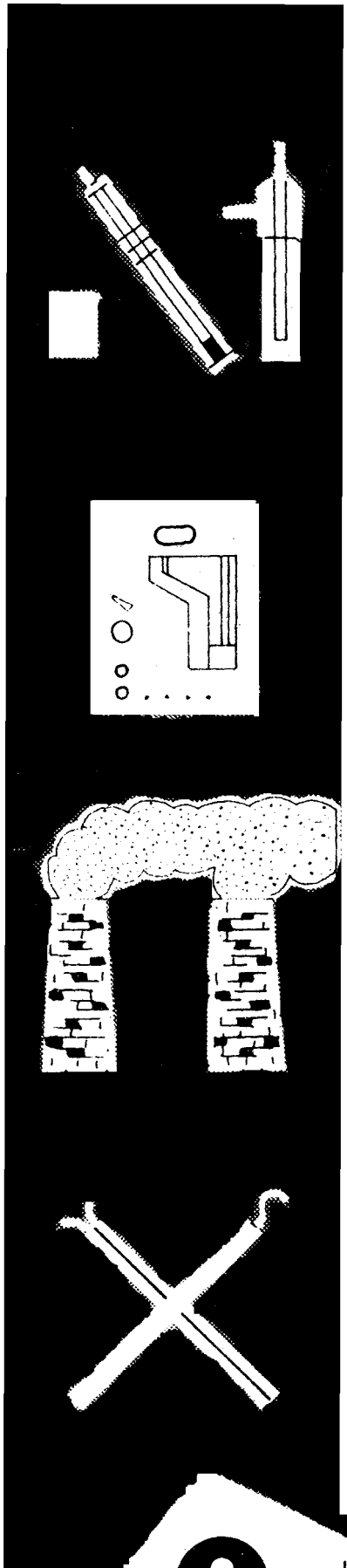
EMB REPORT NO. 75-GAS-3



AIR POLLUTION EMISSION TEST

EMISSIONS FROM GASOLINE MARKETING

OPERATIONS AT

EXXON RETAIL STATION

HAYWARD, CALIFORNIA

APRIL 1975

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Emission Measurement Branch
Research Triangle Park, North Carolina

EMB REPORT NO. 75 GAS 3
EMISSIONS FROM GASOLINE MARKETING
OPERATIONS AT
EXXON RETAIL STATION
HAYWARD, CALIFORNIA

TASK 3, CONTRACT NO. 68-02-1407

B.E.E. PROJECT NO. 00-4659-01

APRIL 1975

Submitted by: James H. Geiger
James H. Geiger
Assistant Project Engineer

Peter R Charrington
Peter R. Charrington, P.E.
Senior Project Engineer

Approved by: William P. May
William P. May, P.E.
Project Manager

D.N. Bibbo
D.N. Bibbo, P.E.
Executive Vice President

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I. INTRODUCTION

Under Section 110 of the Clean Air Act of 1970, as amended, the States are required to submit implementation plans for the control of pollutants for which a national primary and/or secondary ambient air quality standard has been established. Since such standards have been established for hydrocarbons, and because it has been determined that hydrocarbon emissions during vehicle fueling can contribute significantly to the ambient hydrocarbon concentrations, information is required concerning the effectiveness of the various source control techniques applicable to retail gasoline marketing operations.

An EXXON COMPANY retail station at 390 W. Jackson St., Hayward, California, is equipped with devices for hydrocarbon emission reduction and was selected for an emission testing program by the Office of Air Quality Planning and Standards. Testing was conducted by BETZ ENVIRONMENTAL ENGINEERS, INC. personnel during July 30 to August 2, 1974.

This retail station employs the vapor balance or displacement approach to hydrocarbon emission control. The gasoline vapors normally displaced by the liquid gasoline and lost to the atmosphere during vehicle refueling are returned to the underground fuel storage tanks for subsequent recovery by displacement during bulk gasoline delivery. The design employed at this location uses OPW-7VN dispensing nozzles on all product dispensers. The vapor return piping for the three product grades is manifolded at the dispenser islands with a common return to the storage tanks. All three underground storage tanks are manifolded together and are vented to atmosphere through one common riser. No pressure-vacuum control valve is used in this system design.

Testing was performed during 236 vehicle refuelings to determine potential hydrocarbon emissions, actual hydrocarbon emissions, and the vapor recovery efficiency of the control system. A bulk gasoline delivery was not monitored during the test program.

II. SUMMARY OF RESULTS

The field data for the vehicle refuelings are compiled chronologically in Appendix A. This listing includes all data. The complete listing for each fueling is given on two pages. The type of fueling can be determined by referring to the column "Leak Check Result". The entry "PS-BSL" denotes a fueling that qualifies as baseline data. "NO-NBL" denotes a normally-fueled test vehicle. "NO-ATB" denotes an attempted baseline that was not successful. The data under this category were not used in any calculations.

The test scope included the calculation of hydrocarbon recoveries and system efficiencies on a mass as well as volumetric basis. Due to malfunctioning flame ionization detectors, all the hydrocarbon concentrations reported are meaningless and thus it is not possible to perform calculations on a mass basis.

The results of testing on a volumetric basis are presented below.

A. Determination of Potential Emissions

In order to determine the amount of potential emission from a vehicle during fueling, every second or third vehicle fueled was designated as a baseline vehicle,

and special procedures were followed to ensure that all the hydrocarbon vapors were displaced through the vapor return system. To accomplish this, all atmospheric vents on the vehicle fuel tank were blocked and special care was taken to ensure a tight, leak-free fillpipe-nozzle interface. If there was no leakage at the interface (as detected by an explosimeter) and the vehicle fuel tank proved leak-free during a subsequent leak check, the vehicle fueling was termed as baseline and the calculated results were used to formulate a potential emission relationship. A linear relationship was assumed to exist between the volume of vapor returned to volume of liquid dispensed ratio versus the difference between the vehicle tank liquid temperature and the dispensed liquid temperature. For the baseline data obtained during this test, this relationship by least squares is:

$$(V/L)\ \text{potential} = 1.014 - 0.015\ \Delta T_{vd}$$

where:

(V/L) potential = volume of vapors returned to volume of liquid dispensed ratio, (ft^3/ft^3).

ΔT_{vd} = difference between inital vehicle tank liquid temperature and the dispensed fuel temperature.

A comparison of the baseline results to the predicted equation is given in Figure 1. The calculated results are listed in Appendix B, pages B1 - B4.

B. Determination of Actual Vapors Recovered

For the vehicles that were designated as non-baseline or test fuelings, no special

procedures were followed during testing. The attendant fueled the vehicle according to normal, routine practices.

The calculated results of testing are presented in Appendix B, pages B5 - B8. All the results are presented, and, in the cases where necessary data were missing, that fueling was not included in any further calculations. These cases are noted in the results tabulation in Appendix B. Most of these deletions were caused by the inability to obtain an initial fuel tank temperature because of anti-siphon devices installed in the vehicle fill-pipe.

The results are presented in Figures 2 to 5 on a daily basis, and are summarized in Figure 6. These figures compare the actual emission data to the potential emissions predicted from the baseline correlation.

C. Underground Tank Emissions

For testing purposes, a valving system was installed on the underground tank atmospheric vent. The system was designed so that when the pressure in the underground tank became greater than +0.15 "H_2O gage, the tank would vent to atmosphere through a dry-gas meter. No such venting was measured during the entire test period, therefore the emission from the tank vent was zero.

The system also allowed the underground tanks to draw air unrestricted into the tanks in the event that the pressure became less than -0.15"H_2O gage. Such in-breathing occurred during testing but the volume was not measured.

D. Calculation of Average Volumetric Recovery Factors and Recovery Efficiencies.

The average potential volumetric emission factor for the test car data set based on the correlation developed from the baseline vehicles, is 0.978 ft^3/ft^3. The average volumetric recovery for the test car data is 0.650 ft^3/ft^3. The difference between the average potential emission and the average recovery is the average emission to the atmosphere at the vehicle, which is 0.328 ft^3/ft^3. The ratio of the average recovery to the average potential emission results in an average volumetric recovery efficiency at the vehicle of 66.4%. The above averages are weighted and are not a simple median of the individual vehicle factors and efficiencies. The weighting mechanism is basically the amount of fuel dispensed for the individual fuelings. This procedure prevents a very large or a very small fueling from having a disproportionate impact on the calculated averages.

Since the emissions from the underground tanks were zero during the test period, the total system emission factors and recovery efficiencies are the same as those calculated at the vehicle.

There are two factors introduced for testing purposes that could possibly have an effect on the measured performance of the vapor recovery system. Firstly, the dry gas meters which were installed to measure the volume of vapors returned added a significant pressure drop in the vapor return piping system. This pressure drop ranged from 0.15 to 0.25 "H_2O, depending on the flow rate. This increased resistance to flow would increase the pressure at the nozzle-fillpipe interface and provide a larger driving force for leakage at the interface.

The second factor would be the pressure-vacuum valving system used to measure underground tank venting. This system is designed so that the underground tank vent is closed when the pressure is between -0.15 and +0.15 "H_2O gage. The normal vent configuration consists of a capped 2" pipe with a 1/2" opening to atmosphere. Under non-flow conditions, the normal vent configuration would maintain the underground tanks at atmospheric pressure. With the P-V system installed, a pressure in the range -0.15 to +0.15 "H_2O is maintained in the underground tanks. When the underground tank pressure is between -0.15"H_2O gage and atmospheric, there is an additional driving force present which might partially offset the added flow resistance contributed by the dry gas meter. However, the simultaneous operation of a tested and a non-tested dispenser could tend to yield higher recoveries at non-tested dispensers and possibly lower recoveries at the tested dispenser. This would happen because the meter-less line would be the path of least resistance to flow.

In the case where the underground tank pressure is between atmospheric and +0.15"H_2O gage, a back pressure could be set up in the recovery system and tend to increase losses at the vehicle.

No quantitative estimates can be made regarding the magnitude of the effect on the recovery system efficiency by the above two factors, either alone or their interacting affects.

