM	95	15.50
13	17	H10	DON	8-Jul-01	12:38 PM	89	12.00
14	15	H10	DON	8-Jul-01	12:00 PM	91	10.50
15	80	H10	ARCH	12-Jul-01	12:50 PM	95	9.00
17	9	H10	DON	7-Jul-01	3:05 PM	92	10.50
18	22	H10	DON	8-Jul-01	2:05 PM	93	18.50
19	13	H10	DON	7-Jul-01	4:25 PM	94	22.00
19	30	H0	ARCH	9-Jul-01	1:07 PM	96	13.00
19	122	L3	ARCH	19-Jul-01	2:30 PM	83	10.00
21	85	H10	DON	12-Jul-01	2:40 PM	92	4.00
23	93	H10	ARCH	12-Jul-01	5:47 PM	94	10.50
25	86	H10	DON	12-Jul-01	3:12 PM	95	15.50
26	90	H10	ARCH	12-Jul-01	4:37 PM	93	9.00
28	58	H10	DON	11-Jul-01	11:56 AM	87	8.00
29	56	H10	ARCH	11-Jul-01	11:20 AM	89	6.00
30	5	H10	DON	7-Jul-01	1:50 PM	89	15.50
31	1	H10	DON	7-Jul-01	12:30 PM	87	17.00
32	7	H10	DON	7-Jul-01	2:30 PM	91	6.00
34	12	H10	ARCH	7-Jul-01	3:55 PM	94	6.00
35	16	H10	ARCH	8-Jul-01	11:58 AM	92	2.50
36	75	H10	ARCH	12-Jul-01	11:15 AM	90	6.00
37	92	H10	ARCH	12-Jul-01	5:12 PM	95	12.00
38	76	H10	DON	12-Jul-01	11:15 AM	86	11.00
39	91	H10	ARCH	12-Jul-01	5:01 PM	96	16.00
39	124	L3	DON	19-Jul-01	3:05 PM	82	13.00
40	89	H10	ARCH	12-Jul-01	4:27 PM	96	9.00
41	6	H10	ARCH	7-Jul-01	2:00 PM	92	12.50
42	11	H10	DON	7-Jul-01	3:43 PM	93	4.00
44	31	H10	DON	9-Jul-01	1:25 PM	95	36.00
44	96	L3	DON	13-Jul-01	11:55 AM	86	8.50
45	18	H10	ARCH	8-Jul-01	12:38 PM	94	11.00
46	27	H10	DON	9-Jul-01	12:10 PM	94	10.50
47	35	H10	DON	9-Jul-01	2:35 PM	97	7.00
49	52	H10	DON	10-Jul-01	2:30 PM	96	27.00
49	114	L3	DON	14-Jul-01	2:07 PM	87	23.50
50	25	H10	ARCH	8-Jul-01	3:04 PM	97	9.00
52	69	H10	DON	11-Jul-01	3:30 PM	92	11.50
53	77	H10	ARCH	12-Jul-01	11:45 AM	90	10.00