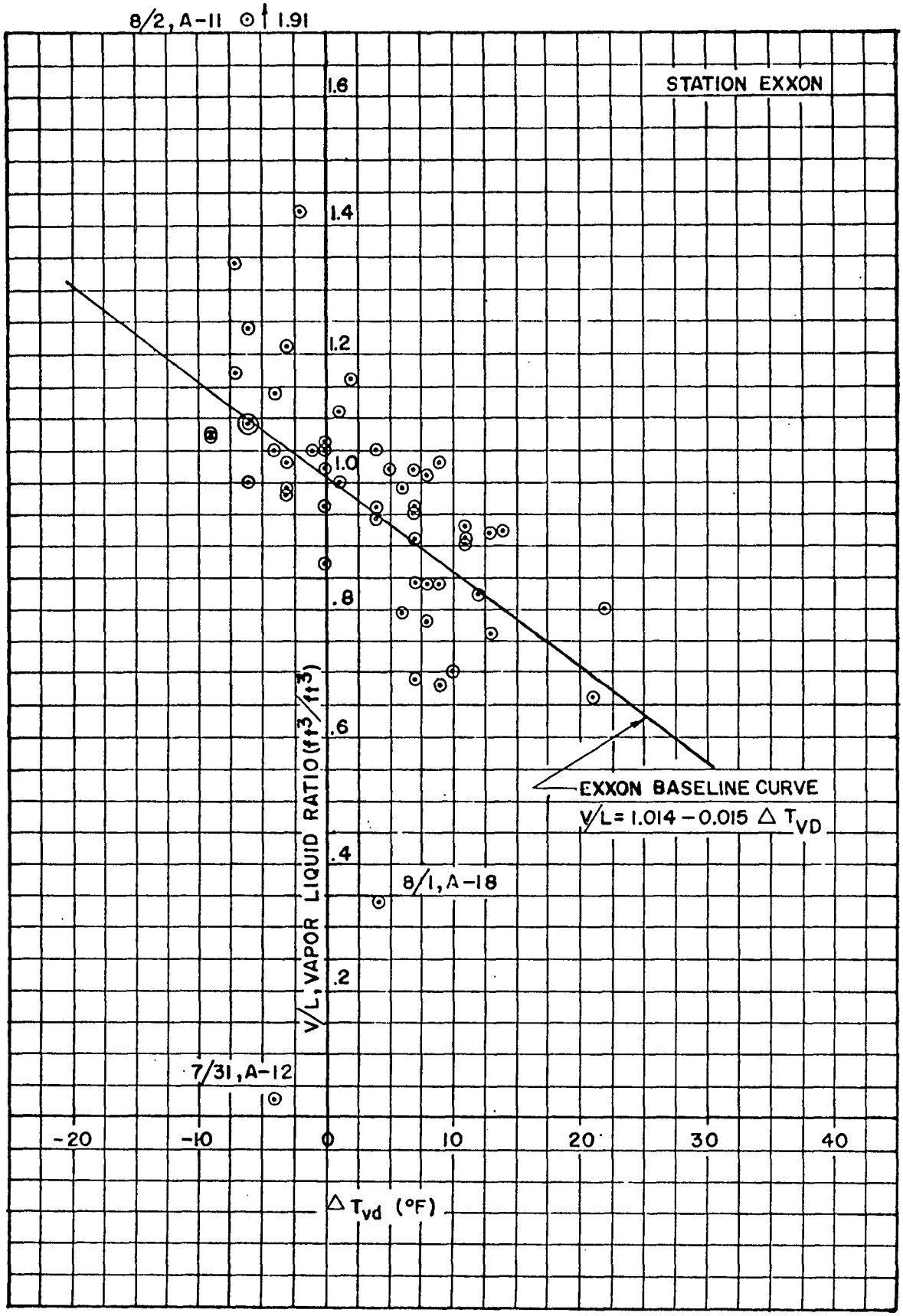


FIGURE 1 — EXXON STATION BASELINE DATA

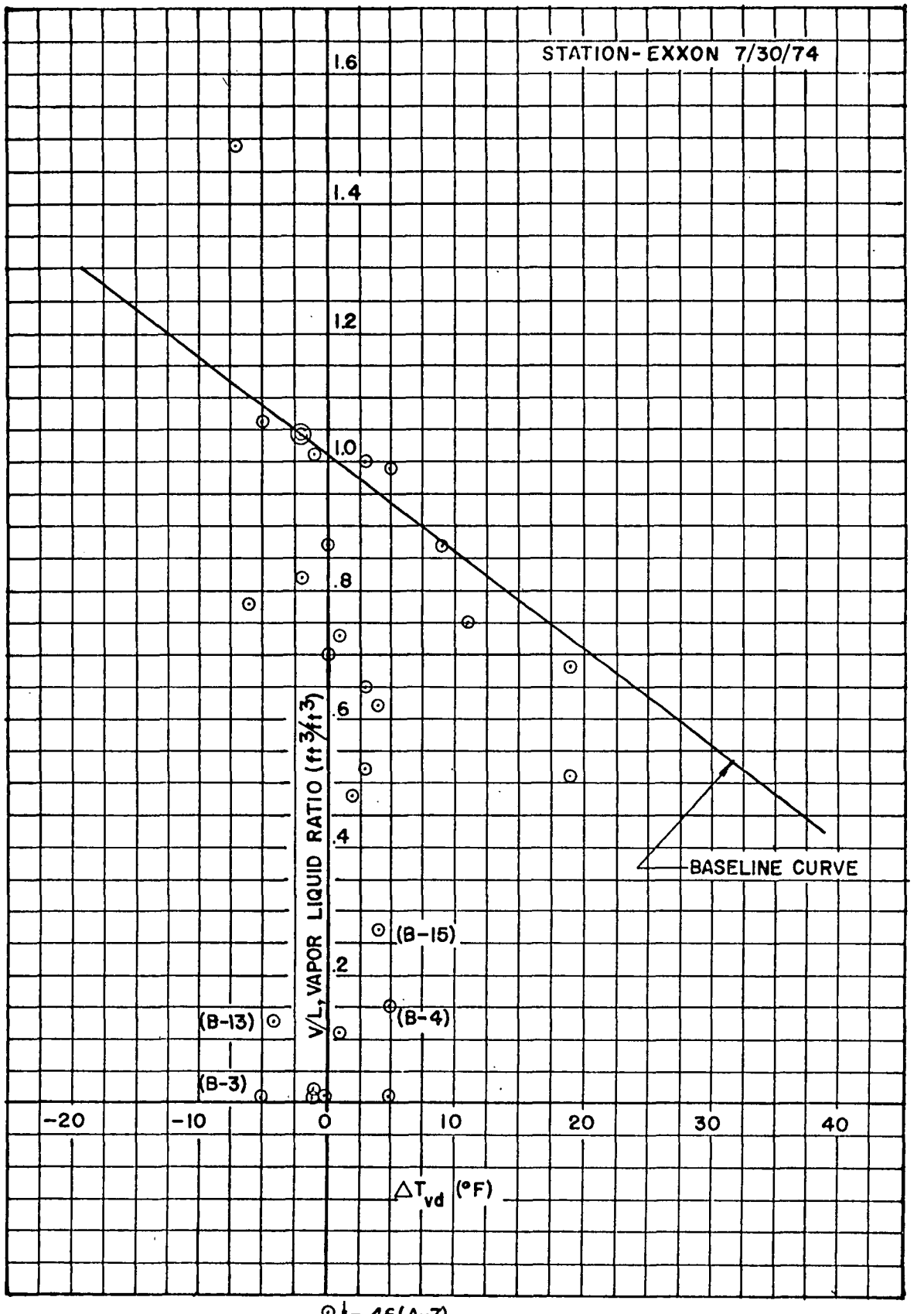


FIGURE 2- NON BASELINE DATA 7/30/74

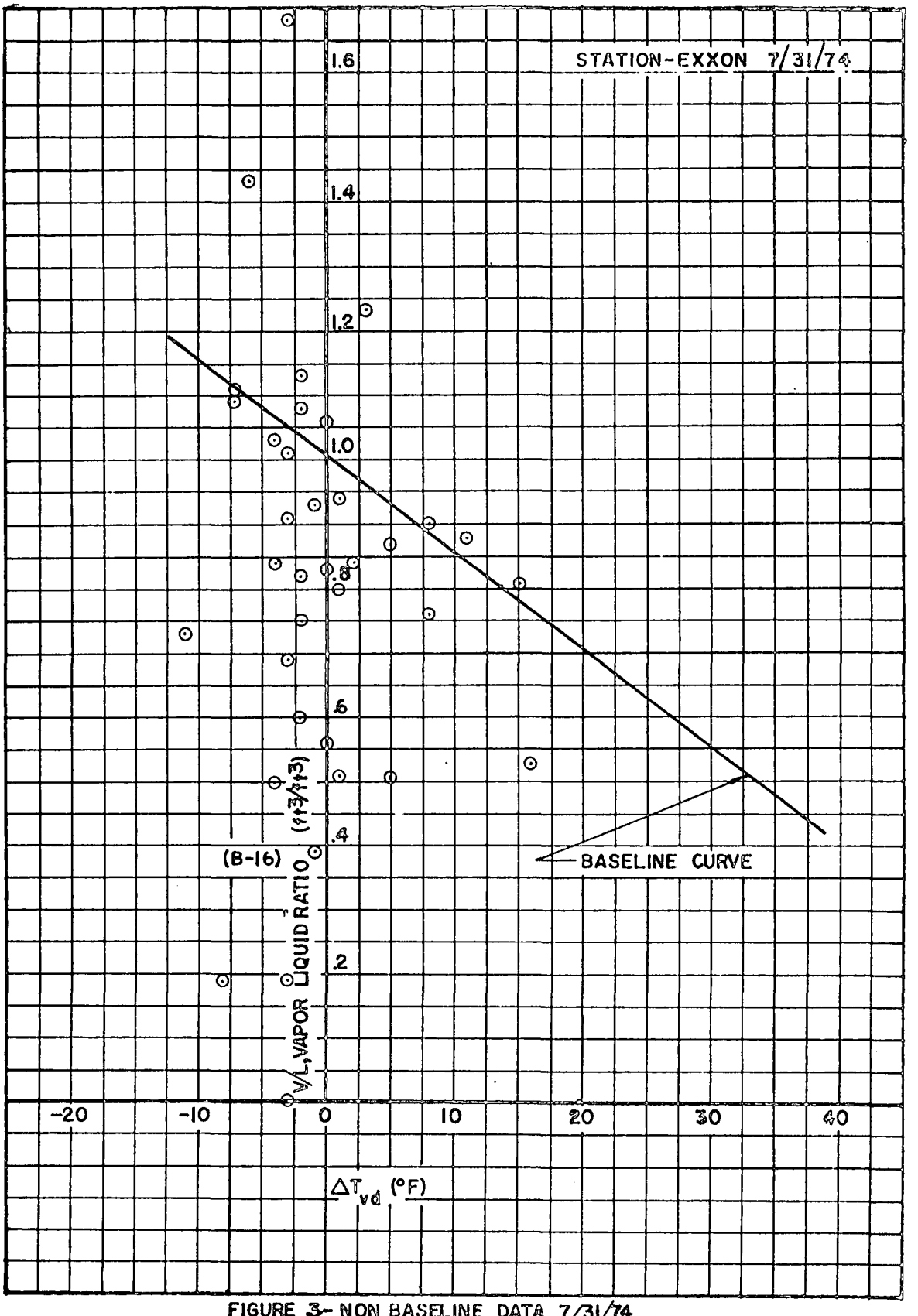


FIGURE 3- NON BASELINE DATA 7/31/74

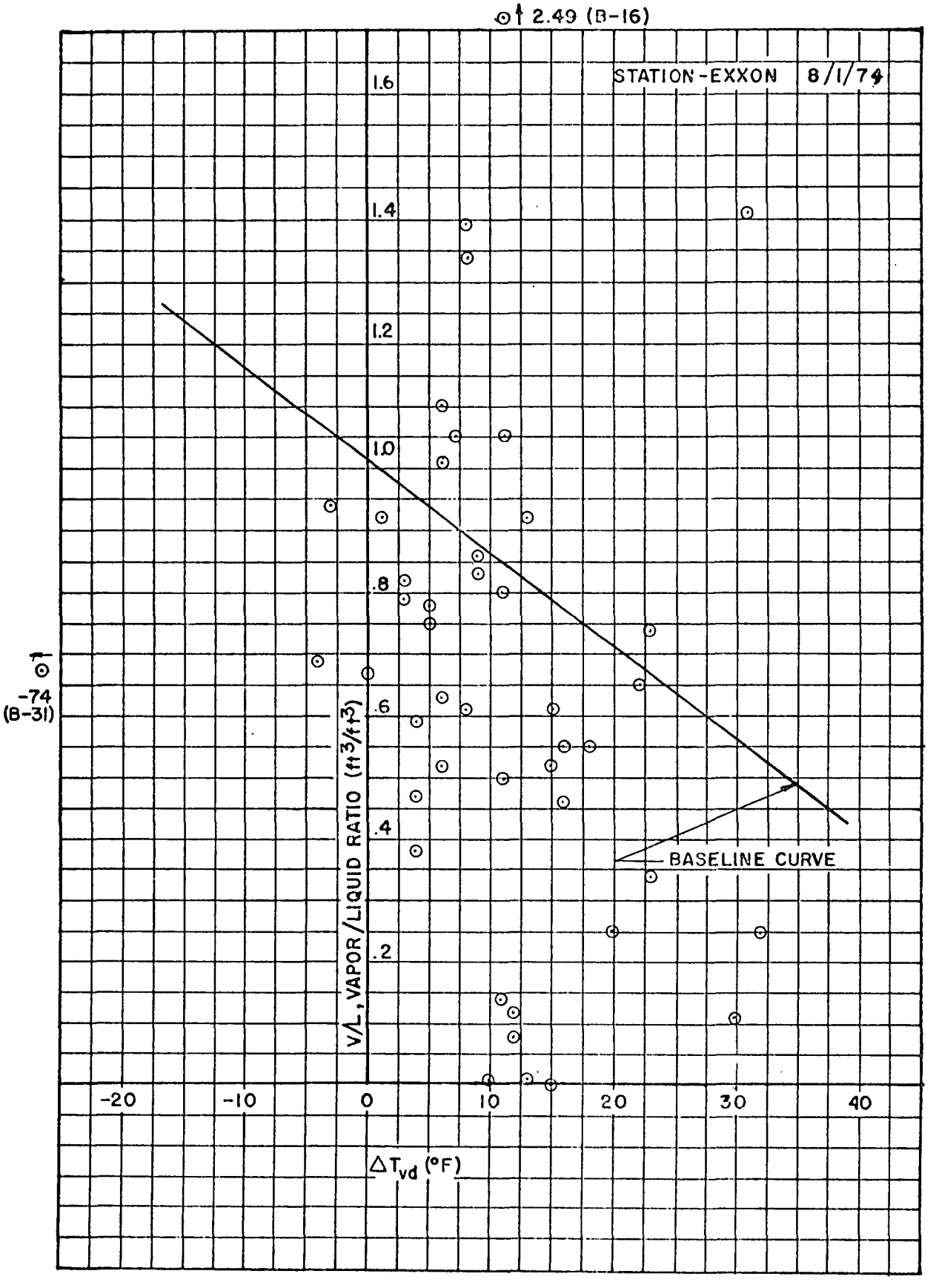
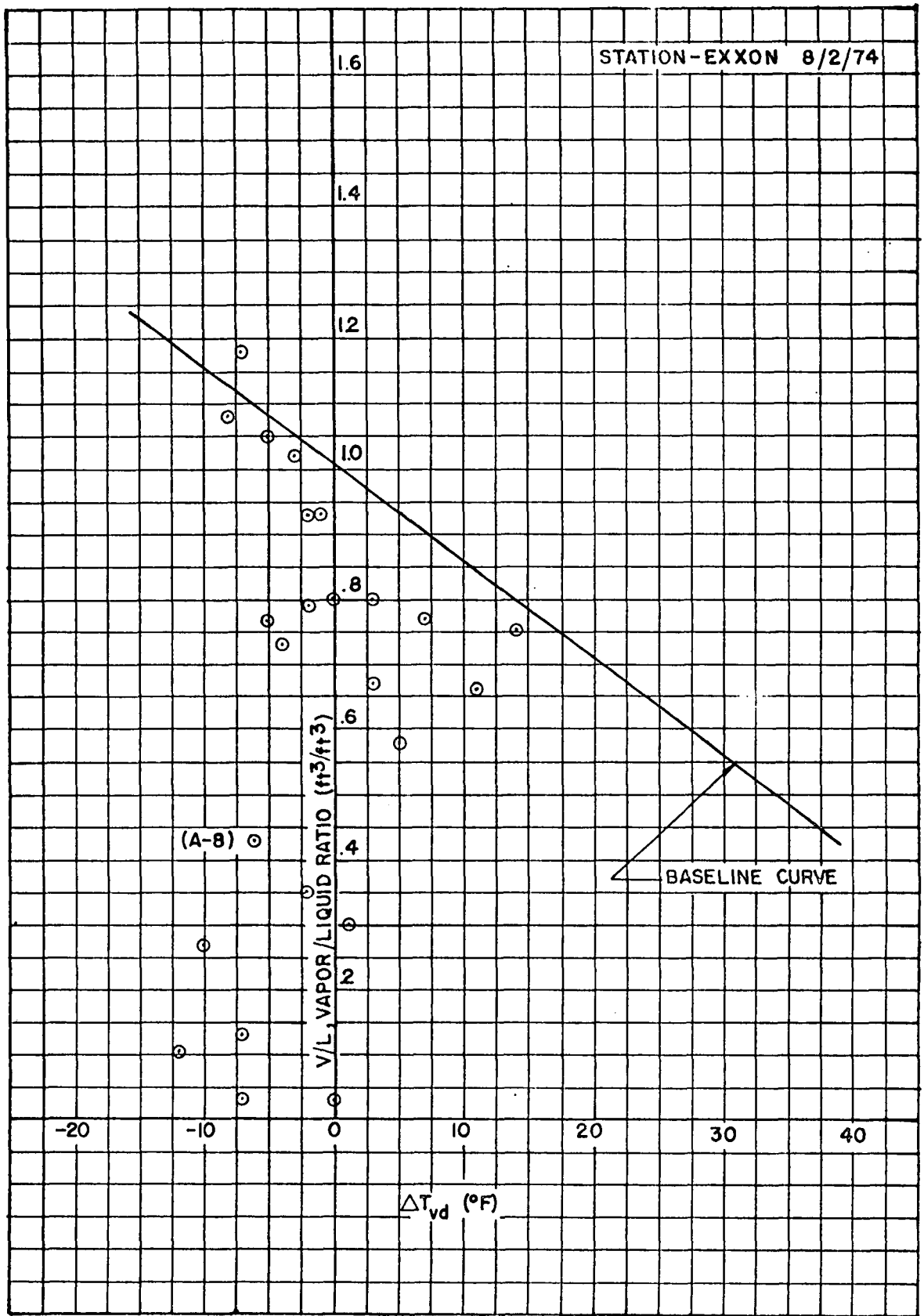


FIGURE 4 - NON BASELINE DATA 8/1/74



⊙ - 237 (A-30)

FIGURE 5 - NON BASELINE DATA 8/2/74

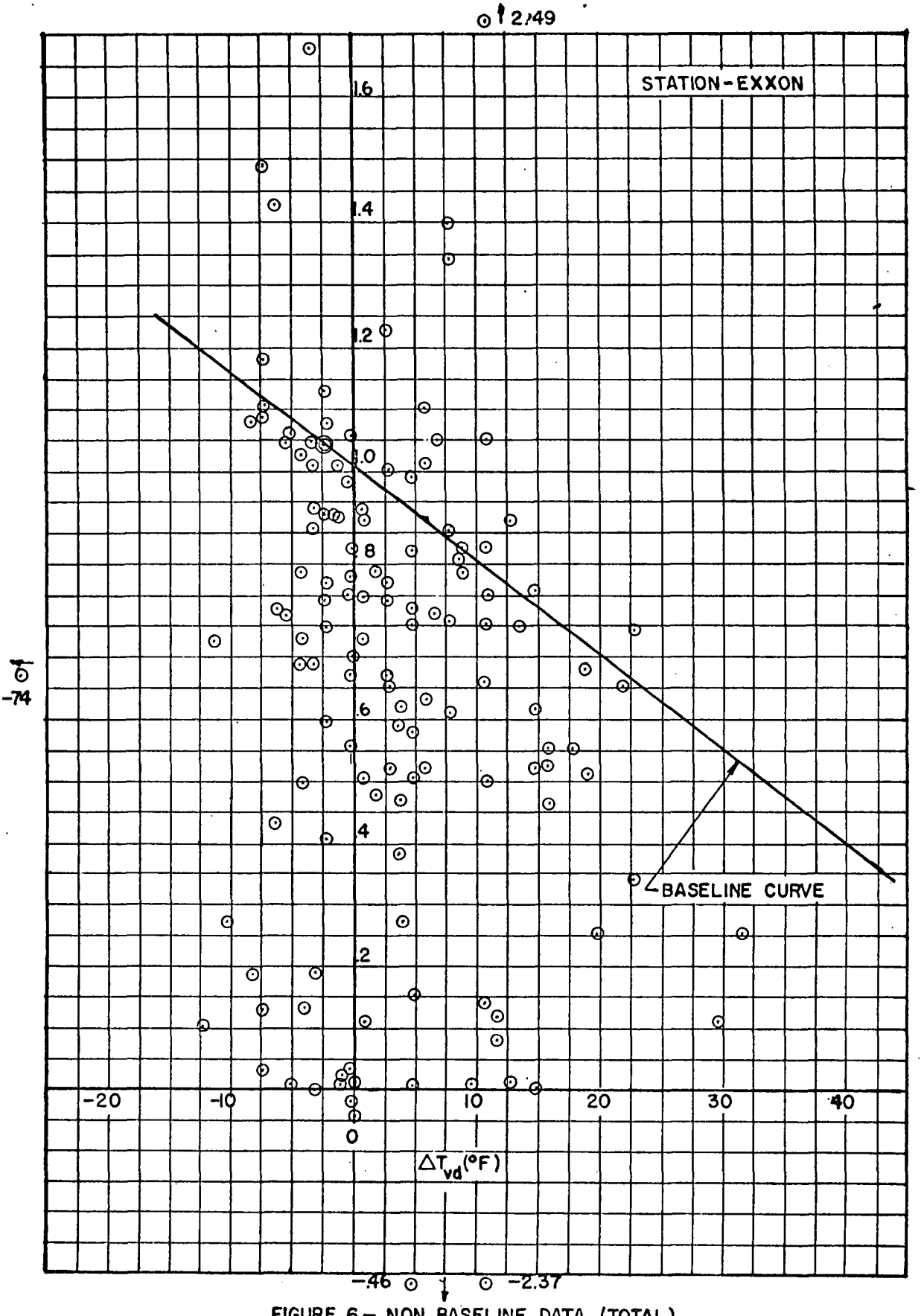


FIGURE 6 – NON BASELINE DATA (TOTAL)

E. Apparent Outlying Points

1. Baseline Data - The baseline data contains three (3) apparent outlying points (7/31, A-12; 8/1, A-18; and 8/2, A-11) indicated in Figure 1. Point 7/31, A-12 was probably due to an instance when the dry gas meter ran backwards without being noticed. Point 8/1, A-18 was probably due to the misreading of the dry gas meter index although the same results could have been produced if the dry gas meter had run backwards. Allowing for a misreading, point 8/1, A-18 would have a V/L ratio of 1.117. The occurrence of point 8/2, A-11 has no ready explanation unless a dry gas meter reading had been recorded incorrectly. If that were the case, then point 8/2, A-11 would have a V/L ratio of 0.873.

2. Non-Baseline Data - Because the data point scatter was so great, there were only two instances that could definitely be considered as apparent outlying points.

   Those points were 7/30, A-7 and 8/1, B-16. Only the first point can be identified as definitely outlying because for this vehicle the dry gas meter was observed to be running backwards.

   Two other known problems occurred with point 7/30, B-4 (dry gas meter running backwards) and with point 7/30, B-13 (kinked vapor return line). Additionally, the following points had occurrences of spit back: 7/30, B-3; 7/30, B-15; 7/31, B-16; and 8/2, A-8.

F. Vehicle Summary

Below is a summary of the vehicles tested and under which category each falls.

Date	Vehicles Tested	Baseline	Non-Baseline	Attempted Baseline
7/30/74	54	13	30	11
7/31/74	62	15	37	10
8/1/74	85	21	48	16
8/2/74	35	6	26	3
Total	236	55	141	40

G. Explosimeter Readings

Explosimeter readings for non-baseline automobiles are summarized below. The average would be 68% of the lower explosive limit.

Percent LEL	0	5	10	15	25	30	35	40	60	80	100
No. of Vehicles	31	3	5	1	2	1	2	2	3	2	89

H. Fueling Difficulties

There were five (5) occurrences of spitback of varying amounts, four (4) occurring at pump B. It is unknown why spitback occurred, but it may have been due to the configuration of the automobile fill pipes.

There were only two difficulties encountered that were due to the recovery system. One was being able to latch the vapor return sleeve so that the nozzle remained in the automobile fill pipe without assistance on certain models of automobiles. The

other difficulty was keeping the liquid and vapor return hoses from tangling. These difficulties did not present major problems however.

I. RVP, Distillation, O_2 & N_2 Results

The Reid Vapor Pressure (RVP) of volatile nonviscous petroleum products differs from the true vapor pressure of the sample due to some small sample vaporization and the presence of water vapor and air in the confined space. RVP samples were taken from 42 automobiles and from the underground storage tanks. RVP samples were taken in accordance with ASTM method D270-65 and determinations were made in accordance with ASTM method D323-72. Briefly, gasoline was withdrawn into a glass bottle, the bottle tightly capped, and then stored in an ice bath until delivery to the laboratory.

A frequency plot of Reid Vapor Pressures is shown in Figure 7. The data is listed in Table 1 as abstracted from Appendix C, pages C1 - C4. The mean vehicle fuel RVP was between 7.5 and 8.0. The Exxon "Regular" gasoline had an average RVP of 8.65 psi.

Distillations were performed on samples of underground storage tank contents as per ASTM method D86-67. The results of the distillations are included in Appendix C, pages C5 - C6.

Dissolved oxygen and dissolved nitrogen determinations were made by gas chromatography as per ASTM method D2504-67. These results are listed in Table 2 as abstracted from Appendix C, page C7.

All analyses were performed by the CHARLES MARTIN INSPECTORS OF PETROLEUM, INC., Richmond, California.

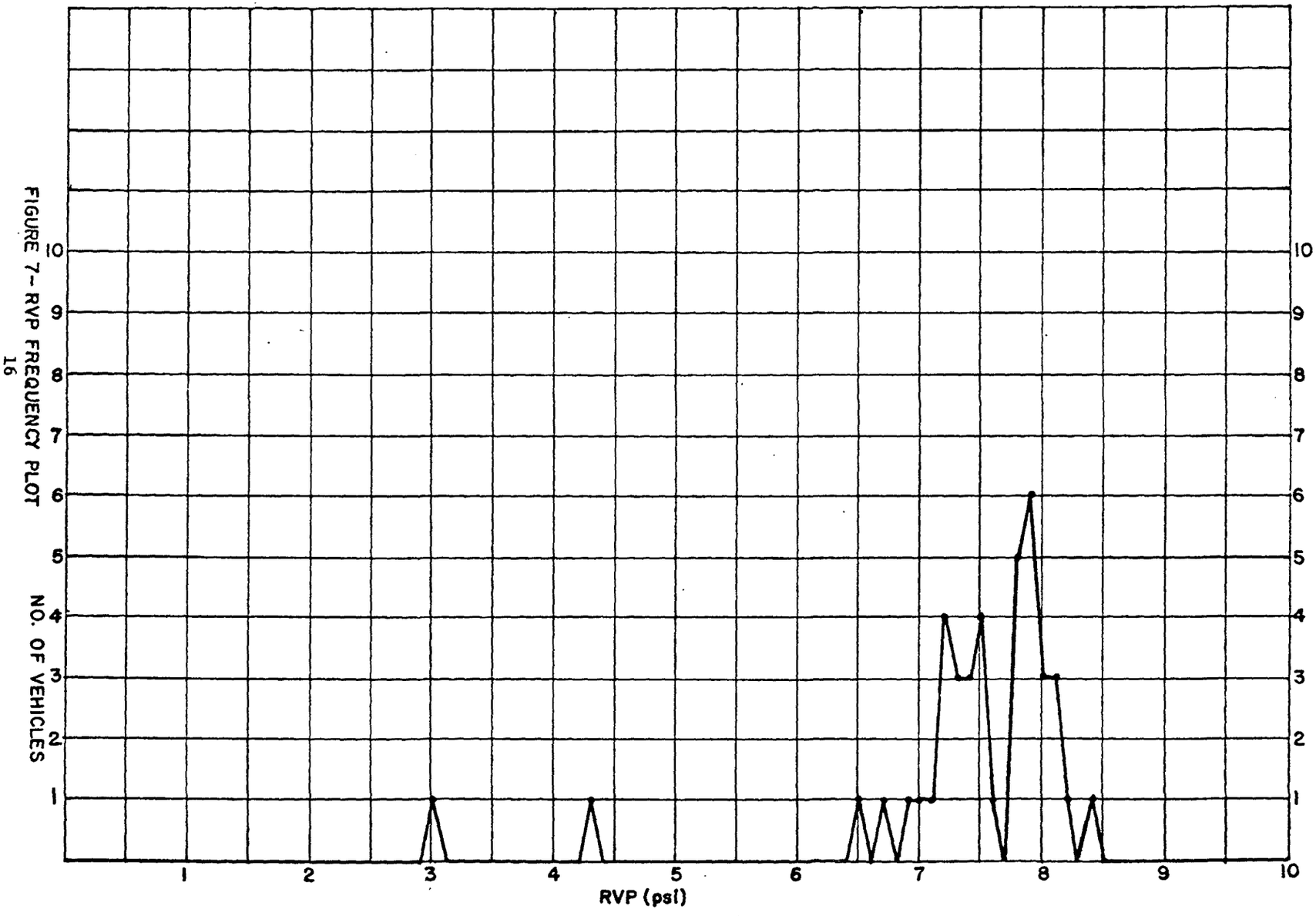


FIGURE 7- RVP FREQUENCY PLOT

LICENSE NO.	RVP	PUMP	DATE
CAL. 999KTP	7.9	A-03	7/30
CAL. Q30014	8.1	A-05	7/30
CAL. 55676H	3.0	A-15	7/30
CAL. 077CVO	6.9	A-17	7/30
CAL. C71170	7.2	A-19	7/30
CAL. 972BWL	8.1	A-22	7/30
CAL. ZPN472	7.5	A-27	7/30
CAL. AGH326	8.0	B-05	7/30
CAL. SDT582	7.8	B-10	7/30
CAL. 140FIW	8.2	B-14	7/30
CAL. 287JAR	7.9	B-25	7/30
CAL. 181CMC	7.9	A-01	7/31
CAL. 193BOF	8.4	A-03	7/31
CAL. XPU480	8.0	A-06	7/31
CAL. WDK111	8.1	A-12	7/31
CAL. 960KDV	7.9	A-16	7/31
CAL. 353EZC	7.4	A-21	7/31
CAL. 941GTS	7.2	B-04	7/31
CAL. MKB050	7.3	B-09	7/31
CAL. HOE171	7.9	B-15	7/31
CAL. VAA970	7.5	B-21	7/31
CAL. VSL292	6.5	B-27	7/31
CAL. 393GTA	7.5	B-30	7/31
NY 223YYJ	7.8	A-05	8/1
CAL. UCW618	7.8	A-13	8/1
CAL. UBW517	4.3	A-18	8/1
CAL. 703LBI	7.9	A-23	8/1
CAL. 377LDG	7.6	B-12	8/1
CAL. 27629W	7.2	B-15	8/1
CAL. 042DGZ	6.7	B-17	8/1
CAL. BZV648	7.1	B-19	8/1
CAL. 388525	7.8	B-23	8/1

TABLE 1 RVP ANALYSIS RESULTS

LICENSE NO.	RVP	PUMP	DATE
CAL. VXE295	7.5	B-27	8/1
CAL. 137FSM	7.2	B-29	8/1
CAL. 411CPL	7.4	B-34	8/1
CAL. 980BYX	7.3	B-39	8/1
CAL. DKL015	7.8	B-44	8/1
CAL. 420LBJ	7.0	A-01	8/2
CAL. 09483V	7.4	A-09	8/2
CAL. 57294L	7.3	A-18	8/2
CAL. 690JTC	8.0	A-26	8/2
EXXON REGULAR	8.7		
EXXON REGULAR	8.7		
EXXON REGULAR	8.8		
EXXON REGULAR	8.4		

TABLE 1 (CON'T)

EXXON REGULAR O_2 & N_2 ANALYSIS

DATE	TIME	DISSOLVED O_2 (ppm)	DISSOLVED N_2 (ppm)
7/31/74		< 10	58
8/1/74	8:00 PM	< 10	57
8/2/74	12:30 PM	< 10	58

TABLE 2 DISSOLVED OXYGEN & NITROGEN RESULTS

III. PROCESS DESCRIPTION AND OPERATION

A. Station Description

The Exxon retail station at 390 W. Jackson St., Hayward, California has two groups of covered pump islands as illustrated in Drawing 1. Due to the gasoline shortage of 1973, the group of pumps designated as Group I were shut down and are no longer used. The islands designated as Group II were modified for vapor recovery during 1974. There are two dispensers for each of the three grades of gasoline (regular, premium, unleaded) sold at this station. The vapor return lines for all six dispensers are manifolded together at the island and return to the storage tank area through a common line. At the storage tanks, all three are manifolded together. All three tanks are then vented to atmosphere through one two-inch riser. This riser is equipped with a cap with a 1/2" hole for atmospheric breathing by the underground tanks. The piping layout is shown in Drawing 2.

Each underground tank is equipped with a connection for vapor recovery during bulk deliveries.

For vapor collection during automobile fueling, each dispenser is equipped with an OPW-7VN vapor recovery nozzle. This nozzle uses a bellows (boot) arrangement for flexibility in mating at the vehicle fill-pipe. To prevent vapor losses while the dispenser is not in use, a mechanical check valve arrangement is used. The design is such that when the dispenser is not in use, the annular opening in the face of the rubber boot will seat against a collar on the liquid spout. When the nozzle

spout is forced into a vehicle fillpipe, the boot is forced back from the collar and the vapor return path is opened.

B. Process Operation

While all dispensers were equipped with vapor recovery equipment, testing was performed on only two regular grade dispensers. The pump attendants during the testing were the normal station attendants who followed regular procedures except when instructed otherwise. The attendants had approximately two weeks experience with the nozzles prior to testing. If the automobile being fueled were to be classed as an attempted baseline, the pump attendant was instructed to hold the dispensing nozzle in such a way so as to provide intimate contact between the automobile fill pipe and the vapor return bellows (force fit). On all other automobiles the nozzle was inserted to the "latched" position and was left unattended while the attendant performed his ancillary duties, or hand-held when nozzle configuration or the amount of fuel to be dispensed made it impractical to latch the nozzle. It was noticed that the performance of some of these duties, such as windshield cleaning, caused the automobile to rock, which in turn occassionally caused intermittent gaps at the fill pipe/bellows interface.

Usually the dispenser was set at the middle notch with a rate of approximately five (5) gallons per minute. However, other dispensing rates were sometimes used.