Vehicle	Run Number	CRC Fuel Code	Rater	Date	Start Time	Maximum Ambient Temp. F	Total Weighed Demerits
55	37	H10	DON	9-Jul-01	3:30 PM	96	16.00
55	123	L3	ARCH	19-Jul-01	3:02 PM	83	28.00
56	42	H10	DON	10-Jul-01	11:25 AM	92	10.50
57	59	H10	DON	11-Jul-01	12:30 PM	89	21.00
57	127	L3	ARCH	19-Jul-01	4:13 PM	85	13.00
59	55	H10	DON	11-Jul-01	11:20 AM	85	3.50
60	68	H10	DON	11-Jul-01	2:58 PM	91	6.50
61	29	H10	DON	9-Jul-01	12:46 PM	94	15.50
61	125	L3	ARCH	19-Jul-01	3:35 PM	84	10.00
62	45	H10	ARCH	10-Jul-01	12:23 PM	98	18.00
62	120	L3	DON	19-Jul-01	2:00 PM	81	9.00
63	46	H10	DON	10-Jul-01	12:30 PM	97	12.50
64	44	H10	ARCH	10-Jul-01	11:49 AM	96	15.00
66	61	H10	ARCH	11-Jul-01	1:42 PM	92	20.50
66	119	L3	ARCH	19-Jul-01	1:52 PM	82	14.00
67	60	H10	ARCH	11-Jul-01	12:34 PM	89	14.00
68	66	H10	ARCH	11-Jul-01	2:17 PM	92	14.00
69	67	H10	ARCH	11-Jul-01	2:49 PM	93	34.00
69	106	L3	DON	13-Jul-01	2:45 PM	93	33.00
70	71	H10	DON	11-Jul-01	4:05 PM	92	12.50
71	79	H10	ARCH	12-Jul-01	12:17 PM	90	11.00
72	81	H10	DON	12-Jul-01	12:58 PM	90	4.50
73	74	H10	ARCH	12-Jul-01	2:03 PM	96	30.00
73	118	L3	ARCH	14-Jul-01	2:01 PM	90	24.50
74	84	H10	DON	12-Jul-01	2:06 PM	91	58.00
74	107	L3	ARCH	13-Jul-01	2:45 PM	95	51.00
75	78	H10	DON	12-Jul-01	11:45 AM	88	9.00
76	70	H10	ARCH	11-Jul-01	3:29 PM	94	22.00
76	116	L3	DON	14-Jul-01	2:36 PM	88	16.00
77	57	H10	ARCH	11-Jul-01	12:02 PM	91	11.00
78	64	H10	DON	11-Jul-01	1:35 PM	90	22.00
78	126	L3	DON	19-Jul-01	3:40 PM	82	8.50
79	62	H10	DON	11-Jul-01	1:02 PM	89	6.00
80	47	H10	ARCH	10-Jul-01	1:00 PM	98	14.00
81	51	H10	ARCH	10-Jul-01	2:10 PM	101	11.00
83	39	H10	DON	9-Jul-01	4:05 PM	99	10.00
85	24	H10	DON	8-Jul-01	2:41 PM	93	10.00

APPENDIX F

PHYSICAL CHEMISTRY OF TVL1-500, TVL20, AND DVPE

Appendix F

Physical Chemistry of TVL1-500, TVL20, and DVPE

TVL1-500 works well as an index for hot-fuel-handling demerits, because it is a fairly direct measure of the core hot-fuel-handling problem, vapor formation at elevated pressure. A 1:1 vapor liquid ratio is likely to cause significant difficulty in an engine. The injectors cannot pass vapor at a high enough rate to supply the amount of fuel needed to achieve good combustion. The choice of 500kPa absolute pressure was made to best correlate the data in the previous program, but the fact that the rail pressure is in this vicinity for modern vehicles is not a coincidence. By choosing a pressure near the rail operating pressure and a low V:L ratio that still gives trouble in vehicles, one establishes a laboratory test that is likely to correlate well with actual field problems.

Since the test simulates what happens in the vehicle during hot-fuel-handling problems, the test becomes quite robust with respect to fuel composition. If a change in fuel composition (such as addition of an alcohol or ether) lowers the TVL1-500, it will also lower the temperature at which hot-fuel-handling problems are observed. Similar relations apply to DVPE or TVL20, but they are more complicated. To see why, it is necessary to look at the underlying chemical physics.

The relationship between vapor pressure and temperature is predicted quite well by the Clausius Clapyron equation. This thermodynamically-based equation states that pressure is related to temperature by:

$$Ln(P)=Ln(Po)-K/T+K'$$

Where P is the absolute pressure, T is the absolute temperature, and Po is the pressure at some reference temperature. K is related to R, the gas constant, and ΔH_{vap} the heat of vaporization, and K' is a constant determined by the reference temperature.

The ΔH_{vap} of hydrocarbons vary, but not significantly, while the ΔH_{vap} of polar molecules, such as ethanol or water, are quite different. This means that as the ethanol content of gasoline changes, the effect of temperature on pressure changes as well. TVL1-500 avoids this problem by testing in the conditions in which vapor forms in a real vehicle, while DVPE and TVL20 do not.

DVPE is taken at a fixed temperature of 100°F (37.8°C). After a soak, rail temperature can be 120°F (50°C) higher than the DVPE test temperature. The addition of ethanol (or any other compound with a ΔH_{vap} that is significantly different from that of hydrocarbons) increases the rate at which pressure changes with temperature. Consequently, the pressure generated at elevated temperature will be higher for an ethanol mix than it is for a pure hydrocarbon of the same DVPE. Over the small range of ethanol content in real fuel, and for the small variation in temperature resulting (about 50°F or 10°C out of 400°K absolute temperature), a linear response in ethanol content will serve.

TVL20 is not radically different from TVL1-500, except that the test is done at 100kPa. This significantly lowers the temperature at which the required V:L is reached. Again, for any given TVL20 value, as temperature increases, an ethanol blend will increase in pressure faster than a hydrocarbon mixture. Over a limited temperature range, this variation will be linear in ethanol content. A different constant is expected as well, since theTVL20 and TVL1 tests have different reference points.

Fortunately, a different coefficient and an offset proportional to ethanol content are expected for both DVPE and TVL20. Consider TVL20. Both TVL tests evaporate only a tiny amount of fuel, so the change in fuel composition in each test is small, and is not a critical factor. For any amount of ethanol added, the ΔH_{vap} will alter by some amount proportional to concentration, increasing the change in vapor prssure with temperature. So, the temperature change between the TVL20 value and the temperature needed to generate significant vapor in the rail will shrink with increasing ethanol. Thus, a subtracted ethanol term is expected.

A similar response is expected in DVPE, except the term will be added. Addition of ethanol will increase the pressure for any given temperature change. Thus, the effective pressure at the temperature zone where trouble is expected is the DVPE plus a term to account for the increase in pressure over that temperature change due to ethanol.

Of course, these simple relations are not exact because each vehicle has its own rail pressure, so the vapor pressure required to cause trouble, and the soak temperature needed to generate that vapor pressure is different for each vehicle. But over a fleet, the effects should average out to a smooth increase in problems once the index value exceeds a threshold value.

If the ambient conditions are cooler or warmer than the 90°F (32°C) mean in this program, the effect on the results will be subtle. For TVL1-500, a cooler ambient will translate to a somewhat lower soak temperature, based on the results from the 1999 program. Therefore, the threshold value at which TWDs start to respond to TVL1-500 will decrease. That is to say, a more volatile fuel will be required to observe problems. Because the TVL1-500 test samples the conditions under which the vehicle operates, however, the slope of the TWD versus TVL1-500 line should not change. Essentially the line simply shifts to the left. Obviously, at higher ambient temperatures, the line will shift to the right and the threshold will move to higher TVL1-500 values (less volatile fuels).

For the DVPE and TVL20 relationships, a similar alteration in the threshold is expected. While the amount of heating required to get to the point problems are observed is greater at cooler ambient temperatures, that only affects the threshold. As discussed above, the ethanol offset is dependent on the difference between the DVPE or TVL20 test conditions and the conditions that cause problems in the engine. The offset should not be significantly affected by the ambient temperature. Only the propensity of the vehicle to access the conditions needed to observe demerits is affected. Over the ambient temperature range where hot fuel problems are a concern, the offsets should be a function of ethanol content, not test temperature. Indeed, if this were not the case, the variation in test temperature over the course of this testing would preclude the excellent correlation achieved with the offsets.

APPENDIX G

CORRELATION OF TVL1-500 WITH TVL20, DVPE, AND ETHANOL

Appendix G

Correlation of TVL1-500 with TVL20, DVPE, and Ethanol

Inspections of gasoline front-end volatility parameters of TVL1-500, TVL20, and DVPE are shown in Table 2 for the 12 test fuels. Regression analyses were conducted using the 12-fuel data set to determine the correlation of measured TVL1-500 with the traditional front-end volatility parameters, TVL20 and DVPE. The correlation plots of TVL1-500 versus TVL20 or DVPE are shown in Figures F-1 and F-2. The R^2 linear fit for TVL20 and DVPE with TVL 1-500 was 0.788 and 0.738, respectively. Regressions were also run using a combination of these parameters with the ethanol concentration term. The best R^2 fit with parameter TVL1-500 was found for the combination of TVL20 and the ethanol term (adjusted R^2=0.971) as shown in Figure F-3, which compares the calculated against the measured TVL1-500. The addition of an ethanol concentration variable is an improvement over TVL20 alone. The correlation using DVPE and the ethanol term was slightly less than the linear fit found for TVL20 and the ethanol concentration term (adjusted R^2=0.955) as shown in Figure F-4. Addition of other terms, such as the distillation 10% evaporated points, did not improve the correlation.