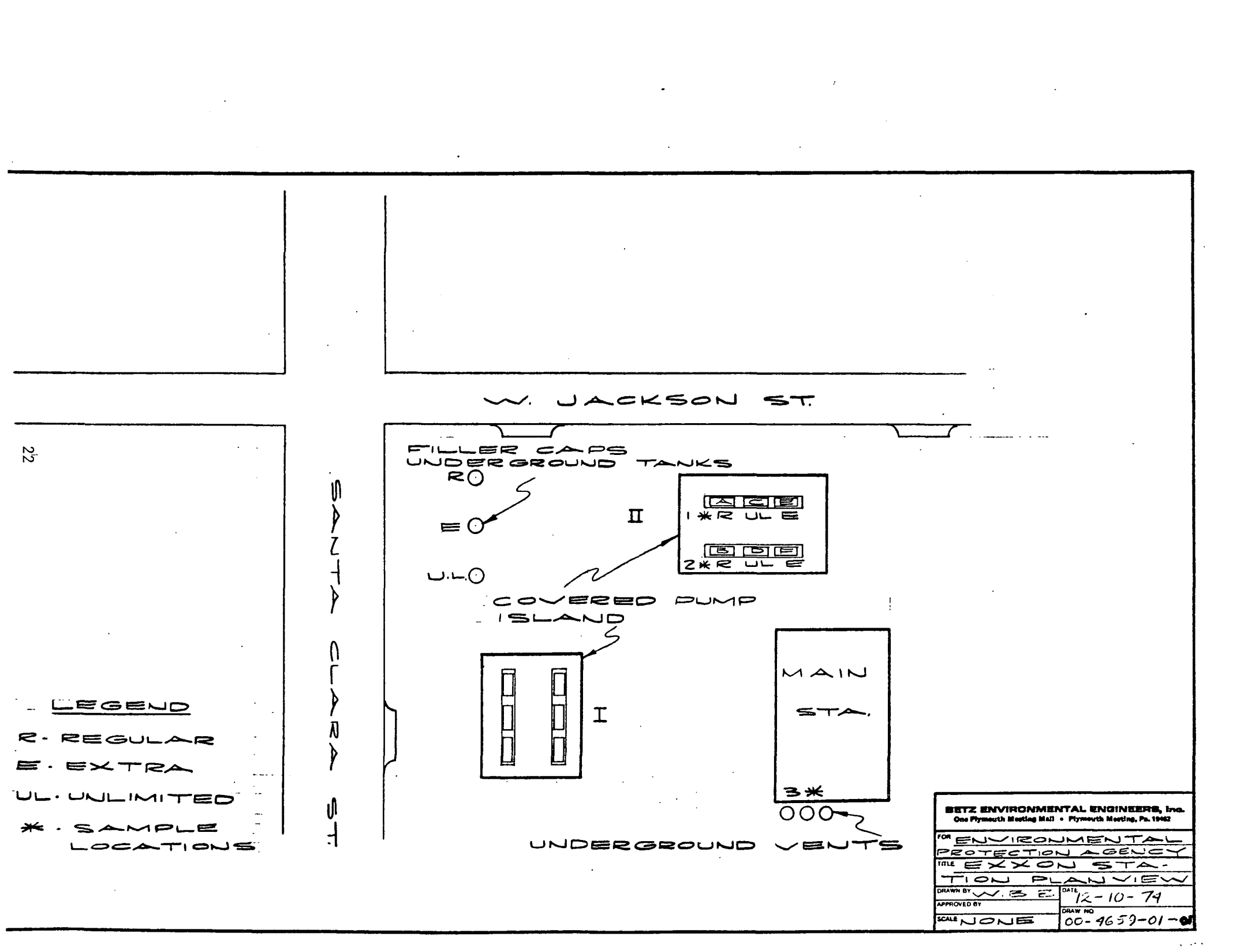
During the periods that testing was performed, the total gasoline sales in gallons were as follows:

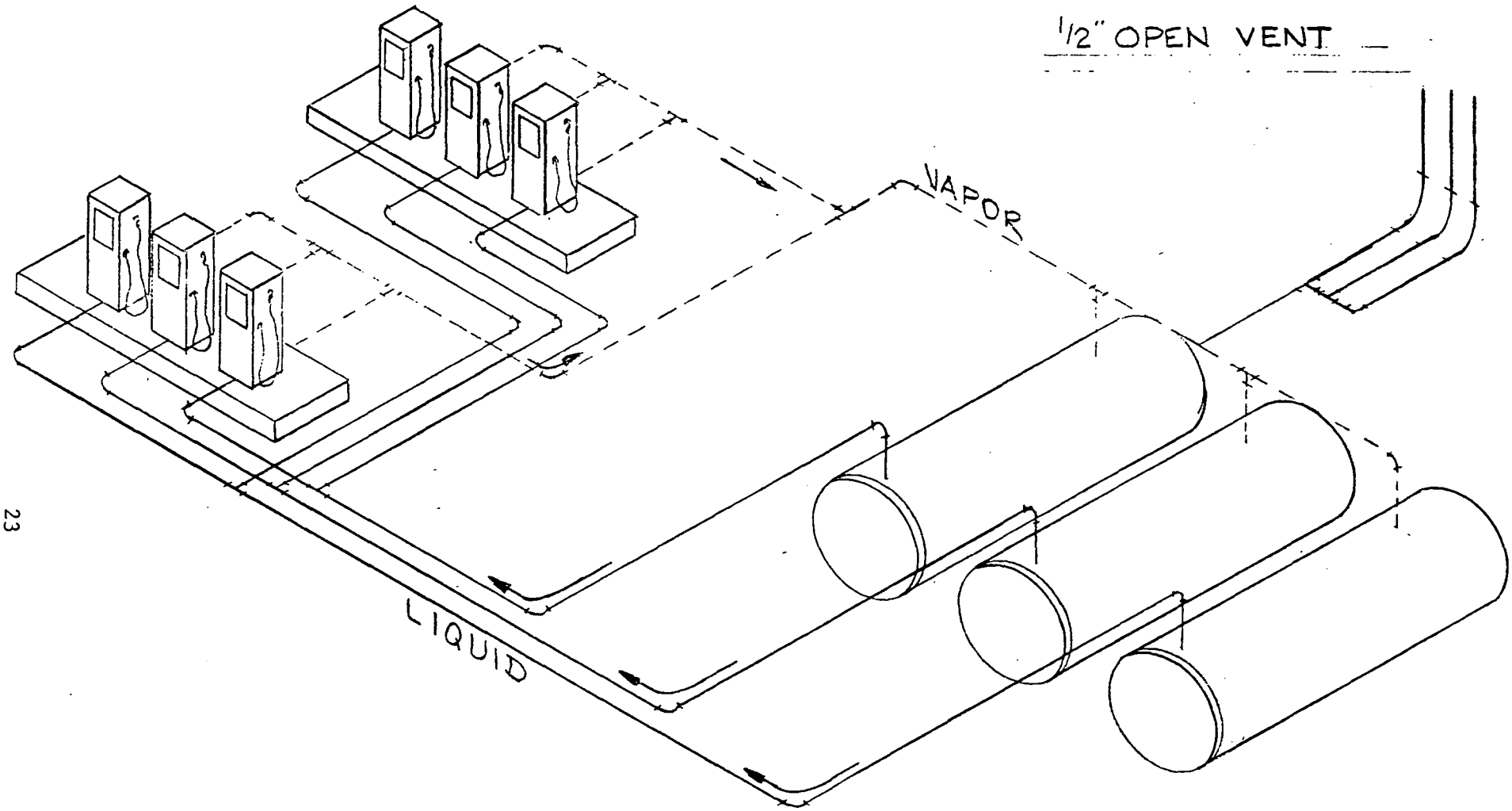
Date	Regular	Unleaded	Extra	Total
7/30	784.6	37.4	228.4	1050.4
7/31	853.7	26.7	249.6	1130.0
8/1	914.8	10.7	366.6	1292.1
8/2	465.8	29.9	110.6	606.3
Total	3018.9	104.7	955.2	4078.8

The ambient temperature at this location varied from the low to mid 50's in the early mornings, rising to the mid 70's by middle afternoon, and then cooling to the 60's around sundown. Testing was scheduled as follows in order to obtain data during each temperature condition.

Date	Test Time
7/30	11:00 am - 5:30 pm
7/31	9:30 am - 3:30 pm
8/1	12:50 pm - 7:45 pm
8/2	8:00 am - 12:00 noon

The weather conditions were generally the same for the four days of testing.


W. JACKSON ST.
SANTA CLARA ST.
FILLER CAPS
UNDERGROUND TANKS
R
E
U.L.
II
1*RULE
2*RULE
COVERED PUMP
ISLAND
I
MAIN
STA.
3*
UNDERGROUND VENTS
LEGEND
R- REGULAR
E- EXTRA
UL- UNLIMITED
* - SAMPLE
LOCATIONS
BETZ ENVIRONMENTAL ENGINEERS, Inc.
One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462
FOR ENVIRONMENTAL
PROTECTION AGENCY
TITLE EXXON STA-
TION PLAN VIEW
DRAWN BY W.B.E.
DATE 12-10-79
APPROVED BY
DRAW NO 00-4659-01-
SCALE NONE

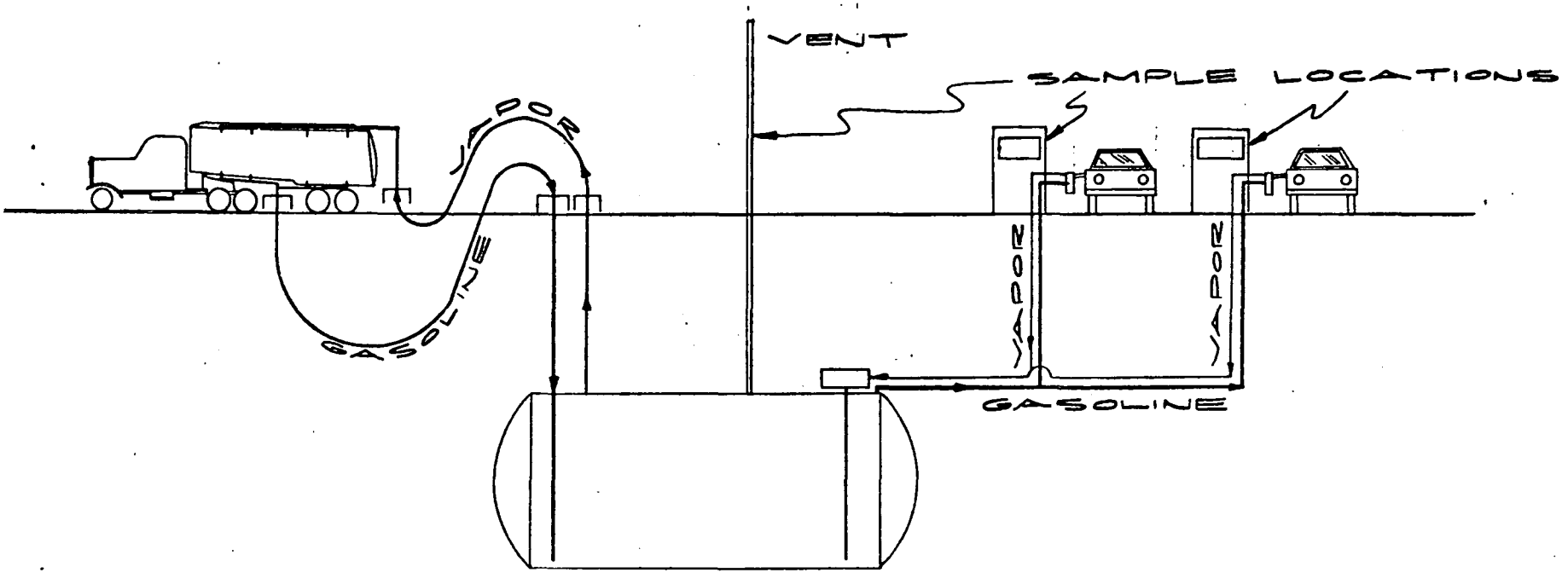


BETZ ENVIRONMENTAL ENGINEERS, Inc.
One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462

FOR ENVIRONMENTAL PROTECTION AGENCY	
TITLE EXXON STATION PIPING DIAGRAM	
DRAWN BY A.L.F.	DATE 3-25-75
APPROVED BY	DRAW NO 00-4659-01-02
SCALE NONE	

IV. SAMPLING LOCATIONS

Sampling locations are indicated in Drawing No. 3. Sampling locations were at the two regular grade gasoline dispensers and at the atmospheric vent of the underground storage tanks. The other group of pump islands remained closed.



BETZ ENVIRONMENTAL ENGINEERS, Inc. One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462	
FOR ENVIRONMENTAL PROTECTION AGENCY	
TITLE SAMPLING LOCATIONS DIRECT DISPLACEMENT SYSTEM	
DRAWN BY W.B.S.	DATE 12-10-74
APPROVED BY	DRAW NO (C0-4657)-C1-03
SCALE NONE	

V. SAMPLING PROCEDURES

A. General

RADIAN CORPORATION was responsible for customer relations. Once a customer consented to the test, the car would be directed to one of the two testing locations. The testing procedures followed were essentially identical to those used in earlier EPA testing in the San Diego, California area[1]. These procedures are summarized below:

1. Record name of station, date, pump number, license number, make of automobile, model and year for every car sampled. Record also whether the automobile was recently driven in local traffic or on highways and the approximate number of miles driven prior to entering the station.
2. Measure and record the vehicle tank liquid temperature prior to filling.
3. Record the initial dry gas meter reading in the vapor return line.
4. Obtain liquid samples for R.V.P. analysis from every fifth automobile tested.
5. Monitor and record during vehicle filling the hydrocarbon concentration in the vapor return line. Also monitor around fillneck with the explosimeter and record reading.
6. Monitor and record the returned vapor temperature and the dispensed gasoline temperature.
7. Measure and record the time required for dispensing of gasoline -- starting when the nozzle is turned on and ending when the nozzle automatically shut off. Record any event of spillage or spitback.

[1]Test evaluation of gasoline transfer vapor recovery system, November 1974, Report No. 74 GAS 1 prepared by TRW, Inc. under EPA Contract No. 68-02-0235.

8. Record the total number of gallons dispensed for each automobile.
9. Monitor and record the pressure in the vehicle tank after filling for every other automobile, if possible.
10. After filling the automobile, record the final dry gas meter reading in the vapor return line.

If the automobile were to be considered as a potential baseline automobile, as determined by RADIAN CORPORATION, additional testing was performed. The philosophy of "baseline" is those automobiles for which 100% of the potential vapors are returned. To be considered as baseline a vehicle must have had no leaks in its fuel system and must have had a tight fill pipe/nozzle interface. To obtain a leak free fuel system, any known vents were plugged prior to fueling. To obtain a tight fill pipe/nozzle interface, the nozzle was force fit. If an explosimeter check revealed no leakage around the fill pipe/nozzle interface, the vehicle was directed to another area where a leak check would be performed to determine any leakage in the automobile's fuel system. The leak check procedure is outlined as follows (See Drawing No. 6):

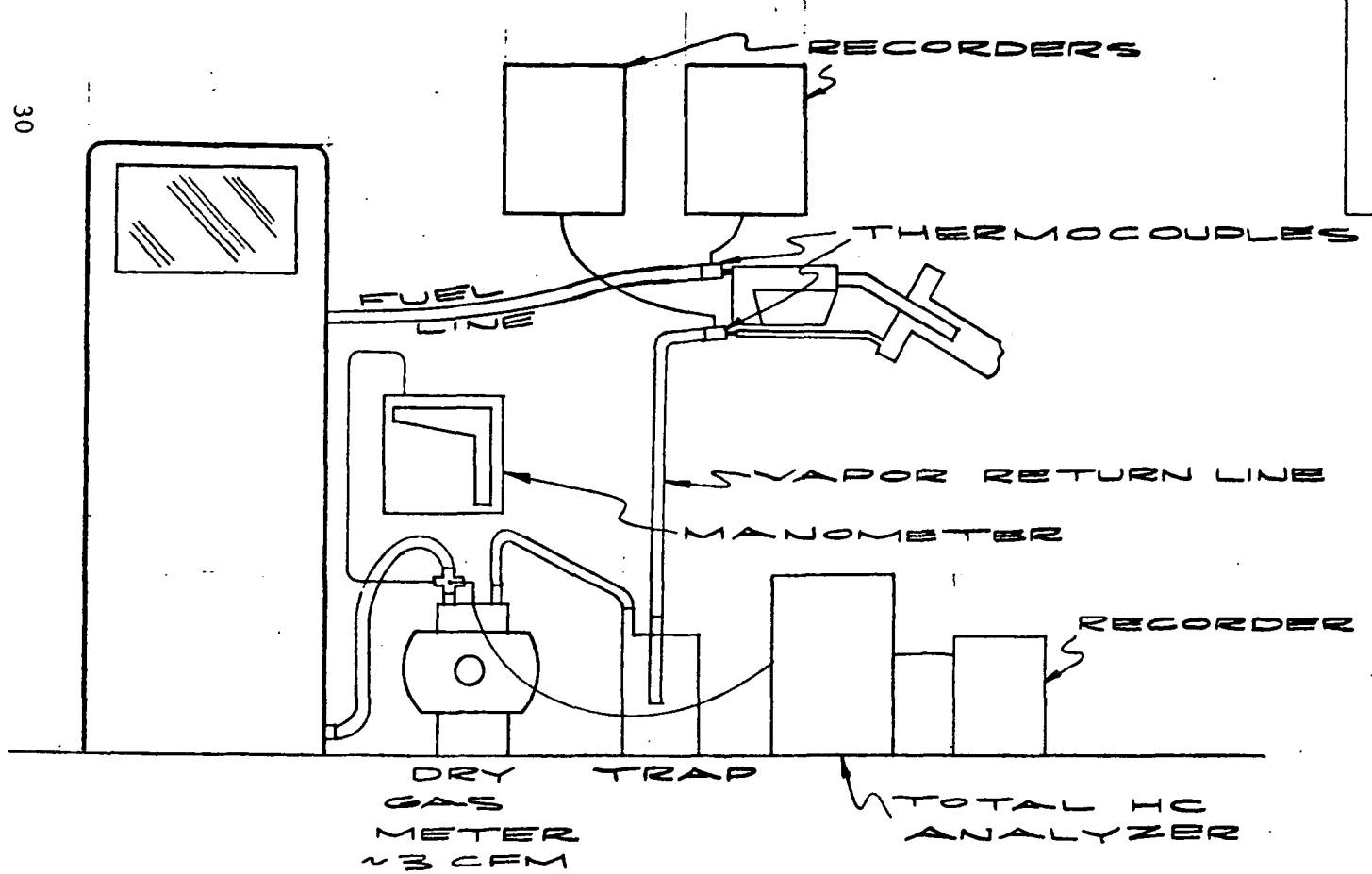
1. Connect flow valve to nitrogen tank so that flow can be controlled by manipulation of valve. Mount on mounting board.
2. Attach 12" piece of Tygon tubing to outlet of valve and the other end to one leg of "T".
3. Mount 12" glass tube on the mounting board with clamp and attach top of glass tube to "T" with small piece of Tygon tubing.

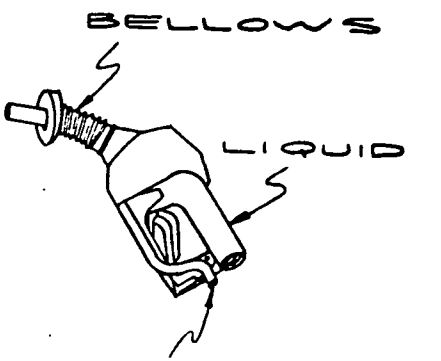
4. Use 2' piece of Tygon tubing to connect remaining leg of "T" to the inlet of the Rotameter. Mount meter on board.
5. With remaining Tygon hose, connect outlet of flow meter and the rubber seal for the vehicle fillneck connection. Mount the flow meter in a vertical position.
6. Fill liquid holding tank to at least 6" depth with water.
7. Place glass tube open end beneath the surface of the water in the holding tank and measure the "H". (See Drawing 6). For the tests make one run with the H at 2" or whatever the maximum H was when determining vehicle pressure tank conditions. Mount tube with clamp on board.
8. Plug known fuel system vents.
9. Place rubber seal over open fillneck and hold firmly to avoid leaks at the seal.
10. Allow nitrogen to flow by opening the valve until bubbles appear at the open end of the tube submerged in the holding tank.
11. After 30 seconds, record flow rate from flow rate meter.
12. If no flow at meter, vehicle considered "baseline".
13. If flow, vehicle considered "attempted baseline."

If a leak were found around the fill pipe/nozzle interface, no leak check would be performed and the automobile would be considered as "attempted baseline". Attempted baseline vehicles were not used in any calculations.

The testing equipment for the gasoline dispensers is shown in Drawing No. 4. Nozzles used in the testing were manufactured by the DOVER CORPORATION, OPW DIVISION.

The underground tank vent testing equipment is indicated in Drawing No. 5. The vent was modified to allow unrestricted inbreathing by a pressure switch set for -0.15 in. H_2O which controlled a normally closed solenoid valve which opened to the ambient atmosphere. Alternatively, a pressure switch set for +0.15 in. H_2O controlled a normally closed solenoid valve which vented through the sampling train.

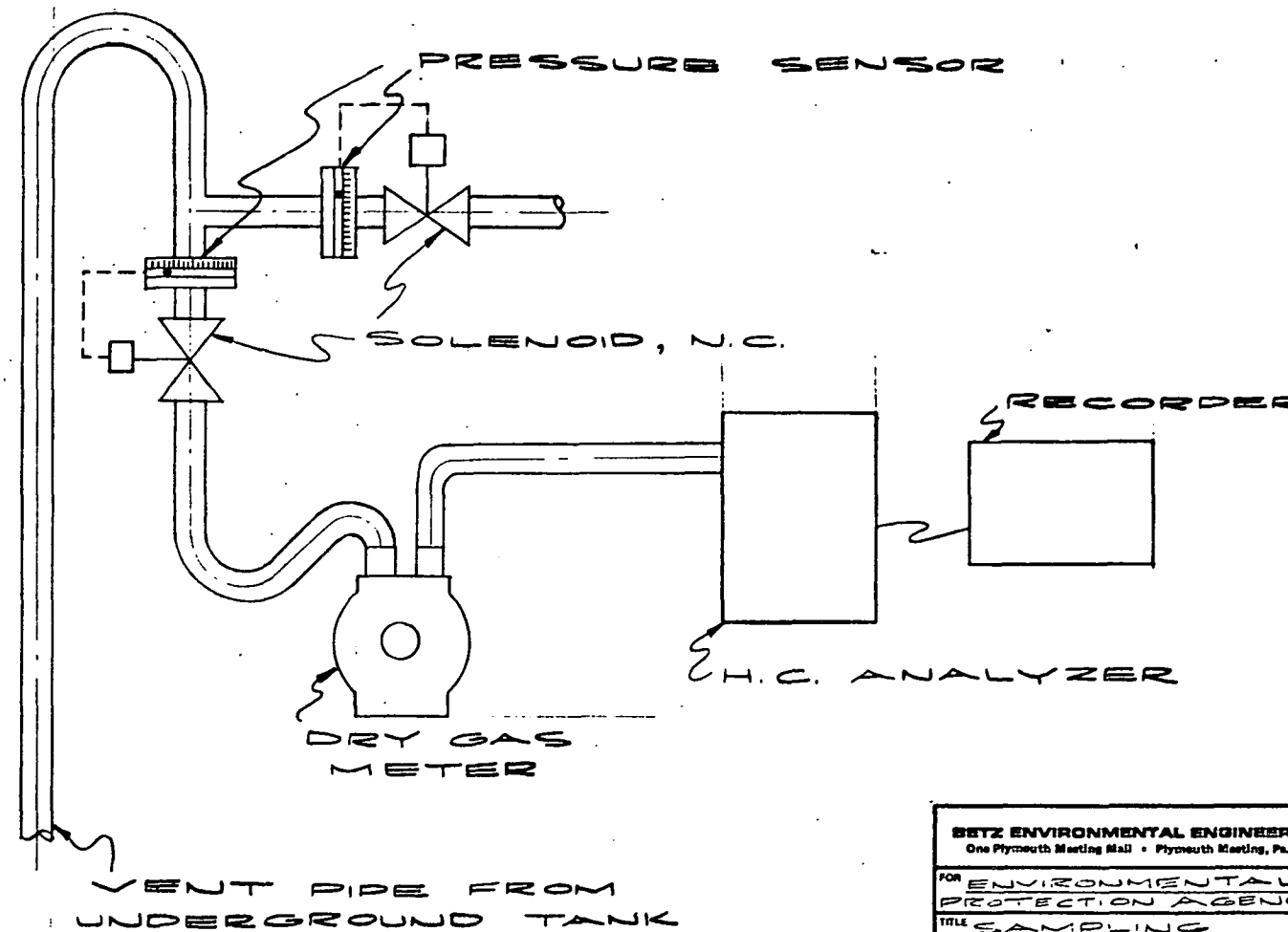




NOZZLE DETAIL

BETZ ENVIRONMENTAL ENGINEERS, Inc.
One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462

FOR	ENVIRONMENTAL PROTECTION AGENCY
TITLE	SAMPLING SCHEMATICS (PUMP)
DRAWN BY	W.B.B
APPROVED BY	
SCALE	NONE
DATE	12-10-79
DRAW NO	CO-4657-01-CA



BETZ ENVIRONMENTAL ENGINEERS, Inc.
One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462

FOR	ENVIRONMENTAL PROTECTION AGENCY
TITLE	SAMPLING SCHEMATIC (VENT)
DRAWN BY W.B.B.	DATE 12-10-74
APPROVED BY	DRAW NO CC-4659-01-05
SCALE NONE	

B. Instrumentation Problems

While the instrumentation was not complex, there were some problems. Most of these difficulties can easily be avoided in the future with simple precautions, while some are not easily solved. The parameters measured were pressure, temperature, volume, and, indirectly, mass of hydrocarbons:

1. Pressure - Two pressures were of interest; one, the system pressure, was obtained at the outlet of the dry gas meter, (it was recorded for every automobile) and the other, the automobile tank pressure, was recorded for baseline automobiles only and was usually obtained at the vehicle carbon cannister inlet.