Figure G-1
TVL 1-500 Versus TVL20
12 CRC 2001 TEST FUELS

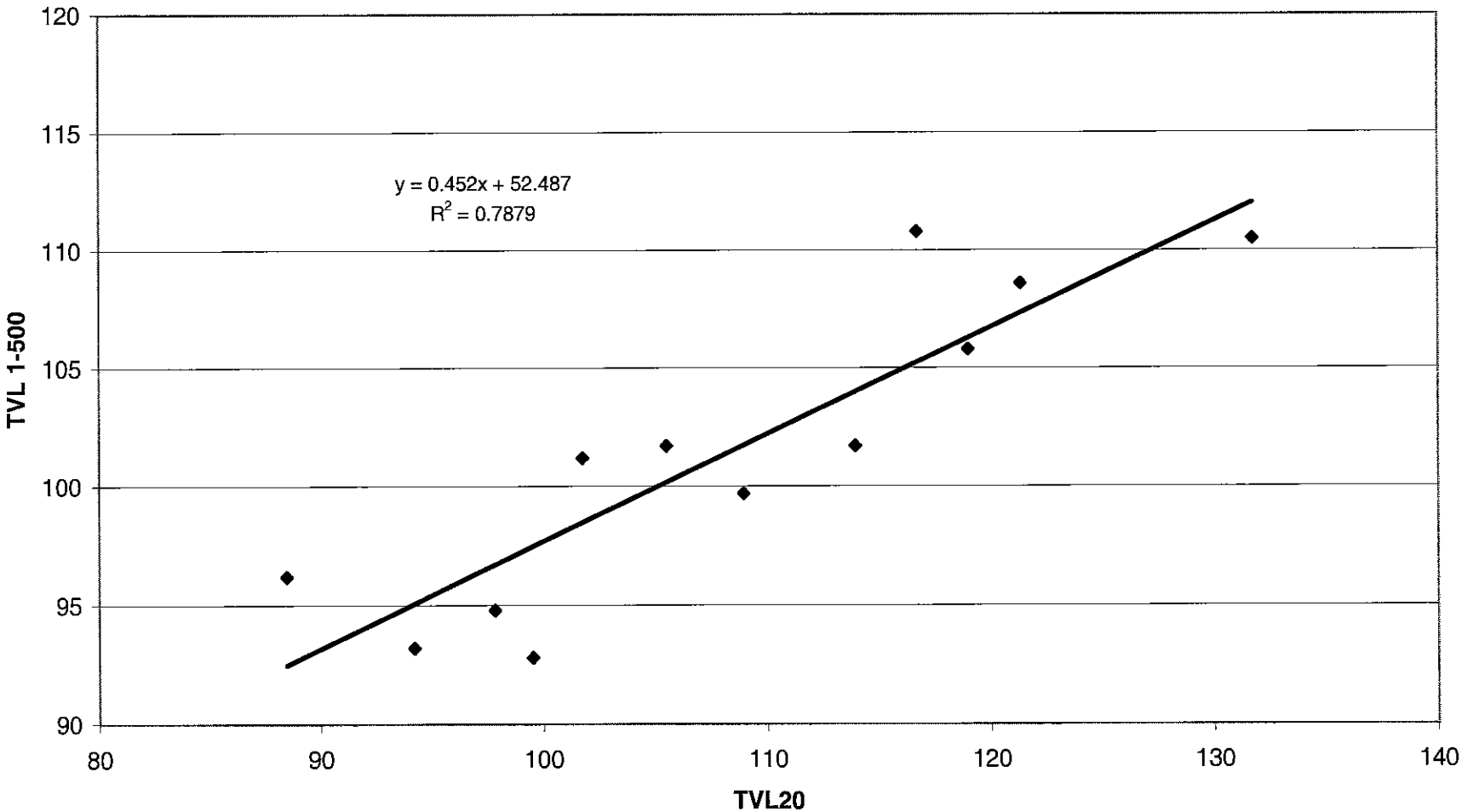


Figure G-2
TVL 1-500 Versus DVPE