   A possible alternative for determining the system pressure, would be through the use of a pressure transducer because the manometer, being located at the gasoline pumps, was subject to jarring, thereby causing a loss of level. The rubber connecting tubing was also easily pinched or pulled off. It might even be better if the pressure were obtained at the underground tank vent. This would give a much closer measurement of system pressure because the negative influences of dry gas meter, sample pump, and mechanical problems would be eliminated.

   Since the automobile tank pressure was obtained only for baseline automobiles, it was subject to the fluctuations of a hand held nozzle. Depending on the time expended in pumping the gasoline, the rate of pumping, the constancy of the rate of pumping, the firmness of the forced fit,

and the relative temperatures of the dispensed gasoline and the vehicle tank, a steady pressure state may not have been reached. Usually the maximum pressure was recorded. If a real time analysis of this pressure were desired, a pressure transducer with recorder should be substituted.

2. Temperature - Four temperatures were of interest: underground tank, vehicle tank, dispensed gasoline, and returned vapor. The underground tank and vehicle tank temperatures were obtained with a digital pyrometer of high accuracy and repeatability.

   The inputs for the dispensed gasoline and returned vapor recording pyrometers were provided by resistance bulbs located at the gasoline dispensing nozzle. The sensing elements extended about three (3) inches above the nozzle and were quite prone to bending during normal gasoline dispensing operations. Additionally, the connecting wires were constantly under strain and in some instances were broken, even though every effort was made to keep the strain off the wires and probes. There were times when the recording pyrometers gave obviously erroneous readings. The suspected cause of these bad readings was the above mentioned strain. It is possible, although unknown, that this strain could have caused less obvious erroneous readings. It is proposed that these temperatures be sampled at other points, specifically that the returned vapor temperature be sampled at the dry gas meter and that the dispensed gasoline

temperature be sampled at the base of the pump. It is felt that there are two distinct advantages to this change: Firstly, it will eliminate equipment abuse thereby insuring more accurate readings and preventing down time. Secondly, by taking temperature readings physically closer to the volume measurement points, a better temperature/volume correlation is possible . The disadvantage is that these temperatures can no longer be considered as nozzle temperatures. However, it is doubtful that there is a significant temperature gradient in the hose lines but rather that a steady state zero gradient condition would be quickly reached.

3. Volume - No problems were encountered with the dry gas meter per se. However, there were two (2) times when the dry gas meter was observed running backwards. Both occurrences were on July 30, tests A-7 and B-4. Various theories for this anomaly exist, but to B.E.E.'s knowledge, no solution has been proposed. It is unknown how often this phenomenon occurred undetected.

4. Mass of Hydrocarbons - The mass of hydrocarbons in the vapor return line and vent was to be determined from the percentage of hydrocarbons on a volume basis. This percentage was measured with a Beckman Model 400 Hydrocarbon analyzer, using the flame ionization principal. To eliminate the need for a complicated dilution system (required because of the expected high concentrations, 50-75% by volume, of hydrocarbons), a longer

sample capillary was installed in series with the existing capillary prior to instrument use. The length of this column was recommended by BECKMAN INSTRUMENTS, INC., to be approximately twenty (20) feet with the theory being that by increasing the length of the capillary and by decreasing the sample pressure,a smaller sample will be delivered to the flame ionization detector (FID) thus allowing samples of very high concentrations to be determined without flame saturation. Normally, the BECKMAN 400 Unit as shipped can be used to determine concentrations only as high as 0-4% by volume before flame saturation occurs.

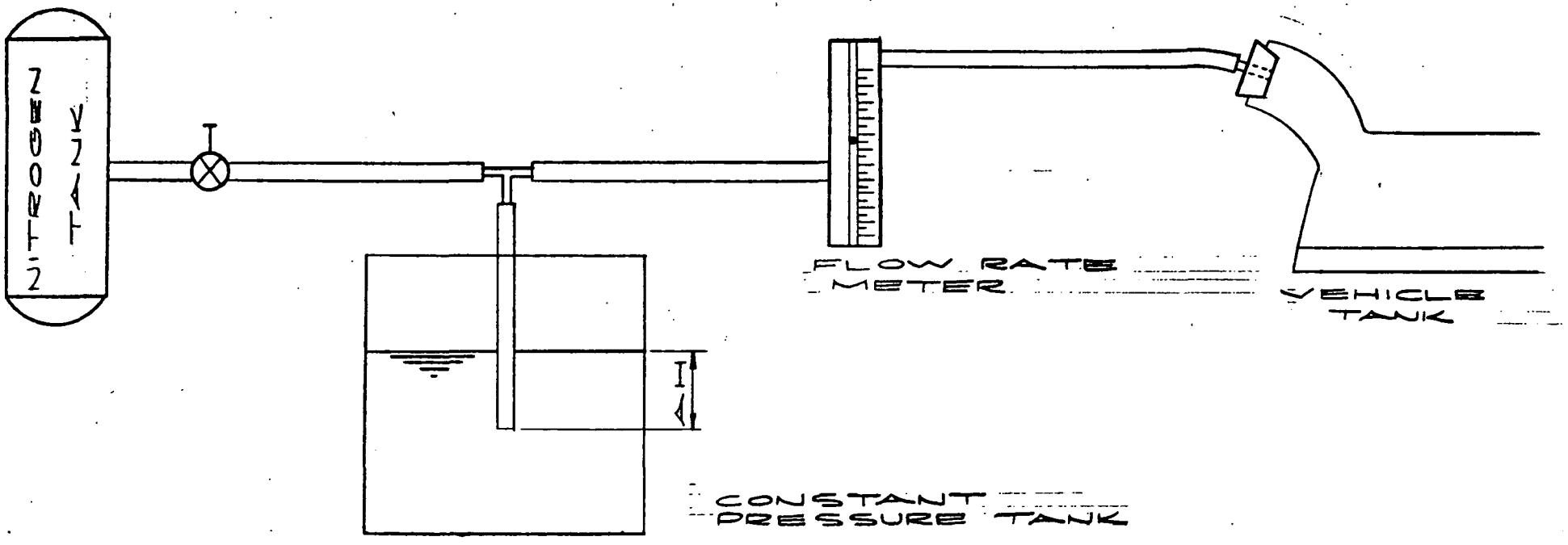
Propane was chosen as the calibration gas becuase its molecular weight is close to that of gasoline. The propane calibration gas was obtained in cylinder sizes comparable to those of methane. Unfortunately, the quantity of propane in the cylinders was insufficient due to the fact that propane liquifies at about 100 psi. The compressed gas supplier could not deliver sufficient quantities of propane quickly enough and methane, which was more easily supplied, was substituted as the calibration gas.

Both speed and magnitude of analyzer response are affected by the type of hydrocarbon in the sample. Magnitude of the analyzer response to an atom of carbon depends on the chemical environment of this atom in the molecule. The characteristic response of a given type of atom may be expressed approximately by a value designated as the "effective car-

bon number". The effective carbon number of a particular type of carbon atom is defined as the ratio of the instrument response caused by an atom of that type and the instrument response caused by an aliphatic carbon atom. To determine the exact effective carbon number of propane it is necessary to perform a calibration of methane versus propane. Because of supply problems, it was decided to perform this calibration in our laboratory.

When this calibration was attempted, completely erroneous data was obtained. The data indicated that the instruments were operating in a saturated condition, that is, an increase in sample concentration did not cause an increase in analyzer response. However, there was no immediate explanation of why saturation was encountered. A thorough overhaul by BECKMAN INSTRUMENTS, INC. revealed that the polarizing electrodes had corroded. With no electric field guiding the ions to the collector, the ions migrated at random, thereby giving the analyzer an almost flat response.

The primary reason that this condition was not discovered during the sampling program was the fact that only a single gas was used for calibration. A secondary reason was unfamiliarity with the use of the longer capillary and lower sample pressures. It is recommended that calibrations be performed with two (2) widely separated concentrations of calibration gases.



BETZ ENVIRONMENTAL ENGINEERS, Inc. One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462	
FOR ENVIRONMENTAL PROTECTION AGENCY	
TITLE BASELINE CHECK APPARATUS	
DRAWN BY W.B.	DATE 12-10-79
APPROVED BY	JOB NO 60-4659-01-06
SCALE NONE	

TEST RESULTS

APPENDIX A

STATION- EXXON DATE- 7/30/74 AVE. UNDERGROUND TANK TEMP- 69.0 F

PUMP	TIME	LIC. NO.	MAKE	MODEL	TYPE OF DRIVING	DISTANCE TRAVELLED	LK CHK RESULT	RVP	EXPLOS.	NOZZLE FIT	SPITBACK
A-01	11:17AM	CAL -78RFJN	CHEV	MONTE CARLO	LOCAL	0.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-02	11:22AM	CAL -12169M	DODGE	72 TRADESMAN	LOCAL	0.MI.	NO-ATB	0.0	0.0	FORCE	
A-03	11:31AM	CAL -999KTP	74 FORD	PINTO	LOCAL	0.MI.	PS-BSL	7.9	0.0	FORCE	NO
A-04	11:55AM	CALF-NKT488	65 VW	BUG	HIGHWAY	26.MI.	NO-NBL	0.0	100.0	POOR	NO
A-05	12:03PM	CAL -Q30014	CHEV	EL CAMINO	LOCAL	0.MI.	PS-BSL	8.1	0.0	FORCE	NO
A-06	12:10PM	CAL -115VPY	70 PONTIAC	FIREBIRD	HIGHWAY	10.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-07	11:22AM	CAL -YHW771	69 VW	BUG	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-08	12:47PM	CAL -WKS889	BUICK	LE SABRE 400	LOCAL	1.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-09	1:11PM	CAL -RGN-845	FORD	COUNTRY SQUIRE	LOCAL	1.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-10	1:30PM	CAL -MML-539	65 OLDS	CUTLASS	HIGHWAY	30.MI.	NO-NBL	0.0	5.0	GOOD	NO
A-11	2:32PM	CAL -504JYF	73 FORD	GRAN TORINO	HIGHWAY	1.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-12	3:12PM	CAL -YJU-255	69 FORD	ECONOLINE	HIGHWAY	15.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-13	3:32PM	CAL -30731J	72 FORD	250 TRUCK	HIGHWAY	6.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-14	3:38PM	CAL -Q20571	67 FORD	100 CAMPER	HIGHWAY	12.MI.	NO-NBL	0.0	60.0	GOOD	NO
A-15	3:59PM	CAL -55676-H	69 DATSUN	1600 TRUCK	LOCAL	1.MI.	NO-NBL	3.0	35.0	GOOD	NO
A-16	4:12PM	CAL -470-JHW	73 VW	BUG	HIGHWAY	200.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-17	4:22PM	CAL -077-CVO	72 DATSUN	122	HIGHWAY	20.MI.	NO-NBL	6.9	100.0	POOR	NO
A-18	0:00AM	CAL -NJV-296	65 PLYMOUTH	SATELLITE	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-19	4:37PM	CAL -C71-170	62 CHEV	10-TRUCK	LOCAL	1.MI.	NO-ATB	7.2	100.0	FORCE	NO
A-20	0:00AM	CAL -498-DGY	71 TOYOTA	COROLLA	HIGHWAY	15.MI.	NO-NBL	0.0	60.0	GOOD	NO
A-21	4:55PM	CAL -41-970-R	59 CHEV	APACHE 31	LOCAL	1.MI.	NO-NBL	0.0	100.0	POOR	NO
A-22	5:04PM	CAL -972-BWL	70 CHEV	CAMARO	LOCAL	20.MI.	NO-NBL	8.1	10.0	GOOD	NO
A-23	5:14PM	ARIZ-RRA-962	69 CHEV	NOVA	LOCAL	1.MI.	NO-NBL	0.0	80.0	GOOD	NO
A-24	5:23PM	CAL -093-JVT	72 VW	SQUAREBACK	HIGHWAY	20.MI.	NO-NBL	0.0	100.0	POOR	NO
A-25	5:34PM	CAL -404-ERT	72 FORD	MAVERICK	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-26	5:38PM	CAL -DJR-460	60 FORD	RANCH WAGON	LOCAL	1.MI.	NO-NBL	0.0	100.0	POOR	NO
A-27	5:47PM	CAL -ZPN-472	69 CHEV	NOVA	HIGHWAY	250.MI.	NO-NBL	7.5	100.0	POOR	NO
B-01	11:00AM	WASH-PA4444	FORD	71 CUSTOM	HIGHWAY	0.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-02	11:40AM	CAL -9133155156	63 CHRYSLER	IMPERIAL	HIGHWAY	217.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-03	11:55AM	CAL -YKM825	68 CADILLAC	FLEETWOOD	LOCAL	1.MI.	NO-NBL	0.0	100.0	POOR	YES
B-04	12:30PM	CAL -542CLB	62 CADILLAC	COUPE DE VILLE	HIGHWAY	9.MI.	NO-NBL	0.0	0.0	POOR	NO
B-05	12:45PM	CALF-AGH326	65 VW	BUG	HIGHWAY	100.MI.	NO-NBL	8.0	0.0	GOOD	NO
B-06	12:55PM	CAL -26868S	74 CHEV	CHEYENNE/10	LOCAL	10.MI.	NO-ATB	0.0	60.0	FORCE	YES
B-07	1:04PM	CAL -617HKS	73 MERCURY	MONTEGO WAGON	LOCAL	0.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-08	1:45PM	CAL -356LCP	73 DODGE	CHARGER	HIGHWAY	10.MI.	NO-ATB	0.0	100.0	FORCE	NO
B-09	1:57PM	CAL -717KIZ	74 FORD	PINTO	LOCAL	0.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-10	2:00PM	CAL -SDI582	66 CHEV	CHEVELLE	LOCAL	2.MI.	NO-NBL	7.8	0.0	GOOD	NO
B-11	2:10PM	CAL -URA601	66 FORD	THUNDERBIRD	LOCAL	1.MI.	FL-ATB	0.0	0.0	FORCE	NO
B-12	2:40PM	ILL -GF1448	67 VW	BUG	HIGHWAY	20.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-13	3:06PM	CAL -178-CSF	73 VW	HATCHBACK	HIGHWAY	12.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-14	3:15PM	CAL -140FIW	73 FORD	GALAXIE 500	HIGHWAY	15.MI.	NO-NBL	8.2	0.0	GOOD	
B-15	3:30PM	TEX -FS9151	73 GMC	CUSTOM 15000	HIGHWAY	15.MI.	NO-NBL	0.0	0.0	POOR	YES
B-16	3:55PM	CAL -803JUJ	74 FORD	PINTO	LOCAL	1.MI.	NO-ATB	0.1	0.0	FORCE	NO
B-17	4:00PM	CAL -76141S	74 DODGE	TRADESMAN	LOCAL	5.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-18	4:10PM	CAL -97814U	72 FORD	COURIER	LOCAL	3.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-19	4:15PM	CAL -ASH892	64 OLDS	F-85	LOCAL	4.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-20	4:30PM	CAL -25037P	73 DODGE	B 200	LOCAL	1.MI.	PS-ATB	0.0	0.0	FORCE	NO
B-21	4:30PM	CAL -333FCO	71 CHEV	KINGSWOOD	LOCAL	30.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-22	4:50PM	CAL -CLB045	62 MERCURY	MONTEREY	LOCAL	3.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-23	4:55PM	CAL -136JIX	73 VW	BUG	HIGHWAY	30.MI.	NO-ATB	0.0	0.0	FORCE	NO
B-24	5:05PM	CAL -770GQF	73 MAZDA	ROTARY WAGON	HIGHWAY	10.MI.	NO-NBL	0.0	100.0	POOR	NO
B-25	5:20PM	CAL -267JAR	71 PLYMOUTH	SATELLITE	LOCAL	1.MI.	PS-BSL	7.9	0.0	FORCE	NO
B-26	5:25PM	CAL -269KIG	74 TOYOTA	COROLLA	LOCAL	2.MI.	NO-NBL	0.0	100.0	POOR	NO
B-27	5:30PM	CAL -977GMY	72 OLDS	CUTLASS	HIGHWAY	10.MI.	PS-BSL	0.0	0.0	FORCE	NO

STATION- EXXON DATE- 7/30/74 AVE. UNDERGROUND TANK TEMP- 69.0 F

PUMP	TIME	VEHICLE TANK TEMP (DEG. F)	VEHICLE TANK PRESS (IN. H20)	GAS DISP (GALS)	DISP TIME (MIN.)	DISP TEMP (DEG F)	RET VAPOR TEMP (DEG F)	INITIAL VOLUME (FT3)	FINAL VOLUME (FT3)	HYDCRBN CONC.	RET LINE PRESS (IN H20)
A-01	11:17	61.0	2.4	10.0	2.2	70.0	69.0	42.066	43.489	63.2%	0.240
A-02	11:22	61.0	1.3	5.4	1.3	70.0	70.0	43.489	43.817	45.5%	0.060
A-03	11:31	66.0	2.4	8.9	1.9	70.0	68.0	43.817	45.171	56.2%	0.070
A-04	11:55	63.0	0.0	8.0	1.6	70.0	71.0	45.171	46.767	51.5%	-0.020
A-05	12:43	68.0	0.3	5.4	1.1	73.0	70.0	46.767	47.795	58.0%	-0.030
A-06	12:10	84.0	3.0	5.4	1.1	72.0	73.0	47.795	48.948	59.5%	-0.230
A-07	11:22	73.0	0.4	5.4	0.0	70.0	71.0	48.948	48.613	61.9%	-0.230
A-08	12:47	77.0	0.2	5.4	1.1	72.0	72.0	48.672	48.949	61.0%	0.220
A-09	1:11	73.0	0.0	5.4	1.1	70.0	72.0	48.951	49.423	58.2%	-0.080
A-10	1:30	91.0	0.0	17.3	5.0	72.0	76.0	49.426	50.600	54.5%	-0.072
A-11	2:02	72.0	0.0	5.4	1.2	75.0	78.0	54.142	55.214	55.2%	0.240
A-12	3:12	75.0	0.0	15.5	2.1	76.0	78.0	57.149	57.395	53.2%	-0.062
A-13	3:32	75.0	0.0	10.7	1.2	72.0	76.0	57.397	58.143	50.2%	-0.110
A-14	3:38	74.0	0.0	9.1	0.0	74.0	77.0	58.143	58.158	59.0%	-0.230
A-15	3:59	77.0	0.0	5.4	1.2	74.0	78.0	58.179	58.898	93.2%	2.062
A-16	4:12	71.0	0.0	9.7	2.0	72.0	79.0	58.908	60.223	0.0%	0.060
A-17	4:22	74.0	0.0	5.4	1.3	75.0	80.0	60.229	60.233	0.2%	3.070
A-18	4:00	74.0	0.0	11.2	2.4	74.0	76.0	60.234	61.287	0.0%	0.120
A-19	4:37	66.0	0.0	7.2	1.5	71.0	74.0	61.289	61.526	51.2%	-0.080
A-20	4:00	76.0	0.0	8.2	1.7	71.0	74.0	61.526	62.614	61.2%	-0.150
A-21	4:55	73.0	0.0	7.2	1.5	72.0	79.0	64.658	64.761	49.2%	-0.242
A-22	5:04	81.0	0.0	7.8	1.6	72.0	76.0	64.664	65.566	49.2%	-0.032
A-23	5:14	72.0	0.0	5.4	0.7	74.0	78.0	65.566	66.318	64.2%	0.130
A-24	5:23	72.0	0.0	9.2	2.0	72.0	78.0	66.318	67.390	52.0%	0.060
A-25	5:34	73.0	0.0	12.5	1.4	71.0	74.0	67.392	69.328	53.5%	0.120
A-26	5:38	73.0	0.0	10.6	2.3	71.0	76.0	69.328	70.007	55.0%	-0.080
A-27	5:47	83.0	0.0	13.3	2.8	72.0	73.0	70.007	71.332	57.2%	-0.220
B-01	11:30	73.0	0.4	5.5	1.2	72.0	66.0	53.732	54.272	43.5%	0.080
B-02	11:40	90.0	0.0	14.3	2.9	71.0	68.0	54.562	55.852	41.5%	-0.080
B-03	11:55	69.0	0.0	16.0	3.2	74.0	70.0	55.937	55.954	0.2%	-0.252
B-04	12:30	80.0	0.0	16.7	3.3	75.0	70.0	56.044	56.375	40.0%	-0.220
B-05	12:45	67.0	0.0	5.4	0.6	73.0	71.0	56.374	56.937	40.0%	0.260
B-06	12:55	77.0	-0.0	11.7	2.7	74.0	71.0	56.937	58.408	40.2%	0.220
B-07	1:34	70.0	0.9	18.1	9.5	76.0	72.0	58.410	61.402	39.2%	0.182
B-08	1:45	85.0	0.5	12.2	2.4	76.0	74.0	61.538	63.128	40.2%	0.220
B-09	1:57	73.0	0.6	5.7	1.3	80.0	76.0	63.161	64.180	2.2%	0.230
B-10	2:00	76.0	0.0	10.0	2.1	78.0	77.0	64.187	65.285	39.5%	0.010
B-11	2:10	72.0	0.0	5.3	0.0	76.0	75.0	65.285	66.162	39.5%	0.250
B-12	2:40	68.0	0.0	5.4	1.1	75.0	75.0	66.167	67.012	39.2%	0.240
B-13	3:36	73.0	0.0	8.3	2.0	77.0	74.0	67.035	67.174	39.2%	0.150
B-14	3:15	75.0	0.0	8.8	1.8	77.0	75.0	67.176	68.400	39.5%	0.250
B-15	3:30	80.0	0.0	10.2	0.0	76.0	76.0	68.415	68.783	42.2%	0.202
B-16	3:55	0.0	0.0	5.4	1.1	78.0	63.0	68.794	69.510	41.2%	0.030
B-17	4:00	73.0	0.0	7.2	1.2	78.0	76.0	69.525	70.541	41.2%	0.040
B-18	4:10	83.0	0.0	9.4	1.3	79.0	78.0	70.541	71.320	41.0%	0.220
B-19	4:15	74.0	0.0	8.0	1.8	78.0	78.0	71.320	72.440	41.0%	0.250
B-20	4:30	76.0	0.0	15.9	1.9	74.0	72.0	72.440	74.317	41.0%	0.220
B-21	4:30	88.0	0.0	14.3	1.8	74.0	72.0	74.317	76.084	42.5%	0.130
B-22	4:50	77.0	0.0	9.7	1.5	77.0	76.0	76.090	77.340	40.5%	0.050
B-23	4:55	72.0	0.0	9.4	0.0	74.0	73.0	77.355	78.712	42.5%	0.160
B-24	5:05	79.0	0.0	12.6	2.6	74.0	73.0	78.715	78.735	38.2%	0.160
B-25	5:20	74.0	0.0	16.6	3.5	77.0	77.0	78.735	81.017	41.2%	0.010
B-26	5:25	74.0	0.0	8.6	1.9	75.0	74.0	81.018	81.040	39.5%	0.050
B-27	5:30	75.0	0.0	7.5	1.5	75.0	75.0	84.465	85.335	41.0%	0.060

STATION- EXXON DATE- 7/31/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	LIC. NO.	MAKE	MODEL	TYPE OF DRIVING	DISTANCE TRAVELLED	LK CHK RESULT	RVP	EXPLOS.	NOZZLE FIT	SPITBACK
A-01	9:34AM	CAL -181-CMC	67 FORD	ECONOLINE	LOCAL	2.MI.	NO-NBL	7.9	0.0	GOOD	YES
A-02	9:48AM	CAL -SPP-720	67 CHEV	IMPALA	HIGHWAY	20.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-03	9:58AM	CAL -193-BOF	69 AUSTIN	AMERICA	HIGHWAY	30.MI.	NO-NBL	8.4	0.0	GOOD	NO
A-04	10:07AM	CAL -859-DRK	71 FORD	PINTO	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-05	10:22AM	CAL -UXM-760	67 FORD	MUSTANG	HIGHWAY	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-06	10:54AM	CAL.-XPU-480	69 VW	BUG	HIGHWAY	10.MI.	NO-NBL	8.0	0.0	GOOD	
A-07	11:58AM	GOVT-G11-50491	71 AMERICAN MOT	MATADOR	LOCAL	2.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-08	11:33AM	CAL -8GW006	61 CHEV	BISCAYNE	HIGHWAY	15.MI.	NO-NBL	0.0	5.0	GOOD	NO
A-09	18:00PM	CAL -39-906-J	66 FORD	F-350	LOCAL	4.MI.	NO-NBL	0.0	100.0	POOR	NO
A-10	11:58AM	CAL -708-JIE	73 FORD	PINTO	HIGHWAY	60.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-11	12:15PM	CAL -R46-239	CHEV	10	LOCAL	6.MI.	NO-NBL	0.0	100.0	POOR	NO
A-12	12:25PM	CAL -WDK 111	67VW	SQUAREBACK	HIGHWAY	22.MI.	PS-BSL	8.1	0.0	FORCE	NO
A-13	12:35PM	CAL -792-KDL	74 TOYOTA	1000	LOCAL	1.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-14	12:48PM	CAL -748-AMV	70 VW	BUG	HIGHWAY	6.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-15	12:55PM	COL -TF-328	65 FORD	ECONOLINE	LOCAL	10.MI.	FL-ATB	0.0	0.0	FORCE	NO
A-16	1:00PM	CAL -960 KDV	73 DODGE	DART	LOCAL	2.MI.	PS-BSL	7.9	0.0	FORCE	NO
A-17	1:10PM	CAL -206 CSI	71 BUICK	SKYLARK	LOCAL	1.MI.	NO-NBL	0.0	1.0	GOOD	NO
A-18	1:47PM	CAL -346-EDM	70 BUICK	SKYLARK	HIGHWAY	30.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-19	1:55PM	CAL -0720453	74 GMC	VANDURA	HIGHWAY	15.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-20	2:05PM	CAL -XLB687	62 CHEV	IMPALA	HIGHWAY	20.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-21	2:15PM	CAL -353-EZC	63 MERCURY	COMET	HIGHWAY	28.MI.	PS-BSL	7.4	0.0	FORCE	NO
A-22	2:25PM	CAL -22-459D	73 CHEV	CUSTOM 10	LOCAL	3.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-23	2:30PM	CAL -069-ALK	70 PLYMOUTH	DUSTER	HIGHWAY	39.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-24	2:50PM	CAL -XPV-138	69 TOYOTA	LAND CRUISER	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-25	3:02PM	CAL -880-404	59 FORD	F-100	LOCAL	0.MI.	FL-ATB	0.0	0.0	FORCE	NO
A-26	3:10PM	CAL -AXK 587	63 DODGE	440	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-27	3:20PM	CAL -TCX-144	66 FORD	MUSTANG	LOCAL	12.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-28	3:30PM	CAL -Q30014	67 CHEV	EL CAMINO	LOCAL	1.MI.	NO-NBL	0.0	25.0	GOOD	NO
A-29	3:33PM	CAL -KBP-236	63 FORD	COUNTRY SEDAN	LOCAL	12.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-30	3:40PM	CAL -44792-R	71 DATSUN	1600	LOCAL	3.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-31	3:45PM	CAL -C84860	64 FORD	250	HIGHWAY	20.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-01	9:30AM	CAL -453KSK	71 CHEV	CAMARO	HIGHWAY	50.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-02	9:40AM	CAL -BYH684	CHEV	BEL AIR	HIGHWAY	10.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-03	10:12AM	CAL -TMI205	64 FORD	GALAXIE	HIGHWAY	30.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-04	10:20AM	CAL -941GTS	72 OPEL	MANTA	LOCAL	1.MI.	NO-ATB	7.2	100.0	FORCE	NO
B-05	10:35AM	CAL -923AHI	69 GMC	1500	LOCAL	10.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-06	10:45AM	ORE -KE8745	62 VW	BUS	HIGHWAY	20.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-07	10:55AM	CAL -028KDE	69 OLDS	CUTLASS	LOCAL	5.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-08	11:10AM	CAL -MOM843	64 FORD	FALCON	LOCAL	3.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-09	11:45AM	CAL -MKH050	64 FORD	CUSTOM 500	LOCAL	1.MI.	PS-BSL	7.3	0.0	FORCE	NO
B-10	11:55AM	CAL -466AWT	62 CHEVY	IMPALA	LOCAL	2.MI.	NO-ATB	0.0	80.0	FORCE	NO
B-11	12:00PM	CAL -690JTC	73 GMC	SIERRA		0.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-12	12:10PM	CAL -794JTB	73 TOYOTA	ST	LOCAL	20.MI.	NO-ATB	0.0	100.0	FORCE	
B-13	12:15PM	CAL -555HKS	73 CONTINENTAL	MARK IV	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-14	12:25PM	CAL -879397	60 CHEVY	APACHE 20	HIGHWAY	15.MI.	PS-BSL	0.0	0.0	FORCE	
B-15	12:30PM	CAL -HDE171	65 FORD	MUSTANG	LOCAL	1.MI.	NO-NBL	7.9	25.0	GOOD	NO
B-16	12:25PM	CAL -DZF743	62 DODGE	LANCER	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	YES
B-17	12:50PM	CAL -10233M	72 FORD	SPORT CUS.100	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-18	1:00PM	CAL.-TJH386	67 CHEVY	CAMARO	LOCAL	20.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-19	1:30PM	CAL -070AWY	62 MERCURY	METEOR	HIGHWAY	20.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-20	1:43PM	CAL -324JKN	1970 VW	SEDAN	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO

STATION- EXXON DATE- 7/31/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	LIC. NO.	MAKE	MODEL	TYPE OF DRIVING	DISTANCE TRAVELLED	LK CHK RESULT	RVP	EXPLOS.	NOZZLE FIT	SPITBACK
B-21	1:50PM	CAL.-VAA970	67 FORD	T-BIRD	LOCAL	1.MI.	NO-NBL	7.5	100.0	GOOD	NO
B-22	2:05PM	CAL.-RJZ111	65 CHEVROLET	WAGON	LOCAL	5.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-23	2:30PM	CAL.-RWP674	66 VW		LOCAL	10.MI.	NO-ATB	0.0	0.0	FORCE	NO
B-24	2:40PM	CAL.-ICE341	64 VW	SEDAN	LOCAL	8.MI.	NO-ATB	0.0	0.0	FORCE	NO
B-25	2:55PM	CAL.-77002C	69 CHEV.	TRUCK	HIGHWAY	14.MI.	NO-NBL	0.0	100.0	POOR	
B-26	3:05PM	CAL.-0720452	74 GMC	VANDURA	HIGHWAY	35.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-27	3:10PM	CAL -VSL292	68 CHRYSLER	NEW YORKER	HIGHWAY	50.MI.	NO-NBL	6.5	100.0	GOOD	NO
B-28	3:20PM	CAL.-588DRN	OPEL	1971 SW	HIGHWAY	22.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-29	3:30PM	CAL.-199KNZ	VW	1974 SEDAN	LOCAL	20.MI.	NO-NBL	0.0	5.0	GOOD	NO
B-30	3:35PM	CAL.-393GTA	FORD	1973 PINTO	LOCAL	28.MI.	NO-ATB	7.5	65.0	FORCE	NO
B-31	2:10PM	GOVT-G1143142	68 CHEV.	CHEVELLE	HIGHWAY	25.MI.	NO-NBL	0.0	100.0	GOOD	NO

STATION- EXXON DATE- 7/31/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	VEHICLE TANK TEMP (DEG. F)	VEHICLE TANK PRESS (IN. H2O)	GAS DISP (GALS)	DISP TIME (MIN.)	DISP TEMP (DEG F)	RET VAPOR TEMP (DEG F)	INITIAL VOLUME (FT3)	FINAL VOLUME (FT3)	HYDCRBN CONC.	RET LINE PRESS (IN H2O)
A-01	9:34	64.0	0.0	10.0	1.9	72.0	68.0	87,435	87,692	27.0%	0.120
A-02	9:48	73.0	0.0	5.0	1.0	68.0	66.0	87,829	88,152	24.0%	0.160
A-03	9:58	64.0	0.0	8.7	1.9	68.0	66.0	88,152	89,344	29.0%	0.040
A-04	10:07	62.0	0.0	5.4	0.0	68.0	64.0	89,244	90,277	24.0%	0.010
A-05	10:22	63.0	0.0	9.3	1.1	66.0	64.0	90,278	91,411	53.0%	0.120
A-06	10:54	60.0	0.0	7.1	1.3	62.0	67.0	91,411	92,189	54.5%	0.040
A-07	11:36	67.0	0.0	10.0	2.9	69.0	67.0	92,192	92,837	56.0%	-0.032
A-08	11:33	0.0	0.0	5.9	1.3	72.0	69.0	94,249	95,182	52.5%	0.010
A-09	10:00	71.0	0.0	12.5	2.3	73.0	71.0	95,189	96,434	61.0%	0.120
A-10	11:56	73.0	0.0	11.0	2.4	73.0	76.0	96,472	97,752	61.0%	0.220
A-11	12:15	68.0	0.0	5.4	1.0	72.0	72.0	97,752	98,358	57.0%	0.040
A-12	12:25	68.0	0.0	7.4	1.8	72.0	71.0	98,361	98,387	51.5%	-0.050
A-13	12:35	73.0	0.0	5.4	1.0	73.0	72.0	98,387	99,121	55.0%	0.220
A-14	12:48	63.0	0.0	9.2	2.2	74.0	72.0	99,121	100,014	56.0%	0.030
A-15	12:55	69.0	0.0	5.4	1.1	73.0	72.0	100,014	100,348	53.5%	-0.220
A-16	1:00	79.0	0.0	5.4	1.1	72.0	72.0	100,348	101,028	53.0%	-0.040
A-17	1:10	74.0	0.0	9.0	1.1	73.0	74.0	101,008	101,972	56.5%	0.260
A-18	1:47	85.0	0.0	5.4	1.2	76.0	76.0	102,022	102,515	64.5%	0.220
A-19	1:55	79.0	0.0	8.6	1.8	75.0	74.0	102,519	103,622	66.0%	0.022
A-20	2:05	81.0	0.0	14.7	0.0	73.0	74.0	104,793	106,552	65.0%	0.370
A-21	2:15	81.0	0.0	5.4	1.1	73.0	73.0	106,755	107,360	54.5%	0.230
A-22	2:25	76.0	0.0	9.0	1.9	73.0	76.0	108,739	109,846	56.0%	-0.240
A-23	2:30	83.0	0.0	3.5	0.9	74.0	76.0	109,847	110,239	56.0%	0.240
A-24	2:50	69.0	0.0	14.7	3.1	73.0	74.0	110,437	111,427	60.5%	-0.290
A-25	3:02	76.0	0.0	5.4	1.1	71.0	74.0	111,427	112,285	52.0%	0.090
A-26	3:10	72.0	0.0	9.0	1.8	74.0	72.0	112,288	113,585	58.0%	0.140
A-27	3:20	88.0	0.0	5.4	1.1	75.0	75.0	113,585	114,133	63.0%	0.220
A-28	3:32	75.0	0.0	5.4	1.1	77.0	76.0	114,133	114,947	64.0%	0.050
A-29	3:33	82.0	0.0	14.3	3.0	74.0	76.0	114,947	116,398	65.5%	0.120
A-30	3:40	73.0	0.0	13.2	1.3	76.0	76.0	116,398	116,738	66.0%	0.230
A-31	3:45	77.0	0.0	10.7	0.0	77.0	78.0	116,743	117,538	58.0%	0.030
B-01	9:30	81.0	0.0	12.0	1.4	70.0	64.0	102,021	103,425	61.0%	-0.160
B-02	9:40	69.0	0.0	17.3	3.6	69.0	66.0	103,425	105,864	61.5%	0.080
B-03	10:12	66.0	0.0	8.9	1.3	70.0	64.0	127,615	128,324	60.0%	-0.050
B-04	10:20	68.0	0.0	9.8	2.1	70.0	64.0	108,325	108,858	60.5%	-0.030
B-05	10:35	67.0	0.0	5.3	1.2	70.0	64.0	108,864	109,565	60.0%	0.040
B-06	10:45	67.0	0.0	5.4	1.0	70.0	68.0	113,260	113,991	59.5%	0.030
B-07	10:55	69.0	0.0	10.1	2.5	70.0	68.0	113,991	115,252	69.0%	0.030
B-08	11:10	65.0	0.0	10.7	2.2	72.0	67.0	115,253	116,835	59.5%	0.220
B-09	11:45	73.0	0.0	5.4	1.1	72.0	70.0	117,176	117,899	59.0%	-0.220
B-10	11:55	69.0	0.0	5.4	1.2	74.0	70.0	117,899	118,697	58.0%	0.040
B-11	12:00	71.0	0.0	5.4	1.1	74.0	70.0	117,899	119,112	58.0%	0.020
B-12	12:10	68.0	0.0	4.8	1.2	74.0	72.0	119,112	119,607	57.5%	0.030
B-13	12:15	75.0	2.5	12.3	1.7	76.0	74.0	119,608	121,331	58.0%	0.280
B-14	12:25	67.0	0.0	14.5	3.1	73.0	72.0	121,331	123,435	58.0%	0.260
B-15	12:30	66.0	0.0	14.5	3.0	73.0	72.0	123,435	125,543	58.0%	0.030
B-16	12:25	72.0	0.0	6.9	1.5	73.0	72.0	125,543	125,900	57.0%	-0.020
B-17	12:50	74.0	0.0	11.4	0.0	73.0	72.0	128,190	128,972	58.0%	0.240
B-18	1:00	73.0	0.0	5.4	1.3	73.0	73.0	128,972	129,570	57.0%	0.030
B-19	1:30	73.0	2.5	5.4	1.1	73.0	76.0	129,577	130,340	34.0%	0.120
B-20	1:43	76.0	0.0	10.0	2.2	75.0	75.0	130,343	131,596	57.0%	0.220

STATION- EXXON DATE- 7/31/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	VEHICLE TANK TEMP (DEG. F)	VEHICLE TANK PRESS (IN. H2O)	GAS DISP (GALS)	DISP TIME (MIN.)	DISP TEMP (DEG F)	RET VAPOR TEMP (DEG F)	INITIAL VOLUME (FT3)	FINAL VOLUME (FT3)	HYDCRBN CONC.	RET LINE PRESS (IN H2O)
B-21	1:50	72.0	0.0	14.3	3.0	75.0	75.0	131,590	132.910	56.0%	0.220
B-22	2:05	77.0	0.0	5.4	2.7	75.0	75.0	132,935	133.540	52.5%	-0.100
B-23	2:30	73.0	0.0	8.0	1.6	75.0	75.0	136,493	137.533	55.0%	0.040
B-24	2:40	73.0	0.0	5.4	0.7	75.0	75.0	137,533	138.268	54.0%	-0.020
B-25	2:55	72.0	0.0	16.1	3.1	75.0	75.0	138,278	138.282	53.0%	0.220
B-26	3:05	76.0	0.0	5.4	1.7	72.0	74.0	138,283	136.962	53.0%	0.020
B-27	3:10	90.0	0.0	17.8	3.6	75.0	75.0	138,968	140.892	53.0%	0.060
B-28	3:20	79.0	0.0	5.4	1.3	75.0	75.0	140,910	141.670	50.5%	0.050
B-29	3:30	78.0	0.0	5.4	1.1	75.0	75.0	141,670	142.555	50.0%	0.040
B-30	3:35	76.0	0.0	5.4	1.2	75.0	75.0	142,555	143.343	50.5%	0.160
B-31	2:10	90.0	0.0	10.2	2.2	74.0	75.0	135,754	136.475	55.0%	-0.240

STATION- EXXON DATE- 8/ 1/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	LIC. NO.	MAKE	MODEL	TYPE OF DRIVING	DISTANCE TRAVELLED	LK CHK RESULT	RVP	EXPLOS.	NOZZLE FIT	SPITBACK
A-01	12:50PM	CAL.-10527V	61 FORD	RANCHERO	LOCAL	2.MI.	FL-ATB	0.0	0.0	FORCE	NO
A-02	1:00PM	COL.-TF-328	65 FORD	ECONOLINE	LOCAL	2.MI.	NO-ATB	0.0	0.0	FORCE	NO
A-03	1:04PM	CAL.-BYN287	62 MERCURY	MONTEREY	LOCAL	3.MI.	NO-NBL	0.0	40.0	GOOD	NO
A-04	1:10PM	CAL -ZET-165	69 TRIUMPH	SPITFIRE	HIGHWAY	4.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-05	1:15PM	N.Y.-223YYJ	PURCHE	914	HIGHWAY	8.MI.	NO-ATB	7.8	100.0	FORCE	NO
A-06	1:35PM	CAL.-26R88S	74 CHEVY	CHEYENNE 10	LOCAL	5.MI.	NO-NBL	0.0	10.0	GOOD	NO
A-07	1:40PM	CAL.-12169M	72 DODGE	TRADESMAN 100	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-08	2:10PM	CAL.-379-GFE	72 CHEVY	VEGA	LOCAL	3.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-09	2:20PM	CAL.-624LBF	74 FORD	MUSTANG II	LOCAL	2.MI.	NO-NBL	0.0	30.0	GOOD	NO
A-10	2:25PM	CAL.-407EDD	68 CHEVY	CHEVELLE	HIGHWAY	42.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-11	2:30PM	CAL.-880KDY	74 FORD	PINTO	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-12	2:45PM	CAL.-97490W	66 FORD	600	HIGHWAY	10.MI.	NO-NBL	0.0	100.0	POOR	NO
A-13	2:55PM	CAL.-UCW618	67 FORD	MUSTANG	LOCAL	15.MI.	NO-NBL	7.8	100.0	GOOD	NO
A-14	3:15PM	CAL.-023-HKK	73 OLDS	NINETY EIGHT	HIGHWAY	40.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-15	3:30PM	CAL.-CHW-632	59 VW	BUG	HIGHWAY	6.MI.	NO-NBL	0.0	100.0	POOR	NO
A-16	3:35PM	CAL.-24583R	72 FORD	F250	LOCAL	1.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-17	3:55PM	CAL.-BSA-114	62 CHEVY	IMPALA	LOCAL	4.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-18	4:15PM	CAL.-UBW517	VW	67 SQUAREBACK	LOCAL	4.MI.	PS-BSL	4.3	0.0	FORCE	NO
A-19	4:25PM	CAL.-665-CLY	71 FORD	PINTO	LOCAL	15.MI.	NO-NBL	0.0	35.0	GOOD	NO
A-20	4:35PM	CAL.-TLZ-429	67 MERCURY	COUGAR	LOCAL	4.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-21	4:40PM	CAL.-787-DGJ	71 CHEV.	CAPRICE	HIGHWAY	10.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-22	4:50PM	CAL.-ABY947	63 PLYMOUTH	VALIANT	LOCAL	3.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-23	4:55PM	CAL.-703LBI	74 CHEV.	CHEVELLE	HIGHWAY	100.MI.	NO-ATB	7.9	100.0	FORCE	NO
A-24	5:05PM	CAL.-VLM962	68 DODGE	CHARGER	HIGHWAY	50.MI.	NO-NBL	0.0	100.0	POOR	NO
A-25	5:10PM	CAL.-611AZR	70 AM. MOTORS	REBEL	LOCAL	3.MI.	NO-ATB	0.0	100.0	FORCE	NO
A-26	5:20PM	CAL.-402-GLO	73 CHEV.	MONTE CARLO	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-27	5:20PM	CAL.-77566S	74 CHEVY	CHEYENNE 10	LOCAL	5.MI.	NO-NBL	0.0	100.0	POOR	NO
A-28	5:35PM	CAL.-65044N	8 JEEP	J4000	LOCAL	2.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-29	5:50PM	CAL.-U83-380	66 FORD	250	HIGHWAY	5.MI.	NO-NBL	0.0	40.0	GOOD	NO
A-30	5:55PM	CAL.-617HKS	73 MERCURY	MONTEGO	HIGHWAY	100.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-31	6:00PM	CAL.-310KDG	74 DODGE	COLT	LOCAL	2.MI.	FL-NBL	0.0	0.0	GOOD	NO
A-32	6:05PM	CAL.-33624P	73 CHEVY	CUSTOM 20		20.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-33	6:15PM	CAL.-576FXO	72 DATSUN	240Z	HIGHWAY	6.MI.	NO-NBL	0.0	100.0	POOR	NO
A-34	6:20PM	CAL.-206 DEM	71 PLYMOUTH	SCZMP	LOCAL	0.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-35	6:40PM	CAL.-YJR510	69 CHEVY	CAMARO	LOCAL	1.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-36	6:45PM	CAL.-244GQE	66 FORD	LTD	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-37	6:55PM	CAL.-ZIC-002	69 CHEV.	CHEVELLE	LOCAL	10.MI.	NO-NBL	0.0	15.0	GOOD	NO
A-38	7:10AM	CAL.-SPR573	66 PLYMOUTH	BARACUDA	LOCAL	6.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-39	7:25AM	CAL.-XJX-438	69 FORD	FALCON	LOCAL	400.MI.	NO-NBL	0.0	100.0	POOR	NO
B-01	12:30PM	CAL.-216EDV	DODGE	72 COLT	HIGHWAY	35.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-02	12:44PM	CAL.-VAH682	67 VW	SEDAN 7	HIGHWAY	1.MI.	NO-NBL	0.0	60.0	GOOD	NO
B-03	12:47PM	CAL.-276FIV	1972 VOLVO	142E	LOCAL	15.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-04	12:53PM	CAL.-199KNZ	VW	SEDAN	HIGHWAY	10.MI.	FL-ATB	0.0	0.0	FORCE	NO
B-05	1:20PM	CAL.-617HKS	73 MERCURY	MONTEGO	HIGHWAY	10.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-06	1:35PM	CAL.-999KTP	74 FORD	PINTO WAGON	HIGHWAY	40.MI.	PS-BSL	0.0	0.0	FORCE	
B-07	1:43PM	CAL.-571GJW	1973 CHEV.	NOVA	LOCAL	3.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-08	1:48PM	CAL.-003JKV	AMC	1973 MATADOR	HIGHWAY	3.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-09	2:04PM	CAL.-Q30014	1967 CHEV.	TRUCK	LOCAL	1.MI.	NO-ATB	0.0	5.0	FORCE	NO
B-10	2:20PM	CAL.-UAA970	1967 FORD	T. BIRD	LOCAL	0.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-11	2:33PM	CAL.-070AWY	1962 MERCURY	METEOR	LOCAL	15.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-12	2:50PM	CAL.-377LDG	1974 PONTIAC	FIREBIRD	HIGHWAY	8.MI.	PS-BSL	7.6	0.0	FORCE	NO