12 CRC 2001 TEST FUELS

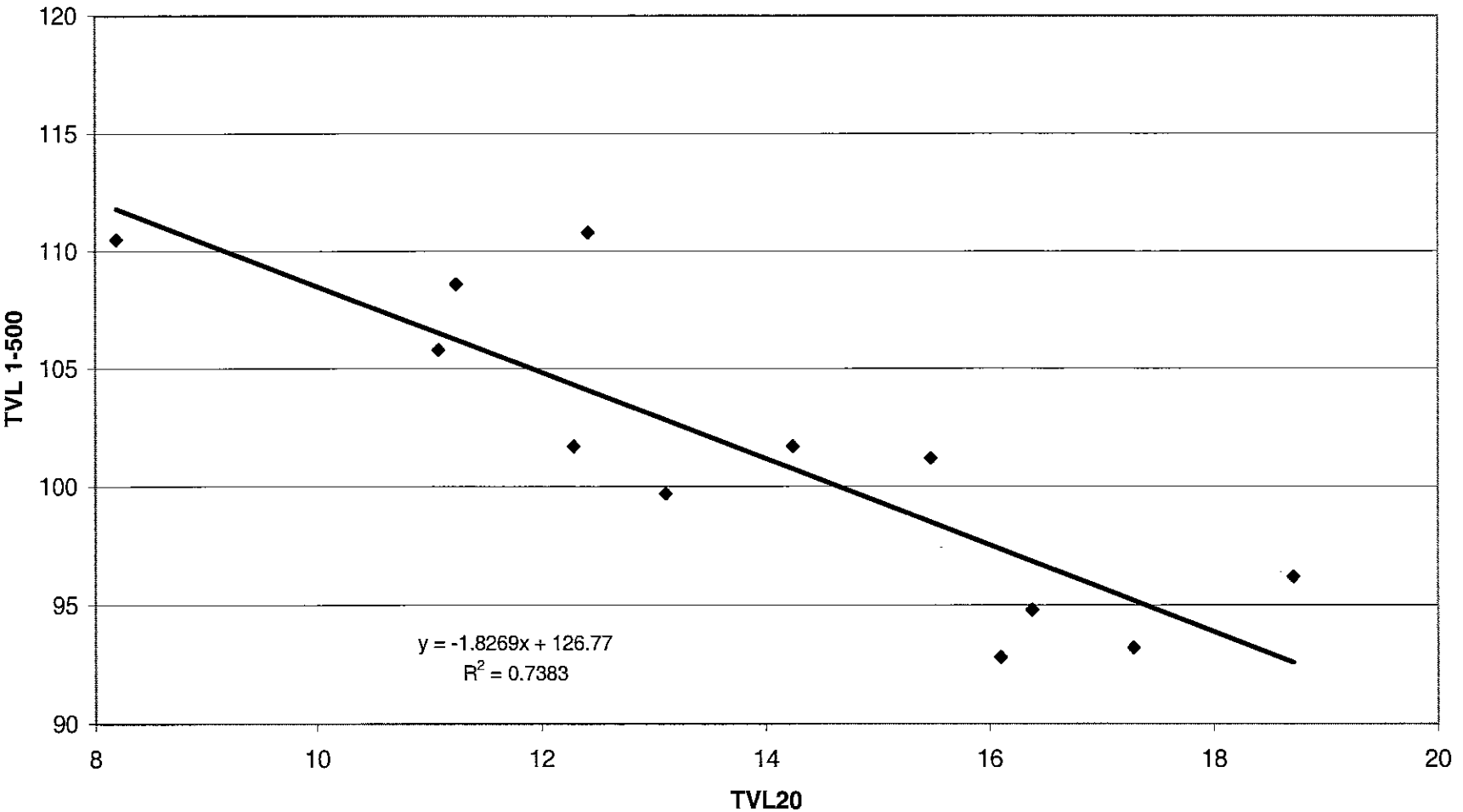


Figure G-3
Calculated TVL 1-500 Versus Measured--TVL20 and EtOH
12 CRC 2001 TEST FUELS