STATION- EXXON DATE- 8/ 1/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	LIC. NO.	MAKE	MODEL	TYPE OF DRIVING	DISTANCE TRAVELLED	LK CHK RESULT	RVP	EXPLOS.	NOZZLE FIT	SPITBACK
B-13	3:04PM	CAL.-CCN186	1963 FORD	FALCON	HIGHWAY	20.MI.	NO-NBL	0.0	100.0	GOOD	YES
B-14	3:06PM	CAL.-T64010	1965 FORD	VAN	LOCAL	5.MI.	NO-NBL	0.0	100.0	GOOD	
B-15	3:16PM	CAL.-276219W	1967 FORD	VAN 1	LOCAL	2.MI.	FL-ATB	7.2	0.0	FORCE	NO
B-16	3:22PM	CAL.-690JTC	1974 GMC	SIERRA	HIGHWAY	2.MI.	NO-NBL	0.0	10.0	GOOD	NO
B-17	3:35PM	CAL.-042-DGZ	1960 PONTIAC	CATALINA	LOCAL	2.MI.	NO-NBL	6.7	100.0	GOOD	NO
B-18	3:48PM	CAL.-994FIW	1972 BUICK	SW	HIGHWAY	25.MI.	FL-ATB	0.0	0.0	FORCE	NO
B-19	3:58PM	CAL.-BZV648	1964 FORD	GAL.500	LOCAL	0.MI.	NO-ATB	7.1	100.0	FORCE	NO
B-20	4:15PM	CAL.-960KDV	DODGE	1974 DART	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-21	4:25PM	CAL.-10870V	CHEV.	1961 CORVAIR 95	LOCAL	3.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-22	4:32PM	CAL.-102GGC	FORD	1973 PINTO	HIGHWAY	40.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-23	4:36PM	CAL.-388525	DATSUN	1970 P.V.	HIGHWAY	3.MI.	NO-NBL	7.6	10.0	GOOD	NO
B-24	4:45PM	CAL.-WPT174	CHEV.	1968 MALIBU	LOCAL	8.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-25	4:53PM	CAL.-466AWT	CHEV.	1970 IMPALA	LOCAL	5.MI.	NO-NBL	0.0	100.0	GOOD	
B-26	5:00PM	CAL.-DKJ506	CHEV.	1963 NOVA	HIGHWAY	10.MI.	NO-ATB	0.0	10.0	FORCE	NO
B-27	5:05PM	CAL.-VXE295	DODGE	1968 CHARGER	LOCAL	1.MI.	NO-NBL	7.5	100.0	POOR	NO
B-28	5:17PM	CAL.-DY2021	MERCEDES	1961 220SB	LOCAL	2.MI.	NO-NBL	0.0	10.0	GOOD	NO
B-29	5:29PM	CAL.-137FSM	BUICK	1972 RIVERA	HIGHWAY	25.MI.	NO-ATB	7.2	100.0	FORCE	NO
B-30	5:33PM	CAL.-CNZ966	PONTIAC	1965 BONNEVILLE	HIGHWAY	5.MI.	NO-NBL	0.0	100.0	POOR	
B-31	5:45PM	CAL.-0720452	GMC	1974 VAN	HIGHWAY	50.MI.	NO-NBL	0.0	0.0	GOOD	NO
B-32	5:52PM	CAL.-OLA191	VW	1964 SEDAN	HIGHWAY	4.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-33	6:00PM	CAL.-BIZ484	CHEV.	1955 CHEV.	LOCAL	0.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-34	6:07PM	CAL.-411CPL	FORD	1970 PINTO	LOCAL	2.MI.	PS-BSL	7.4	0.0	FORCE	NO
B-35	5:17PM	CAL.-63197V	FORD	1974 VAN	HIGHWAY	25.MI.	NO-NBL	0.0	100.0	GOOD	NO
B-36	6:28PM	CAL.-251CMO	MERCURY	1971 CAPRI	LOCAL	1.MI.	NO-ATB	0.0	100.0	FORCE	NO
B-37	6:33PM	CAL.-30111L	CHEV.	1972 P.U.	LOCAL	0.MI.	NO-ATB	0.0	25.0	FORCE	NO
B-38	6:39PM	CAL.-973GUX	OLDSMOBILE	1974 CUTLASS	LOCAL	8.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-39	6:45PM	CAL.-980BYX	FORD	1968Sw	HIGHWAY	15.MI.	NO-NBL	7.3	80.0	GOOD	NO
B-40	7:00AM	CAL.-133EVQ	PLYMOUTH	1972 SATELLITE	HIGHWAY	70.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-41	7:06AM	CAL -919JTT	1973 CHEV.	VAN	LOCAL	2.MI.	FL-ATB	0.0	0.0	FORCE	NO
B-42	7:15AM	CAL.-567FHB	DODGE	1972 SWINGER	LOCAL	2.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-43	7:23AM	CAL -481FRN	1971 CHEV	NOVA	HIGHWAY	8.MI.	PS-BSL	0.0	0.0	FORCE	
B-44	7:34AM	CAL.-DKL015	FORD	1964 GALAXIE	HIGHWAY	15.MI.	NO-NBL	7.8	100.0	POOR	
B-45	7:35AM	ORE.-BHW810	1969 TOYOTA	CORONA 1600	LOCAL	1.MI.	PS-BSL	0.0	0.0	FORCE	NO
B-46	7:42AM	CAL.-DKZ207	DODGE	1965 DART	LOCAL	1.MI.	NO-NBL	0.0	100.0	POOR	NO

STATION- EXXON DATE- 8/ 1/74 AVE. UNDERGROUND TANK TEMP= 68.5 F

PUMP	TIME	VEHICLE TANK TEMP (DEG. F)	VEHICLE TANK PRESS (IN. H2O)	GAS DISP (GALS)	DISP TIME (MIN.)	DISP TEMP (DEG F)	RET VAPOR TEMP (DEG F)	INITIAL VOLUME (FT3)	FINAL VOLUME (FT3)	HYDCRBN CONC.	RET LINE PRESS (IN H2O)
A-01	12:50	83.0	0.0	5.4	1.0	72.0	72.0	150.478	151.132	54.0%	0.093
A-02	1:00	77.0	0.0	5.4	1.3	73.0	73.0	151.132	0.000	46.0%	-0.070
A-03	1:04	74.0	0.0	9.2	1.6	77.0	76.0	150.785	151.942	49.5%	0.040
A-04	1:10	83.0	0.0	5.4	1.2	74.0	74.0	151.942	152.283	52.0%	-0.033
A-05	1:15	82.0	0.0	5.4	1.5	73.0	75.0	152.283	152.288	35.0%	-0.150
A-06	1:35	79.0	0.0	5.4	1.2	73.0	72.0	152.429	153.156	46.5%	0.040
A-07	1:40	73.0	0.0	5.5	1.2	73.0	72.0	153.157	153.647	44.5%	-0.010
A-08	2:10	80.0	0.0	9.0	1.9	69.0	74.0	155.363	156.625	82.5%	0.230
A-09	2:20	96.0	0.0	11.3	2.3	73.0	76.0	156.625	157.745	98.0%	-0.020
A-10	2:25	102.0	0.0	5.4	1.2	72.0	75.0	157.745	157.825	77.0%	-0.030
A-11	2:30	74.0	0.0	7.3	1.6	73.0	75.0	157.983	159.266	76.5%	0.350
A-12	2:45	87.0	0.0	20.8	3.2	75.0	76.0	159.266	159.289	73.0%	-0.020
A-13	2:55	105.0	0.0	10.7	2.4	73.0	77.0	159.288	159.642	84.0%	0.010
A-14	3:15	0.0	0.0	20.6	3.6	75.0	79.0	159.642	161.354	92.0%	0.012
A-15	3:30	85.0	0.0	9.4	1.7	73.0	77.0	161.354	161.509	45.5%	-0.050
A-16	3:35	0.0	0.0	9.0	2.2	73.0	76.0	161.509	162.761	70.5%	0.250
A-17	3:55	83.0	0.0	5.4	1.8	75.0	79.0	164.739	165.704	64.0%	0.440
A-18	4:15	88.0	0.0	9.6	2.0	76.0	77.0	165.704	166.137	56.0%	-0.140
A-19	4:25	93.0	0.0	7.2	1.5	75.0	79.0	166.137	166.670	58.5%	-0.120
A-20	4:35	95.0	0.0	5.4	0.8	75.0	80.0	166.670	166.852	55.5%	-0.140
A-21	4:40	95.0	0.0	15.2	3.4	73.0	76.0	166.859	168.172	75.0%	-0.120
A-22	4:50	78.0	0.0	5.6	1.3	74.0	0.0	168.172	168.617	30.0%	0.210
A-23	4:55	94.0	0.3	17.0	3.3	72.0	78.0	168.509	169.969	69.0%	-0.040
A-24	5:05	104.0	0.0	5.4	1.2	73.0	75.0	169.969	170.985	62.0%	-0.090
A-25	5:10	87.0	0.0	7.1	1.5	73.0	0.0	169.969	170.290	56.5%	-0.020
A-26	5:20	83.0	0.5	9.0	1.8	76.0	78.0	170.290	171.296	56.0%	0.015
A-27	5:20	66.0	0.0	14.3	3.1	73.0	75.0	171.296	171.314	51.5%	-0.020
A-28	5:35	0.0	0.0	14.4	3.4	73.0	78.0	171.314	173.038	61.5%	0.020
A-29	5:50	81.0	0.0	5.4	1.3	73.0	74.0	173.038	174.043	53.0%	0.090
A-30	5:55	84.0	0.4	10.7	2.4	71.0	76.0	174.047	175.364	28.2%	-0.080
A-31	6:00	84.0	0.0	7.2	0.0	72.0	75.0	175.364	175.991	67.2%	-0.010
A-32	6:05	83.0	0.0	9.0	2.0	74.0	76.0	175.991	176.990	67.0%	-0.010
A-33	6:15	86.0	0.0	5.4	1.0	72.0	75.0	176.990	177.319	62.0%	-0.010
A-34	6:20	79.0	0.0	5.4	1.1	73.0	75.0	177.319	178.113	69.2%	0.030
A-35	6:40	92.0	0.0	9.0	1.4	71.0	75.0	178.189	178.978	57.5%	-0.010
A-36	6:45	85.0	0.0	5.4	1.0	73.0	75.0	178.978	179.573	69.2%	-0.010
A-37	6:55	95.0	0.0	5.9	1.3	72.0	75.0	179.692	179.983	38.2%	-0.020
A-38	7:10	75.0	0.0	14.6	2.8	71.0	74.0	180.422	181.322	47.5%	-0.050
A-39	7:25	68.0	0.0	13.9	2.8	72.0	73.0	181.332	182.357	5.9%	-0.020
B-01	12:38	79.0	0.0	5.4	1.2	74.0	75.0	179.333	179.899	56.0%	-0.130
B-02	12:44	75.0	0.0	5.4	1.1	74.0	75.0	179.899	180.562	55.0%	-0.060
B-03	12:47	78.0	0.0	5.4	1.2	75.0	76.0	180.563	181.135	54.5%	-0.050
B-04	12:53	75.0	0.0	5.4	1.2	74.0	76.0	181.135	181.693	54.0%	-0.010
B-05	1:20	84.0	0.0	18.6	4.1	75.0	75.0	182.895	185.462	53.5%	-0.160
B-06	1:35	82.0	0.0	5.4	1.0	75.0	75.0	185.462	186.153	50.5%	-0.080
B-07	1:43	86.0	0.0	14.1	1.5	75.0	75.0	186.153	187.853	50.5%	-0.180
B-08	1:48	83.0	0.0	4.5	0.8	75.0	75.0	187.854	188.223	50.0%	-0.180
B-09	2:34	81.0	0.0	5.4	1.1	75.0	80.0	190.090	190.576	48.0%	-0.180
B-10	2:20	71.0	0.0	5.4	1.1	75.0	75.0	190.585	191.081	48.5%	-0.200
B-11	2:33	81.0	0.0	5.4	1.1	75.0	75.0	191.085	191.799	49.0%	-0.170
B-12	2:50	97.0	0.0	15.6	3.4	75.0	85.0	191.802	193.466	78.0%	0.220

STATION- EXXON DATE- 8/ 1/74 AVE. UNDERGROUND TANK TEMP- 68.5 F

PUMP	TIME	VEHICLE TANK TEMP (DEG. F)	VEHICLE TANK PRESS (IN. H2O)	GAS DISP (GALS)	DISP TIME (MIN.)	DISP TEMP (DEG F)	RET VAPOR TEMP (DEG F)	INITIAL VOLUME (FT3)	FINAL VOLUME (FT3)	HYDCRBN CONC.	RET LINE PRESS (IN H20)
B-13	3:04	92.0	0.0	12.3	0.0	75.0	85.0	193,470	194.324	77.0%	-0.220
B-14	3:06	86.0	0.0	5.4	1.5	75.0	85.0	194,325	194.428	76.0%	-0.240
B-15	3:16	92.0	0.0	5.4	1.2	76.0	86.0	194,438	194.650	63.0%	-0.160
B-16	3:22	86.0	0.0	5.4	1.1	75.0	85.0	194,650	196.450	72.0%	0.400
B-17	3:35	86.0	0.0	16.4	3.6	75.0	85.0	196,450	198.198	75.0%	-0.060
B-18	3:48	96.0	0.0	17.4	3.7	75.0	85.0	198,220	199,980	76.0%	-0.260
B-19	3:58	92.0	0.0	5.4	1.1	75.0	85.0	199,960	200.105	75.0%	-0.040
B-20	4:15	86.0	0.0	5.4	1.2	75.0	85.0	200,244	200,913	76.0%	-0.080
B-21	4:25	86.0	0.0	5.4	1.1	78.0	85.0	200,913	201.644	76.0%	0.020
B-22	4:32	85.0	0.5	5.4	1.8	78.0	85.0	201,648	202.148	73.5%	-0.060
B-23	4:38	86.0	0.0	7.7	1.2	77.0	85.0	202,153	203.035	73.0%	-0.080
B-24	4:45	92.0	0.0	5.4	1.2	75.0	85.0	203,035	203.473	72.0%	-0.120
B-25	4:53	90.0	0.0	5.4	1.2	75.0	85.0	0.000	0.000	71.0%	-0.020
B-26	5:00	84.0	0.0	11.0	2.4	76.0	85.0	204,457	205.468	73.0%	-0.040
B-27	5:15	86.0	0.0	5.4	1.2	75.0	85.0	206,824	207.165	71.0%	-0.040
B-28	5:17	88.0	0.0	8.9	1.1	75.0	84.0	207,782	208.670	73.5%	-0.060
B-29	5:29	103.0	0.5	8.9	1.1	75.0	85.0	208,872	209.150	70.0%	-0.010
B-30	5:33	85.0	0.0	5.4	0.7	75.0	84.0	209,155	209.160	70.0%	-0.100
B-31	5:45	0.0	1.2	5.4	1.2	75.0	85.0	209,162	209.645	72.0%	-1.000
B-32	5:52	87.0	0.5	5.4	1.9	75.0	83.0	209,659	210.394	72.5%	-0.040
B-33	6:10	81.0	0.0	8.9	1.1	75.0	84.0	210,396	211.009	73.0%	0.100
B-34	6:27	86.0	1.4	5.4	1.0	75.0	80.0	211,009	211.663	69.0%	-0.080
B-35	5:17	81.0	0.0	8.9	1.0	75.0	80.0	211,669	212.423	69.5%	-0.100
B-36	6:28	85.0	0.5	5.4	1.8	75.0	83.0	212,425	213.045	71.0%	0.040
B-37	6:33	78.0	0.5	5.4	1.2	75.0	83.0	213,045	213.635	70.0%	-0.040
B-38	6:39	85.0	0.5	10.4	2.4	75.0	82.0	213,635	214.604	71.5%	-0.080
B-39	6:45	82.0	0.0	12.5	2.7	75.0	80.0	214,605	216.364	69.5%	-0.040
B-40	7:00	81.0	0.0	5.4	0.0	75.0	80.0	216,365	216.935	79.0%	-0.040
B-41	7:06	75.0	5.0	8.9	0.0	75.0	83.0	216,938	218.030	69.0%	-0.220
B-42	7:15	82.0	0.5	5.4	1.1	75.0	82.0	218,030	218.712	68.5%	-0.100
B-43	7:23	82.0	0.3	7.2	1.5	74.0	74.0	218,713	219.464	68.0%	-0.100
B-44	7:34	78.0	0.0	5.4	1.2	74.0	73.0	219,465	219.736	77.0%	-0.010
B-45	7:35	74.0	0.0	10.1	2.2	74.0	74.0	219,736	221.158	68.0%	0.020
B-46	7:42	79.0	0.0	8.9	2.0	74.0	72.0	221,158	222.050	68.0%	0.240

STATION- EXXON DATE- 8/ 2/74 AVE. UNDERGROUND TANK TEMP- 70.0 F

PUMP	TIME	VEHICLE TANK TEMP (DEG. F)	VEHICLE TANK PRESS (IN. H20)	GAS DISP (GALS)	DISP TIME (MIN.)	DISP TEMP (DEG F)	RET VAPOR TEMP (DEG F)	INITIAL VOLUME (FT3)	FINAL VOLUME (FT3)	HYDCRBN CONC.	RET LINE PRESS (IN H20)
A-01	8:10	75.0	0.4	5.4	1.0	68.0	59.0	194.119	194.853	56.5%	0.390
A-02	8:20	66.0	1.1	5.4	1.1	72.0	61.0	194.853	195.637	51.5%	0.070
A-03	8:25	0.0	0.0	17.7	3.8	72.0	63.0	195.637	197.928	78.0%	0.030
A-04	8:40	72.0	0.2	5.4	1.0	72.0	63.0	197.928	198.638	44.5%	0.040
A-05	8:45	66.0	0.0	5.4	1.2	73.0	63.0	198.638	199.493	35.0%	0.080
A-06	8:50	67.0	1.0	5.4	1.0	73.0	64.0	199.493	200.218	32.5%	0.360
A-07	8:55	65.0	0.0	5.4	1.2	73.0	63.0	200.218	200.997	36.0%	0.080
A-08	9:00	67.0	0.0	8.6	2.9	73.0	64.0	200.997	201.487	0.0%	0.040
A-09	9:17	69.0	0.0	7.1	1.8	70.0	60.0	201.493	202.372	73.5%	0.010
A-10	9:18	70.0	1.5	13.8	3.0	73.0	65.0	202.372	204.173	72.0%	0.140
A-11	9:35	67.0	5.0	7.2	1.6	73.0	64.0	204.173	206.013	70.0%	0.380
A-12	9:37	69.0	0.0	10.1	2.2	74.0	65.0	206.040	207.456	69.0%	-0.080
A-13	9:45	62.0	0.0	5.4	0.8	74.0	63.0	207.492	207.567	66.5%	-0.060
A-14	9:49	66.0	5.0	10.7	1.6	75.0	65.0	208.614	210.150	66.0%	0.100
A-15	10:30	63.0	0.0	5.4	0.8	73.0	64.0	210.150	210.342	67.0%	0.020
A-16	0:00	70.0	0.0	5.4	1.2	74.0	63.0	210.343	210.873	66.5%	0.100
A-17	10:10	68.0	0.0	13.7	3.0	73.0	63.0	210.873	212.288	66.0%	0.120
A-18	10:20	68.0	0.0	5.4	0.8	75.0	63.0	212.292	212.310	66.0%	-0.170
A-19	10:27	68.0	0.0	11.5	2.6	74.0	64.0	212.310	213.659	66.0%	-0.020
A-20	10:35	75.0	0.0	16.0	1.2	75.0	66.0	213.686	215.399	67.0%	0.120
A-21	10:40	73.0	0.0	8.9	1.0	75.0	65.0	215.430	215.849	67.0%	0.100
A-22	11:50	70.0	0.0	9.5	2.0	73.0	65.0	216.179	217.471	64.0%	0.080
A-23	10:55	72.0	0.0	5.4	1.0	73.0	67.0	217.472	218.146	69.0%	0.140
A-24	11:00	76.0	0.0	8.0	1.9	73.0	68.0	218.158	218.672	68.0%	-0.050
A-25	0:00	72.0	0.0	14.9	3.2	74.0	68.0	218.872	220.439	67.0%	0.060
A-26	11:10	77.0	0.2	5.4	1.0	73.0	78.0	220.439	221.296	68.0%	0.030
A-27	11:20	75.0	0.0	7.1	0.8	72.0	68.0	221.296	222.053	69.0%	0.440
A-28	11:22	78.0	0.0	9.0	1.0	73.0	69.0	222.053	222.745	69.5%	0.160
A-29	0:00	88.0	0.0	10.7	1.2	74.0	71.0	222.745	223.823	65.0%	-0.200
A-30	11:28	78.0	0.0	4.5	1.0	72.0	70.0	223.823	224.397	67.5%	0.050
A-31	11:30	72.0	0.0	5.4	1.3	72.0	70.0	224.432	224.454	69.0%	-0.030
A-32	11:35	73.0	0.0	7.1	1.2	72.0	69.0	224.454	224.740	64.5%	0.120
A-33	11:37	66.0	0.0	9.5	2.2	73.0	65.0	224.721	224.891	66.0%	0.160
A-34	0:00	80.0	0.0	8.2	1.4	73.0	70.0	224.891	225.733	66.0%	-0.160
A-35	11:45	85.0	0.0	7.2	0.8	74.0	70.0	225.733	226.370	68.0%	-0.060

STATION- EXXON DATE- 8/ 2/74 AVE. UNDERGROUND TANK TEMP- 70.0 F

PUMP	TIME	LIC. NO.	MAKE	MODEL	TYPE OF DRIVING	DISTANCE TRAVELLED	LK CHK RESULT	RVP	EXPLOS.	NOZZLE FIT	SPITBA
A-01	8:10AM	CAL.-420-LBJ	DODGE	74 CHARGER	HIGHWAY	15.MI.	PS-BSL	7.0	0.0	FORCE	NO
A-02	8:20AM	GOVT-G11-49367	71 FORD	CUSTOM	LOCAL	4.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-03	8:25AM	CAL.-23654L	72 CHEV	CUSTOM/10	LOCAL	0.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-04	8:40AM	CAL.-25233P	73 CHEV.	CHEVY VAN 10	HIGHWAY	62.MI.	NO-ATB	0.0	5.0	FORCE	NO
A-05	8:45AM	CAL.-WGP459	68 PONTIAC	LE MANS	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-06	8:50AM	CAR.-36P-ERN	72 CHEV.	MONTE CARLO	HIGHWAY	4.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-07	8:55AM	CAL.-Q30014	67 CHEV.	EL CAMINO	LOCAL	0.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-08	9:00AM	CAL.-110CVH	70 FORD	PINTO	LOCAL	5.MI.	NO-NBL	0.0	100.0	GOOD	YES
A-09	9:17AM	CAL.-09483V	72 DATSUN	600 PICKUP	LOCAL	1.MI.	NO-NBL	7.4	0.0	GOOD	NO
A-10	9:18AM	CAL.-459BIM	70 CHEV.	CHEVELLE	LOCAL	1.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-11	9:35AM	CAL.-33099R	73 DODGE	100	LOCAL	3.MI.	PS-BSL	0.0	0.0	FORCE	NO
A-12	9:37AM	CAL.-469KNW	DODGE	1974 DART	LOCAL	1.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-13	9:45AM	CAL.-RNV575	VW	19?? VAN	LOCAL	0.MI.	NO-NBL	0.0	100.0	POOR	
A-14	9:49AM	CAL.-270GVC	FORD	1973 PINTO SW	LOCAL	1.MI.	PS-BSL	0.0	0.0	FORCE	
A-15	10:00AM	CAL.-545DOZ	CHEV.	1967 IMPALA	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-16	0:00AM	CAL.-WGR214	FORD	1968 MUSTANG	HIGHWAY	18.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-17	10:10AM	CAL.-APF672	DODGE	1955 V8	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	
A-18	10:20AM	CAL.-57294L	CHEV.	1972 LUV	LOCAL	1.MI.	NO-NBL	7.3	100.0	POOR	
A-19	10:27AM	CAL.-MJC109	PLYMOUTH	1964 FURY S.W.	LOCAL	14.MI.	FL-ATB	0.0	0.0	FORCE	NO
A-20	10:35AM	CAL.-398CSQ	FORD	1970 TORINO SW	HIGHWAY	11.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-21	10:40AM	CAL.-K2K685	CHEV.	1957 SW	LOCAL	1.MI.	NO-NBL	0.0	100.0	POOR	
A-22	11:50AM	CAL.-166-GFD	73 FORD	PINTO	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-23	10:55AM	CAL.-RLY589	36 FORD	SEDAN	LOCAL	2.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-24	11:00AM	CAL.-1068953	74 VW	BUS	HIGHWAY	7.MI.	NO-NBL	0.0	100.0	POOR	NO
A-25	0:00AM	CAL.-623BYM	70 PLYMOUTH	SATELLITE	LOCAL	1.MI.	NO-NBL	0.0	0.0	GOOD	NO
A-26	11:10AM	CAL.-690JTC	74 GMC	TRAVELALL	LOCAL	5.MI.	NO-ATB	8.0	100.0	FORCE	NO
A-27	11:20AM	CAL.-393GTA	73 FORD	PINTO	LOCAL	6.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-28	11:22AM	CAL.-YIN876	65 CHEVY	IMPALA	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-29	0:00AM	CAL.-417-ERZ	68 FORD	MUSTANG	LOCAL	8.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-30	11:28AM	CAL.-063-GTS	73 DODGE	CHALLENGER	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-31	11:30AM	CAL.-TTA-688	56 CHEV.	WAGON	LOCAL	2.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-32	11:35AM	CAL.-WNK827	1964 PLYMOUTH	VALIANT	HIGHWAY	5.MI.	NO-NBL	0.0	100.0	POOR	NO
A-33	11:37AM	CAL.-SDU351	1962 CHEVY II	NOVA	LOCAL	1.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-34	0:00AM	CAL.-999KIP	74 FORD	PINTO WAGON	LOCAL	10.MI.	NO-NBL	0.0	100.0	GOOD	NO
A-35	11:45AM	CAL.-36013W	74 GMC	VAN	LOCAL	12.MI.	NO-NBL	0.0	100.0	GOOD	NO

CALCULATED DATA

APPENDIX B

STATION- EXXON DATE- 7/30/74
AVE UNDGRD TANK TEMP- 69.0 F BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCTN (VOL)
A-01	11:17AM	1.423	1.065	4.651	-8.000	-9.000	
A-03	11:31AM	1.354	1.138	4.768	-3.000	-4.000	
A-05	12:03PM	1.028	1.424	4.985	-1.000	-2.000	
A-11	2:32PM	0.872	1.208	4.500	3.000	-3.000	
A-25	5:34PM	1.938	1.160	9.036	4.000	2.000	
B-07	1:04PM	2.992	1.237	1.905	1.000	-6.000	
B-09	1:57PM	1.019	1.337	4.442	4.000	-7.000	
B-12	2:40PM	0.845	1.171	4.836	-1.000	-7.000	
B-19	4:15PM	1.120	1.047	4.486	5.000	-4.000	
B-21	4:30PM	1.767	0.924	7.800	19.000	14.000	
B-22	4:50PM	1.250	0.964	6.467	8.000	0.000	
B-25	5:20PM	2.282	1.028	4.766	5.000	-3.000	
B-27	5:30PM	0.870	0.868	5.000	6.000	0.000	

STATION- EXXON
AVE UNDGRD TANK TEMP- 58.5 F.

DATE- 7/31/74
BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A-12	12:25PM	0.026	0.026	4.150	-0.500	-4.000	
A-13	12:35PM	0.734	1.017	5.311	4.500	0.000	
A-16	1:00PM	0.660	0.914	4.909	10.500	7.000	
A-18	1:47PM	0.493	0.683	4.696	16.500	9.000	
A-19	1:55PM	1.103	0.959	4.691	10.500	4.000	
A-21	2:15PM	0.605	0.838	4.765	12.500	8.000	
A-23	2:30PM	0.392	0.838	3.889	14.500	9.000	
A-27	3:20PM	0.548	0.759	4.909	19.500	13.000	
B-02	9:40AM	2.439	1.055	4.850	0.500	0.000	
B-05	10:35AM	0.701	0.989	4.609	-1.500	-3.000	
B-09	11:45AM	0.723	1.002	4.936	4.500	1.000	
B-13	12:15PM	1.723	1.048	7.455	6.500	-1.000	
B-14	12:25PM	2.104	1.086	4.754	-1.500	-6.000	
B-26	3:05PM	0.679	0.941	3.115	7.500	4.000	
B-28	3:20PM	0.760	1.053	4.101	10.500	4.000	

STATION- EXXON
AVE UNDGRD TANK TEMP- 68.5 F

DATE- 8/ 1/74
BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A-11	2:30PM	1.078	1.105	4.515	5.500	1.000	
A-18	4:15PM	0.433	0.337	4.881	11.500	4.000	
A-26	5:20PM	1.006	0.836	4.909	14.500	7.000	
A-30	5:55PM	1.317	0.921	4.490	15.500	13.000	
A-35	6:40PM	0.789	0.656	6.667	23.500	21.000	
A-36	6:45PM	0.595	0.824	5.586	16.500	12.000	
B-05	1:20PM	2.567	1.032	4.574	15.500	9.000	
B-06	1:35PM	0.691	0.957	5.143	13.500	7.000	
B-07	1:43PM	1.700	0.902	9.097	17.500	11.000	
B-11	2:33PM	0.714	0.989	4.985	12.500	6.000	
B-12	2:50PM	1.664	0.798	4.611	28.500	22.000	
B-20	4:15PM	0.669	0.927	4.629	17.500	11.000	
B-21	4:25PM	0.731	1.013	4.765	17.500	8.000	
B-22	4:32PM	0.500	0.693	3.000	16.500	7.000	
B-32	5:52PM	0.735	1.018	2.842	11.500	5.000	
B-34	6:07PM	0.659	0.913	5.684	17.500	11.000	
B-38	6:39PM	0.969	0.697	4.333	16.500	10.000	
B-40	7:00AM	0.573	0.794	********	12.500	6.000	
B-42	7:15AM	0.682	0.945	5.062	13.500	7.000	
B-43	7:23AM	0.751	0.780	4.747	13.500	8.000	
B-45	7:35AM	1.422	1.053	4.626	5.500	0.000	

STATION - EXXON
AVE UNDGRD TANK TEMP- 70.0 F

DATE= 8/ 2/74
BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A=01	8:10AM	0.734	1.017	5.311	5.000	7.000	
A=02	8:20AM	0.784	1.086	4.909	-4.000	-6.000	
A=06	8:50AM	0.725	1.004	5.492	-3.000	-6.000	
A=10	9:18AM	1.801	0.976	4.652	0.000	-3.000	
A=11	9:35AM	1.840	1.912	4.454	-3.000	-6.000	
A=14	9:49AM	1.536	1.074	6.551	-4.000	-9.000	

STATION= EXXON DATE= 7/30/74
AVE UNDGRD TANK TEMP- 69.0 F NON-BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A-04	11:55AM	1.595	1.492	5.106	-6.000	-7.000	133.045
A-07	11:22AM	-0.335	-0.464	********	1.000	0.000	-45.755
A-09	1:11PM	0.472	0.654	4.836	4.000	3.000	67.533
A-10	1:30PM	1.174	0.508	3.437	22.000	19.000	70.251
A-13	3:32PM	0.746	0.522	8.676	6.000	3.000	53.867
A-14	3:38PM	0.015	0.012	********	5.000	0.000	1.216
A-15	3:59PM	0.719	0.996	4.438	8.000	3.000	102.873
A-16	4:12PM	1.315	1.014	4.850	2.000	-1.000	98.496
A-17	4:22PM	0.004	0.006	4.320	5.000	-1.000	0.538
A-18	0:00AM	1.053	0.703	4.699	5.000	0.000	69.342
A-20	0:00AM	1.088	0.993	4.777	7.000	5.000	105.871
A-21	4:55PM	0.103	0.107	4.966	4.000	1.000	10.713
A-22	5:04PM	0.902	0.865	4.776	12.000	9.000	98.739
A-23	5:14PM	0.752	1.042	7.535	3.000	-2.000	99.692
A-24	5:23PM	1.072	0.872	4.678	3.000	0.000	85.940
A-26	5:38PM	0.679	0.479	4.576	4.000	2.000	48.719
A-27	5:47PM	1.325	0.745	4.694	14.000	11.000	88.152
B-01	11:00AM	0.540	0.734	4.714	4.000	1.000	73.526
B-02	11:40AM	1.292	0.675	4.931	21.000	19.000	93.387
B-03	11:55AM	0.017	0.008	4.923	0.000	-5.000	0.729
B-04	12:30PM	0.331	0.148	5.010	11.000	5.000	15.815
B-05	12:45PM	0.563	0.780	9.529	-2.000	-6.000	70.494
B-10	2:00PM	1.098	0.821	4.800	7.000	-2.000	78.603
B-13	3:06PM	0.139	0.125	4.150	4.000	-4.000	11.647
B-14	3:15PM	1.224	1.041	4.889	6.000	-2.000	99.571
B-15	3:30PM	0.368	0.270	********	11.000	4.000	28.324
B-17	4:00PM	1.016	1.056	6.000	4.000	-5.000	96.754
B-18	4:10PM	0.779	0.620	7.139	14.000	4.000	65.060
B-24	5:05PM	0.020	0.012	4.909	10.000	5.000	1.267
B-26	5:25PM	0.022	0.019	4.526	5.000	-1.000	1.859

STATION- EXXON DATE- 7/31/74
AVE UNDGRD TANK TEMP- 68.5 F ION-BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A-01	9:34AM	0.257	0.192	5.263	-4.500	-8.000	16.908
A-02	9:48AM	0.343	0.513	5.000	4.500	5.000	54.737
A-03	9:58AM	1.192	1.025	4.661	-4.500	-4.000	95.283
A-04	10:07AM	1.033	1.431	108.000	-6.500	-6.000	129.344
A-05	10:22AM	1.133	0.911	8.719	-5.500	-3.000	85.951
A-06	10:54AM	0.778	0.820	5.325	-8.500	-2.000	78.444
A-08	11:33AM	0.933	1.183	4.597	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIENT							
A-09	12:00PM	1.245	0.745	5.515	2.500	-2.000	71.301
A-10	11:58AM	1.280	0.871	4.615	9.500	5.000	92.849
A-11	12:15PM	0.606	0.840	5.492	-0.500	-4.000	78.044
A-14	12:48PM	0.893	0.726	4.182	-5.500	-11.000	61.373
A-17	1:10PM	0.964	0.801	8.438	5.500	1.000	80.213
A-20	2:05PM	1.759	0.895	********	12.500	8.000	100.411
A-24	2:50PM	0.990	0.504	4.691	0.500	-4.000	46.836
A-26	3:10PM	1.297	1.078	5.000	3.500	-2.000	103.165
A-28	3:30PM	0.814	1.128	5.062	6.500	-2.000	107.911
A-29	3:33PM	1.451	0.759	4.820	13.500	8.000	85.146
A-30	3:40PM	0.343	0.193	10.025	4.500	-3.000	18.172
A-31	3:45PM	0.795	0.556	********	8.500	0.000	54.799
B-01	9:30AM	1.404	0.875	8.889	12.500	11.000	103.527
B-03	10:12AM	0.709	0.596	6.675	-0.500	-2.000	57.029
B-06	10:45AM	0.731	1.013	5.143	-1.500	-3.000	95.505
B-07	10:55AM	1.261	0.934	4.040	0.500	-1.000	90.710
B-08	11:10AM	1.582	1.106	4.901	-3.500	-7.000	98.600
B-11	12:00PM	1.213	1.680	4.836	2.500	-3.000	158.478
B-15	12:30PM	2.108	1.088	4.807	-2.500	-7.000	96.952
B-16	12:25PM	0.357	0.387	4.452	3.500	-1.000	37.591
B-17	12:50PM	0.782	0.513	********	5.500	1.000	51.370
B-18	1:00PM	0.598	0.828	4.154	4.500	0.000	81.676
B-19	1:30PM	0.763	1.057	4.765	4.500	0.000	104.212
B-20	1:43PM	1.253	0.937	4.444	7.500	1.000	93.834
B-21	1:50PM	1.320	0.691	4.714	3.500	-3.000	65.124
B-22	2:05PM	0.605	0.838	7.902	8.500	2.000	85.211
B-25	2:55PM	0.004	0.002	5.138	3.500	-3.000	0.175
B-27	3:10PM	1.924	0.809	5.314	21.500	15.000	103.133
B-29	3:30PM	0.885	1.226	4.765	9.500	3.000	126.624
B-31	2:10PM	0.721	0.529	4.708	21.500	16.000	68.792

STATION- EXXON DATE- 8/ 1/74
AVE UNDGRD TANK TEMP- 68.5 F NON-BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A-03	1:04PM	1.157	0.941	5.872	5.500	-3.000	88.725
A-06	1:35PM	0.727	1.007	4.563	10.500	6.000	109.212
A-07	1:40PM	0.493	0.666	4.459	4.500	0.000	65.708
A-08	2:10PM	1.262	1.049	4.655	11.500	11.000	124.075
A-09	2:20PM	1.120	0.741	4.878	27.500	23.000	112.134
A-10	2:25PM	0.080	0.111	4.629	33.500	30.000	20.013
A-12	2:45PM	0.222	0.080	6.534	18.500	12.000	9.619
A-13	2:55PM	0.354	0.248	4.367	36.500	32.000	47.316
A-14	3:15PM	1.712	0.622	5.749	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIENT							
A-15	3:30PM	0.155	0.123	5.423	16.500	12.000	14.860
A-16	3:35PM	1.252	1.041	4.030	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIENT							
A-17	3:55PM	0.965	1.337	3.000	14.500	8.000	149.957
A-19	4:25PM	0.533	0.554	4.696	24.500	18.000	75.041
A-20	4:35PM	0.182	0.252	6.750	26.500	20.000	35.648
A-21	4:40PM	1.313	0.646	4.406	26.500	22.000	95.511
A-22	4:50PM	0.445	0.594	4.364	9.500	4.000	62.385
A-24	5:05PM	1.016	1.408	4.563	35.500	31.000	261.411
A-27	5:20PM	0.018	0.009	4.613	17.500	13.000	1.156
A-28	5:35PM	1.724	0.896	4.174	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIENT							
A-29	5:50PM	1.005	1.392	4.050	12.500	8.000	156.173
A-31	6:00PM	0.627	0.651	********	15.500	12.000	78.480
A-32	6:05PM	0.999	0.830	4.615	14.500	9.000	94.776
A-33	6:15PM	0.329	0.456	5.400	19.500	16.000	59.293
A-34	6:20PM	0.794	1.100	4.765	10.500	6.000	119.277
A-37	6:55PM	0.291	0.369	4.658	26.500	23.000	55.801
A-38	7:10AM	0.920	0.471	5.214	6.500	4.000	49.470
A-39	7:25AM	1.025	0.552	4.935	19.500	16.000	71.765
B-01	12:30PM	0.566	0.784	4.629	10.500	5.000	83.634
B-02	12:44PM	0.663	0.919	4.836	6.500	1.000	91.945
B-03	12:47PM	0.572	0.792	4.629	9.500	3.000	81.841
B-08	1:48PM	0.369	0.613	6.000	14.500	8.000	68.809
B-10	2:20PM	0.496	0.687	4.765	2.500	-4.000	63.878
B-13	3:04PM	0.854	0.519	********	21.500	15.000	66.247
B-14	3:06PM	0.103	0.143	3.484	17.500	11.000	16.877
B-16	3:22PM	1.800	2.494	4.909	17.500	11.000	294.950
B-17	3:35PM	1.748	0.797	4.535	17.500	11.000	94.312
B-23	4:38PM	0.882	0.857	6.507	17.500	9.000	97.804
B-24	4:45PM	0.438	0.607	4.696	21.500	15.000	77.392
B-25	4:53PM	0.000	0.000	4.500	21.500	15.000	0.000
B-27	5:05PM	0.361	0.500	4.696	17.500	11.000	59.154
B-28	5:17PM	1.088	0.915	7.853	19.500	13.000	112.246
B-30	5:33PM	0.005	0.007	7.535	16.500	10.000	0.805
B-31	5:45PM	0.483	0.669	4.629	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIENT							
B-33	6:00PM	0.613	0.515	7.853	12.500	6.000	55.873
B-35	5:17PM	0.754	0.634	9.368	12.500	6.000	68.724
B-39	6:45PM	1.759	1.053	4.545	13.500	7.000	116.085
B-44	7:34AM	0.271	0.375	4.433	9.500	4.000	39.399
B-46	7:42AM	0.892	0.750	4.564	10.500	5.000	79.971

STATION= EXXON DATE= 8/ 2/74
AVE UNDGRD TANK TEMP= 70.0 F NON-BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A=03	8:25AM	2.291	0.968	4.699	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIENT							
A=05	8:45AM	0.855	1.184	4.696	-4.000	-7.000	105.591
A=07	8:55AM	0.779	1.079	4.629	-5.000	-8.000	94.906
A=08	9:00AM	0.490	0.426	2.963	-3.000	-6.000	38.524
A=09	9:17AM	0.879	0.926	3.944	-2.000	-2.000	88.627
A=12	9:37AM	1.413	1.050	4.556	-1.000	-5.000	96.263
A=13	9:45AM	0.075	0.104	7.043	-8.000	-12.000	8.669
A=15	10:00AM	0.192	0.266	6.480	-7.000	-10.000	22.777
A=16	0:00AM	0.530	0.734	4.629	0.000	-4.000	68.256
A=17	10:10AM	1.415	0.773	4.541	-2.000	-5.000	70.818
A=18	10:20AM	0.018	0.025	7.200	-2.000	-7.000	2.223
A=20	10:35AM	1.719	0.804	12.973	5.000	0.000	79.240
A=21	10:40AM	0.419	0.352	8.754	3.000	-2.000	33.702
A=22	11:50AM	1.292	1.017	4.711	0.000	-3.000	95.949
A=23	10:55AM	0.674	0.934	5.226	2.000	-1.000	90.684
A=24	11:00AM	0.714	0.668	4.324	6.000	3.000	68.956
A=25	0:00AM	1.567	0.787	4.632	2.000	-2.000	75.287
A=27	11:20AM	0.757	0.798	9.467	5.000	3.000	82.377
A=28	11:22AM	0.692	0.575	9.310	8.000	5.000	61.351
A=29	0:00AM	1.078	0.754	8.795	18.000	14.000	94.282
A=30	11:28AM	0.574	0.954	4.576	8.000	6.000	103.473
A=31	11:30AM	0.022	0.030	4.208	2.000	0.000	3.005
A=32	11:35AM	0.286	0.301	5.757	3.000	1.000	30.166
A=33	11:37AM	0.172	0.134	4.222	-4.000	-7.000	11.934
A=34	0:00AM	0.842	0.768	6.000	10.000	7.000	84.707
A=35	11:45AM	0.637	0.662	9.191	15.000	11.000	78.285

STATION= EXXON DATE= 7/30/74
AVE UNDGRD TANK TEMP= 69.0 F ATMPID BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	FFF O COLLC (VOL
A=02	11:22AM	0.328	0.454	4.263	-8.000	-9.000	
A=06	12:10PM	1.153	1.597	4.765	15.000	12.000	
A=08	12:47PM	0.277	0.384	4.909	8.000	5.000	
A=12	3:12PM	0.246	0.119	7.440	6.000	-1.000	
A=19	4:37PM	0.237	0.246	4.645	-3.000	-5.000	
B=06	12:55PM	1.471	0.941	4.388	8.000	3.000	
B=08	1:45PM	1.590	0.975	4.980	16.000	9.000	
B=11	2:10PM	0.877	1.238	********	3.000	-4.000	
B=16	3:55PM	0.716	0.992	5.062	********	********	
*** THE PREVIOUS AUTOMOBILE WAS NOT USED IN THE CALCULATIONS DUE TO INSUFFICIEN							
B=20	4:30PM	1.877	0.883	8.296	7.000	2.000	
B=23	4:55PM	1.357	1.080	********	3.000	-2.000	

STATION= EXXON DATE= 7/31/74
AVE UNDGRD TANK TEMP- 68.5 F ATMPTD BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL
A=07	11:58AM	0.645	0.483	3.468	-1.500	-2.000	
A=15	12:55PM	0.334	0.463	4.985	0.500	-4.000	
A=22	2:25PM	1.107	0.920	4.821	7.500	3.000	
A=25	3:02PM	0.858	1.189	4.836	7.500	5.000	
B=04	10:20AM	0.532	0.407	4.742	-0.500	-2.000	
B=10	11:55AM	0.798	1.106	4.438	0.500	-5.000	
B=12	12:10PM	0.495	0.771	4.174	-0.500	-6.000	
B=23	2:30PM	1.040	0.973	4.948	4.500	-2.000	
B=24	2:40PM	0.735	1.018	7.902	1.500	-5.000	
B=30	3:35PM	0.788	1.092	4.500	7.500	1.000	

STATION= EXXON DATE= 8/ 1/74
AVE UNDGRD TANK TEMP= 68.5 F ATMPTC BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG=VEH TANK TMP (DEG F)	DISP=VEH TANK TMP (DEG F)	EFF OF COLLCT (VOL)
A=01	12:50PM	0.654	0.906	5.143	14,500	11,000	
A=02	1:00PM	=151.132	=209.374	4.263	8,500	4,000	
A=04	1:10PM	0.341	0.472	4.696	14,500	9,000	
A=05	1:15PM	0.005	0.007	3.522	13,500	9,000	
A=23	4:55PM	1.460	0.642	5.075	25,500	22,000	
A=25	5:10PM	0.321	0.338	4.581	18,500	14,000	
B=04	12:53PM	0.758	1.050	4.696	6,500	1,000	
B=09	2:04PM	0.486	0.673	4.765	12,500	6,000	
B=15	3:16PM	0.212	0.294	4.629	23,500	16,000	
B=18	3:48PM	1.780	0.765	4.724	27,500	21,000	
B=19	3:58PM	0.125	0.173	4.765	23,500	17,000	
B=26	5:00PM	1.011	0.688	4.490	15,500	8,000	
B=29	5:29PM	0.278	0.234	7.853	34,500	28,000	
B=36	6:28PM	0.623	0.859	3.057	16,500	10,000	
B=37	6:33PM	0.590	0.817	4.629	9,500	3,000	
B=41	7:06AM	1.092	0.918	********	6,500	0,000	

STATION- EXXON DATE= 8/ 2/74
AVE UNDGRD TANK TEMP- 70.0 F ATMPID BASELINE

PUMP	TIME	RET VAPOR VOLUME (FT3)	VAP/LIQ RATIO	DISP RATE (G/MIN)	UNDG-VEH TANK TMP (DEG F)	DISP-VEH TANK TMP (DEG F)	EFF C COLLC (VOL
A=04	8:40AM	0.717	0.984	5.143	2.000	0.000	
A=19	10:27AM	1.349	0.878	4.510	-2.000	-6.000	
A=26	11:10AM	0.857	1.187	5.143	7.000	4.000	

Sample Calculations

I. Nomenclature

V_r = net returned vapor volume, ft^3

V_f = final meter reading in vapor return hose, ft^3

V_i = initial meter reading in vapor return hose, ft^3

L_d = dispensed liquid volume, gallons

V/L = vapor volume to liquid volume ratio, ft^3/ft^3

t = fill time, min.