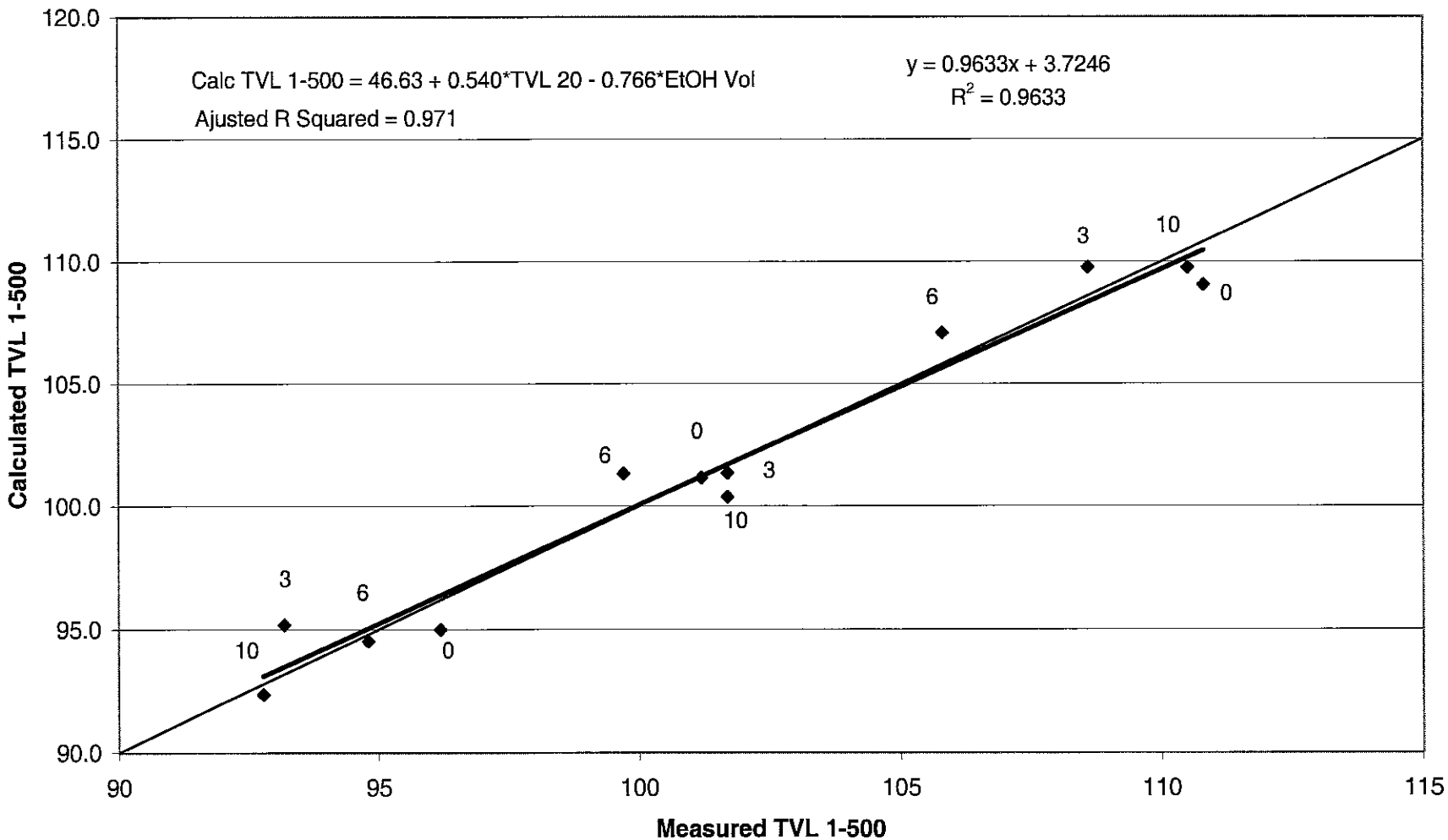
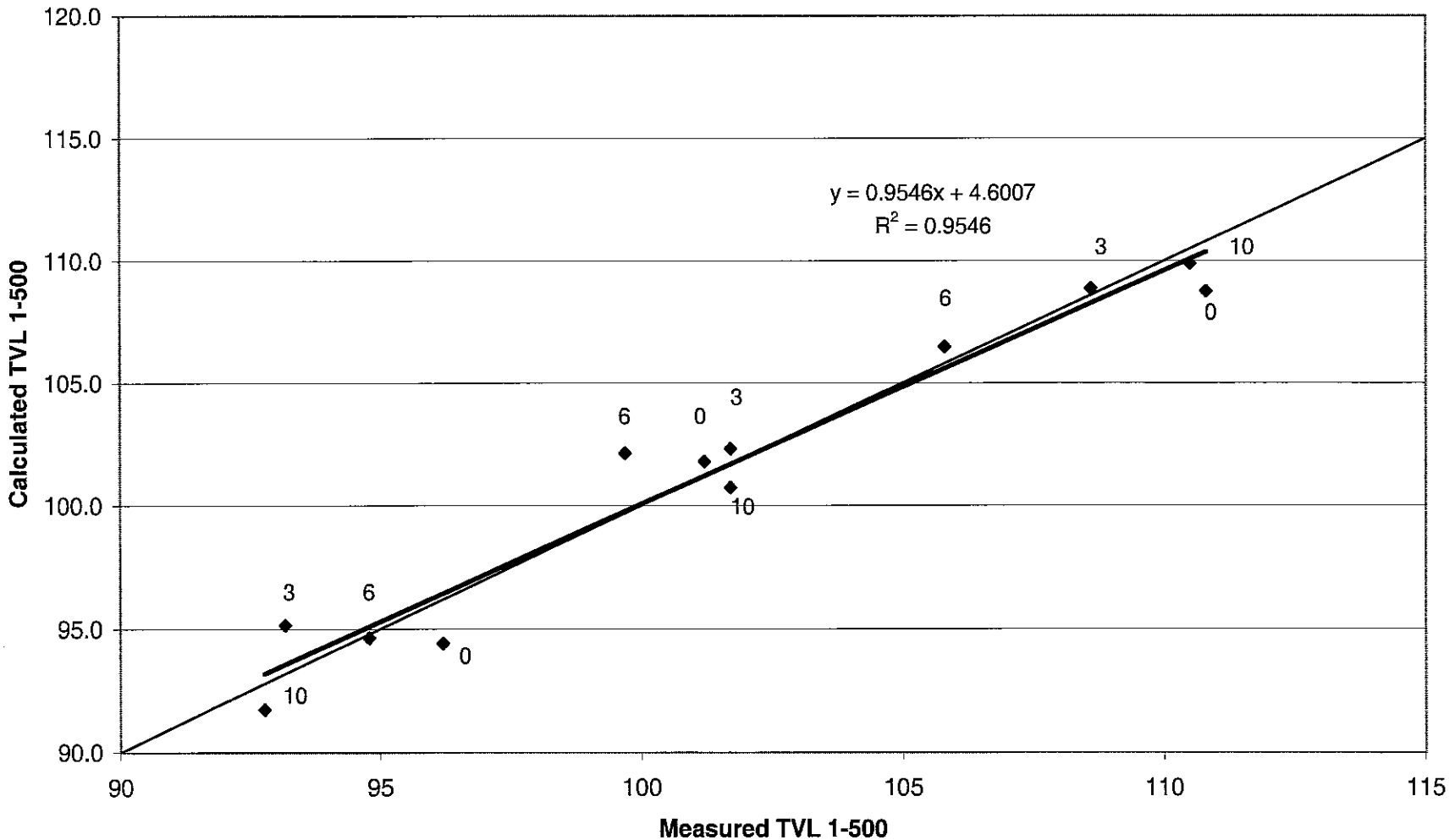