R_d = gasoline dispensing rate, gal/min

T_v = vehicle tank liquid temperature, ^oF

T_u = underground tank temperature, ^oF

T_d = dispensed liquid temperature, ^oF

T_r = returned vapor temperature, ^oF

II. Calculations

A. For each vehicle used in testing, calculate:

1. Volume of returned vapors:

$$V_r = V_f - V_i$$

2. Volume to liquid ratio

$$V/L = \frac{V_r}{L_d} \times 7.481$$

3. Dispensing rate

$$R_d = \frac{L_d}{t}$$

4. Vehicle tank liquid - dispensed liquid temperature difference

$$\Delta T_{vd} = T_v - T_d$$

B. For vehicles qualifying as baseline tests; determine:

the potential emission baseline correlation

$$(V/L)_{pot} = a + b\Delta T_{vd}$$

where

$(V/L)_{pot}$ = potential volume returned to liquid dispensed ratio

a, b = correlation constants.

Numerical least squares techniques are used with ΔT_{vd} as the independent variable and $(V/L)_{pot}$ as the dependent variable.

C. For each non-baseline vehicle calculate: (Delete all baseline and attempted baseline tests from further calculations)

1. V_r, actual vapors returned (from A.1)
2. ΔT_{vd}, vehicle tank liquid temperature - dispensed liquid temp. difference (from A.4)
3. V_{pot}, potential volume returned, based on baseline correlation:

$$V_{pot} = (a + b\Delta T_{vd}) \frac{L_d}{7.481}$$

D. Average recovery factors and efficiencies

1. Average Potential Emission Factor

$$\overline{(V/L)}_{pot} = \frac{\sum_{i=1}^{n} V_{pot_i}}{\sum_{i=1}^{n} L_{d_i}}$$

where i = number of normally filled vehicles in data set

2. Average Recovery Factor

$$\overline{(V/L)}_r = \frac{\sum_{i=1}^{n} V_{r_i}}{\sum_{i=1}^{n} L_{d_i}}$$

3. Average actual emission factor at the vehicle

$$\overline{(V/L)}_e = \overline{(V/L)}_{pot} - \overline{(V/L)}_r$$

4. Average Volumetric Recovery Efficiency

$$E_v = \frac{\overline{(V/L)}_r}{\overline{(V/L)}_{pot}} \quad (100\%)$$

LABORATORY REPORT

APPENDIX C

HOUSTON LABORATORY
1215 DUMBLE STREET

CORPUS CHRISTI LABORATORY
2618 WEST BROADWAY

SAN PEDRO LABORATORY
825 MIRAFLORES AVE.

Chas. MARTIN
Inspectors
of Petroleum, Inc.

JAMES J. MULLIN • APPROVED AND
LICENSED BY NEW YORK PRODUCE EXCHANGE

ELIZABETH, N. J. LABORATORY
BAYWAY TERMINAL BUILDING

NEW ORLEANS LABORATORY
8139 OLEANDER STREET

CHICAGO LABORATORY
ARGO, ILLINOIS

RICHMOND, CALIFORNIA
AUGUST 27, 1974

TO BETZ ENVIRONMENTAL ENGR., INC. ~~SAMPLE SUBMITTED BY~~
1 PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PA 19462
ATTN: P. R. CHARRINGTON
SENIOR PROJECT ENGR.

REPORT OF LABORATORY ANALYSIS

SAMPLE IDENTIFICATION:	GASOLINE VAPOR PRESSURE, REID @ 100°F., P.S.I.
CA 820 DHT	6.4
CA VMJ 865	7.3
CA 042 DGZ	6.7
CA 27629 W	7.2
CA UBW 517	6.3
DKL 015	7.8
CA 690 JTC	8.0
CA 386 ERW	8.0
CA ABZ 947	8.0
CA 980 BYX	7.3
CA 411 CPL	7.4
CA 703 LBI	7.9
137 FSM	7.2
CA 38852S	7.3
CA 57294L	7.3
CA BZU 648	7.1
CA 09483V	7.4
420 LBJ	7.0
VCW 618	7.8
377 LDG	7.6
CA 030014	8.1
CA 63899M	7.9
CA VJN 624	8.0
CA 30877 B	7.5
UNDERGROUND LOW LEAD 8/8/74	7.6
UNDERGROUND TANK AFTER DROP 8/9/74	7.9
CA 438 AAJ	7.2
CA 381 JAY	6.4
NV BF 4028	8.0
CA AVA 614	6.7
CA 293 FDW	3.4
CA P 23 843	7.4
CA 710 DAJ	6.0
CA 145 EEZ	7.2
CA 998 FQG	7.8

BY C. R. Williams
DEPUTY INSPECTOR OF PETROLEUM
APPROVED BY NEW YORK PRODUCE EXCHANGE

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AUGUST 27, 1974

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1 PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PA 19462
ATTN: P. R. CHARRINGTON
SENIOR PROJECT ENGR.

REPORT OF LABORATORY ANALYSIS

SAMPLE IDENTIFICATION:	GASOLINE VAPOR PRESSURE, REID @ 100°F., P.S.I.
CA 254 JWC	8.1
CA 941 GIS 7/31/74	7.2
CA EPU 480 7/31/74	8.0
CA 960 KDV 7/31/74	7.9
353 EZC	7.4
CA ZPH 472	7.3
CA 278 JBQ	6.6
CA 363 GCN	6.6
CA KQK 086	6.8
CA 771 JVG	6.9
CA 095 BCW	8.2
EXXON UNDERGROUND REGULAR GAS 8/1/74 2000	8.7
EXXON HAYWARD REGULAR GAS	8.7
CA 35003 B	7.8
CA 548 FCF	7.8
CA ASH 864	7.9
CA 37063 V	6.8
CA 409 FQD	6.6
CA YJN 011	5.9
CA 349 FJV	6.2
CA 298 FXP	6.7
CA 999 KJD	7.0
CA E 559404	6.8
CA VAA 970	7.5
CA MKB 050 7/31/74	7.3
CA 978 BWL	6.1
CA 55076 H	6.0
CA YJL 292 7/31/74	6.8
CA C 71170	7.2
CA 999 K7P A-3	7.9
CA 077 CVO	6.9
CA 287 JAR	7.9
CA 193 BOF 7/31/74	8.4
CA 140 FIW	8.2
NY 223 YYJ	7.8
CA HOE 171 7/31/74	7.9

BY C R Williams
DEPUTY INSPECTOR OF PETROLEUM
APPROVED BY NEW YORK PRODUCE EXCHANGE

FORM 4

HOUSTON LABORATORY
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RICHMOND, CALIFORNIA

AUGUST 27, 1974

TO BETZ ENVIRONMENTAL ENGR., INC. SAMPLE SUBMITTED BY
1 PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PA 19462
ATTN: P. R. CHARRINGTON
SENIOR PROJECT ENGR.

REPORT OF LABORATORY ANALYSIS

SAMPLE IDENTIFICATION:	GASOLINE VAPOR PRESSURE, REID @ 100°F., P.S.I.
CA AGH 326	8.0
CA SDT 582	7.8
CA 181 CMC 7/31/74	7.9
CA 393 GTA	7.5
CA WDK 111	8.1
CA VXE 295	7.5
139 ARF	7.0
CA 544 CLI	6.8
CA 936 EFZ	6.4
CA 193 HCJ	6.9
CA 06089 U	6.5
CA WDH 856	7.2
CA MKR 322	6.6
CA 158 JWY	6.8
CA 63951 M	6.5
U.S. GOVERNMENT G1170212	7.2
CA VYZ 927	7.1
CA 904 HLE	7.0
CA YLZ 244	7.5
CA 342 JWC	7.2
CA YAM 267	6.4
CA 7746 EI	8.3
CA YQK 313	7.8
CA 009 KEY	7.2
CA 654 JVG	7.9
CA WMK 565	8.2
021 FXO	7.6
CA VA 6 KNX	6.7
257 JBQ	6.8
CA 688 HBZ	7.2
CA WPT 476	7.0
033 DXV	7.7
624 GKH	7.8
CO LX 3060	7.7
CA IV 24	7.5
CA STARR 1	8.0
CA 366 HBZ	7.6

BY C R Williams
DEPUTY INSPECTOR OF PETROLEUM
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FORM 4

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RICHMOND, CALIFORNIA

AUGUST 27, 1974

TO BETZ ENVIRONMENTAL ENGR., INC. SAMPLE SUBMITTED BY
1 PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PA 19462
ATTN: P. R. CHARRINGTON
SENIOR PROJECT ENGR.

REPORT OF LABORATORY ANALYSIS

SAMPLE IDENTIFICATION:	GASOLINE VAPOR PRESSURE, REID @ 100°F., P.S.I.
CA 253 KUA	8.3
CA 589 EEU	7.4
CA B 71 060	7.5
CA 703 DXP	7.3
TLZ 244	6.4
MEXICO VW VAN	7.9
CA 091369	8.2
CA 357 FMU	7.6
CA 15521 N	8.2
CA 280 LBH	8.0

BY C. P. Tull Burns
DEPUTY INSPECTOR OF PETROLEUM
APPROVED BY NEW YORK PRODUCE EXCHANGE

HOUSTON LABORATORY
1215 DUMBLE STREET

CORPUS CHRISTI LABORATORY
2618 WEST BROADWAY

SAN PEDRO LABORATORY
825 MIRAFLORES AVE.

Chas. MARTIN

ELIZABETH, N. J., LABORATORY
BAYWAY TERMINAL BUILDING

CHICAGO LABORATORY
ARGO, ILLINOIS

JAMES J. MULLIN • APPROVED AND LICENSED BY NEW YORK PRODUCE EXCHANGE

RICHMOND, CALIFORNIA
AUGUST 27, 1974

TO BETZ ENVIRONMENTAL ENGR., INC. SAMPLE SUBMITTED BY
1 PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PA 19462
ATTN: P. R. CHARRINGTON
SENIOR PROJECT ENGR.

REPORT OF LABORATORY ANALYSIS

SAMPLE IDENTIFICATION:	GASOLINE EXXON UNDERGROUND REGULAR TANK 4:05 PM - 7/31/74
VAPOR PRESSURE, RIED @ 100°F., PSI	8.4
DISTILLATION:	
INITIAL BOILING POINT, °F.	104
5% RECOVERED, °F.	123
10% RECOVERED, °F.	136
50% RECOVERED, °F.	220
90% RECOVERED, °F.	370
95% RECOVERED, °F.	397
END POINT, °F.	403
RECOVERED, VOLUME, %	97.0
RESIDUE, VOLUME, %	1.5
LOSS, VOLUME, %	1.5

BY C R Williams
DEPUTY INSPECTOR OF PETROLEUM
APPROVED BY NEW YORK PRODUCE EXCHANGE

FORM 4

HOUSTON LABORATORY
1215 DUMBLE STREET

CORPUS CHRISTI LABORATORY
2618 WEST BROADWAY

SAN PEDRO LABORATORY
825 MIRAFLORES AVE.

Chas. MARTIN

ELIZABETH, N. J., LABORATORY
BAYWAY TERMINAL BUILDING

NEW ORLEANS LABORATORY
8139 OLEANDER STREET

CHICAGO LABORATORY
ARGO, ILLINOIS

JAMES J. MULLIN • APPROVED AND
LICENSED BY NEW YORK PRODUCE EXCHANGE

RICHMOND, CALIFORNIA
AUGUST 27, 1974

TO BETZ ENVIRONMENTAL ENGR., INC. SAMPLE SUBMITTED BY
1 PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PA 19462
ATTN: P. R. CHARRINGTON
SENIOR PROJECT ENGR.

REPORT OF LABORATORY ANALYSIS

SAMPLE IDENTIFICATION:	GASOLINE EXXON REGULAR UNDERGROUND TANK 8:00 PM - 8/1/74
VAPOR PRESSURE, REID @ 100°F., PSI	8.8
DISTILLATION:	
INITIAL BOILING POINT, °F.	98
5% RECOVERED, °F.	121
10% RECOVERED, °F.	132
50% RECOVERED, °F.	217
90% RECOVERED, °F.	358
95% RECOVERED, °F.	400
END POINT, °F.	412
RECOVERED, VOLUME, %	96.5
RESIDUE, VOLUME, %	1.5
LOSS, VOLUME, %	2.0

BY C R Williamson
DEPUTY INSPECTOR OF PETROLEUM
APPROVED BY NEW YORK PRODUCE EXCHANGE

FORM 4

DENA TEXAS LABORATORY
1131 NORTH TATAN STREET

CORPUS CHRISTI LABORATORY
2610 WEST BROADWAY

SAN PEDRO LABORATORY
825 MIRAFLORES AVE.

Chas. MARTIN

ELIZABETH, N. J. LABORATORY
BAYWAY TERMINAL BUILDING

NEW ORLEANS LABORATORY
8139 OLEANDER STREET

CHICAGO LABORATORY
ARGO, ILLINOIS

JAMES J. MULLIN - PRESIDENT
INDEPENDENT LICENCED INSPECTION COMPANY
MEMBERS OF ASTM & API

San Pedro, California - September 10, 1974

TO BETZ ENVIRONMENTAL ENGINEERS, INC.
1 Plymouth Meeting Mall
Plymouth Meeting, Pennsylvania 19462

SAMPLE SUBMITTED BY Betz Environmental Engineers

REPORT OF LABORATORY ANALYSIS

LAB #		DISSOLVED OXYGEN PPM	NITROGEN PPM
1048	Underground tank before drop 8/8/74	<10	9
1049	Underground tank after drop 8/9/74	<10	10
1050	Exxon Hayward - 8/2/74, 12:30 PM	<10	58
1051	Exxon Regular underground tank 8/1/74, 8:00 PM	<10	57
1052	Undergound tank 7/31/74, 4:05 PM	<10	58
1079A	Underground tank 8/14/74	<10	10
1079B	Underground tank 8/16/74	<10	9
1079C	Underground tank after drop 8/15/74	<10	9
1079D	Underground tank 8/13/74	<10	10
1079E	Underground tank before drop 8/15/74	<10	8

BY _____
DEPUTY INSPECTOR OF PETROLEUM

DAILY LOG SHEETS

APPENDIX D

SERVICE STATION DAILY DATA SHEET

STATION NAME EXXON DATE 7/30/74

LOCATON Hayward, California

PUMP METER READINGS

	Initial Vol.	Final Vol.
Time	11:00	17:55
Pump No.		
A	28979.1	29327.4
B	45476.2	45912.5
C	86622.3	86658.1
D	41446.9	41448.5
E	34019.0	34203.9
F	78973.3	79016.8

11:00 AM - 6:00 PM

NOTES

1. First day of good testing.
2. Slow at first but improvements fast.
3. Shortage of extra equip.
   a) Explosimeter
   b) Hygrometer
   c) Manometer-2
4. Duty assignments to be discussed after.
5. 54 Cars Tested

UNDERGROUND TANK TEMPERATURE READINGS

Tank No.	Initial	Final
Regular	68 °F	70 °F
Extra	68 °F	70 °F
Unleaded	68 °F	70 °F

Time

UNDERGROUND TANK VOLUME READINGS

Tank No.	Initial	Final
Regular	62" Gal.	55½" Gal.
Extra	76½" Gal.	73" Gal.
Unleaded	60" Gal.	60" Gal.
	Gal.	Gal.

Time

VENT OUTLET VOLUME READINGS

Vent No.	Initial	Final
A	000.11 ft³	000.11 ft³
	ft³	ft³
	ft³	ft³

Time 1:35PM (Initial) Final 17:55

VENT OUTLET HC READINGS

Vent No.	Initial	Final	Average
A	— %	— %	— %
	%	%	%
	%	%	%

Time

← Jackson Street (Rt. 92) →

A	C	E
R	UL	E
B	D	F

SERVICE STATION DAILY DATA SHEET

STATION NAME EXXON DATE 7/31/74

LOCATON HAYWARD

PUMP METER READINGS

Pump No.	Initial Vol. (Time 0800)	Final Vol. (1555)
A	29479.3	29903.2
B	46103.7	46533.5
C	86708.9 [redacted]	86724.4
D	41472.9	41484.1
E	34298.7 [redacted]	34371.3
F	79173.7	79350.7
[redacted]	[redacted]	

NOTES

62 Cars Tested

UNDERGROUND TANK TEMPERATURE READINGS

Tank No.	Initial	Final
Regular	68 °F	69 °F
Extra	69 °F	68 °F
Unleaded	69 °F	71 °F
Time	0800	1615

UNDERGROUND TANK VOLUME READINGS

Tank No.	Initial	Final
Regular	52" [redacted] Gal.	[redacted]" Gal. 46 3/4"
Extra	71 3/4" Gal.	67 1/4" Gal.
Unleaded	58" Gal.	57 1/4 Gal.
	Gal.	Gal.
Time	0800	1615

VENT OUTLET VOLUME READINGS

Vent No.	Initial	Final
A	.11 ft^3	.11 ft^3
	ft^3	ft^3
	ft^3	ft^3
Time	0800	1615

VENT OUTLET HC READINGS

Vent No.	Initial	Final	Average
A	— %	— %	— %
	%	%	%
	%	%	%
Time			

SERVICE STATION DAILY DATA SHEET

STATION NAME Exxon DATE 8/1/74

LOCATON HAYWARD, CALIF.

PUMP METER READINGS

Pump No.	Initial Vol.	Final Vol.
Time	1220	2000
A	30270.2	30753.2
B	46987.0	47418.8
C	86766.2	86776.9
D	41484.1	41484.1
E	34664.7	34860.6
F	79675.8	79846.5

NOTES

85 Oxy Tested

UNDERGROUND TANK TEMPERATURE READINGS

Tank No.	Initial	Final
UNLEADED	67 °F	69 °F
EXTRA	68 °F	68 °F
REGULAR	69 °F	68 °F
Time	1235	2005

UNDERGROUND TANK VOLUME READINGS

Tank No.	Initial	Final
UNLEADED	57 3/4"	57 1/2"
EXTRA	62 1/2" Gal.	58 1/4" Gal.
REGULA	40 3/4" Gal.	33 1/2" Gal.
	Gal.	Gal.
	Gal.	Gal.
Time	1235	2010

VENT OUTLET VOLUME READINGS

Vent No.	Initial	Final
4	.11 ft^3	.11 ft^3
	ft^3	ft^3
	ft^3	ft^3
Time	1300	2010

VENT OUTLET HC READINGS

Vent No.	Initial	Final	Average
A	0 %	0 %	0 %
	%	%	%
	%	%	%
Time	1300		2010

SERVICE STATION DAILY DATA SHEET

STATION NAME EXXON DATE 8/2/74

LOCATION HAYWARD

PUMP METER READINGS

Time	Initial Vol. 0745	Final Vol. 1220
Pump No.		
A	30859.7	31175.0
B	47483.5	47634.6
C	86776.9	86776.9
D	41484.1	41514.0
E	34909.0	34930.0
F	79853.0	79942.6

NOTES

35 cars tested

UNDERGROUND TANK TEMPERATURE READINGS

Tank No.	Initial	Final
Regular	68 °F	72 °F
Extra	69 °F	72 °F
Unleaded	69 °F	73 °F
Time	0750	1235

UNDERGROUND TANK VOLUME READINGS

Tank No.	Initial	Final
Twice		
Regular	31 3/4" Gal.	27 3/4" Gal.
Extra	57" Gal.	56.5" Gal.
Unleaded	57" Gal.	53 3/4" Gal.
	Gal.	Gal.
Time	0750	1240

VENT OUTLET VOLUME READINGS

Vent No.	Initial	Final
A	.11 ft³	.11 ft³
	ft³	ft³
	ft³	ft³
Time	0800	1240

VENT OUTLET HC READINGS

Vent No.	Initial	Final	Average
A	0 %	0 %	0 %
	%	%	%
	%	%	%
Time	0800		1240

PROJECT PARTICIPANTS

APPENDIX E

The following individuals were present during all or part of the testing:

B.E.E.

P.R. Charrington - Senior Project Engineer
F.J. Boinski - Assistant Project Engineer
J.H. Geiger - Assistant Project Engineer
R. Smith - Assistant Project Engineer
G.W. Bainton - Engineering Technician
R. Lamb - Engineering Technician
W. Schultz - Engineering Technician

E.P.A.

W.E. Kelley - FTS, EMB (Task Project Officer)
P.R. Westlin - RSS, EMB
R. Vong - FTS, EMB

RADIAN CORPORATION

J. Dickerman - Associate Engineer

EXXON

B.K. Tom - Staff Engineer
L. Hageman - Station Manager

OPW

R.C. Carl - V.P. Engineering