Figure G-4
Calculated TVL 1-500 Versus Measured--DVPE and EtOH
12 CRC 2001 TEST FUELS



APPENDIX H

FUEL WEATHERING DATA SUMMARY

Table H-1
Average Fuel Weathering by Test Fuel

Fuel	DVPE Loss	DVPE Average	DVPE Group	DVPE Initial	Max Amb T °F	EtOH Vol %
H0	5.49	12.75	18.70	18.24	87.6	0.0
H3	4.24	12.71	17.30	16.95	87.4	3.0
H6	4.08	12.23	16.40	16.31	89.6	6.3
H10	4.67	11.87	16.10	16.54	92.2	10.0
I0	3.73	11.59	15.50	15.31	88.1	0.0
I3	2.68	11.41	14.20	14.09	92.6	2.7
I6	2.22	11.11	13.10	13.33	93.6	5.9
I10	1.72	10.64	12.30	12.36	94.1	9.8
L0	2.19	10.33	12.40	12.52	93.6	0.0
L3	1.13	10.35	11.20	11.48	88.4	3.0
L6	1.31	9.80	11.10	11.10	92.3	6.0
L10	0.21	7.99	8.20	8.20	90.5	10.2

Table H-2
Average Fuel Weathering by Vehicle

Vehicle	DVPE Loss	DVPE Average	DVPE Initial	Max Amb T °F
1	3.28	10.49	13.87	90.4
5	2.12	11.75	13.87	92.7
6	2.54	11.22	13.87	91.7
7	2.49	11.38	13.87	91.4
8	2.22	11.53	13.87	88.9
11	2.61	11.24	13.87	92.2
16	3.15	10.46	13.87	89.4
20	1.89	11.96	13.87	90.6
22	1.64	12.49	14.13	92.5
24	2.14	11.83	13.87	90.2
27	4.19	10.00	14.17	91.5
33	4.76	9.24	13.87	91.3
43	2.27	11.74	13.87	90.6
48	4.33	9.53	13.87	89.7
51	4.19	9.75	13.87	92.4
54	2.77	11.10	13.87	89.7
58	2.57	11.36	13.87	89.9
65	3.50	10.47	13.97	90.1
82	1.95	11.92	13.87	89.6
84	1.92	11.84	13.98	91.1

Table H-3
Summary of Maximum Ambient Test Temperatures

	Vehicle																				
Fuel	1	5	6	7	8	11	16	20	22	24	27	33	43	48	51	54	58	65	82	84	Average
H0	81	82	98	84	79	97	81	95	80	78	80	97	99	82	83	79	82	79	77	97	87.6
H0	91	92	82	92	92	81	91	81	94	90	94	81	80	94	94	91	92	90	90	81	
H0									92		96										
H0											97										
H3	80	84	85	81	83	86	82	83	84	85	85	83	81	83	82	81	79	85	80	85	87.4
H3	94	95	95	91	90	96	92	90	94	90	95	92	94	88	90	90	90	90	88	95	
H6	86	86	88	84	87	88	81	87	88	85	84	87	84	87	88	86	86	85	84	83	89.6
H6	94.7	92	92	91.4	89.9	94	90	93	94	94.9	96	92	94	91.1	92	92	92	95	90	92	
H6									98		92							95			
H10	91	98	93	88	93	91	90	93	100	93	94	88	95	94	93	92	92	96	100	95	92.2
H10	83	92	96	91	88	91	85	89	92	84	94	94	95	90	94	94	93	93	91	96	
H10																				88	
I0	89	93	88	91	90	94	91	93	93	89	90	93	92	85	94	90	88	92	89	95	88.1
I0	91	84	83	87	82	81	89	81	86	90	81	82	85	90	82	88	84	88	88	82	
I3	90	95	90	91	92	92	86	95	94	90	89	90	90	88	90	90	91	88	88	94	92.6
I3	98	99	98	100	88	96	93	90	93	88	100	98	97	95	98	95	92	92	90	90	
I6	86	101	92	86	89	90	88	89	90	88	86	93	91	89	92	91	88	87	92	90	93.6
I6	99	90	101	99	90	101	101	99	99	96	100	100	92	94	101	94	97	95	97	99	
I10	92	92	88	90	88	100	83	90	93	92	89	87	93	92	91	90	88	86	91	91	94.1
I10	101	101	99	101	98	93	99	98	100	101	94	100	93	95	100	93	99	99	96	97	
L0	103	103	104	102	103	104	96	95	97	100	97	104	87	99	103	95	100	96	93	97	93.6
L0	85	92	90	91	89	89	88	88	91	86	88	91	92	84	92	82	88	87	84	90	
L3	94	87	87	88	82	91	84	90	95	91	91	90	88	90	87	91	86	91	92	91	88.4
L3	80	96	85	95	87	95	82	86	83	95	81	82	96	81	98	86	84	86	86	84	
L6	83	88	88	86	80	83	87	84	83	89	88	82	81	85	90	83	82	81	82	86	92.3
L6	100	102	102	98	97	100	100	100	102	96	102	102	95	100.4	100	99.5	101	99.9	96	100	
L6											102										
L10	85	88	81	88	80	81	89	90	89	81	81	90	90	83	87	88	91	82	89	80	90.5
L10	94	93	95	96	97	98	98	95	101	93	97	93	91	94.1	96	92	93	94	98	99	
Average	90.4	92.7	91.7	91.4	88.9	92.2	89.4	90.6	92.5	90.2	91.5	91.3	90.6	89.7	92.4	89.7	89.9	90.1	89.6	91.1	90.8