APTD-1572

JUNE 1973

A STUDY OF BASELINE EMISSIONS ON 6,000 - 14,000 POUND GROSS VEHICLE WEIGHT TRUCKS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Office of Air and Water Programs

Office of Mobile Source Air Pollution Control

Emission Control Technology Division

Ann Arbor, Michigan 48105

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A STUDY OF BASELINE EMISSIONS ON 6,000 - 14,000 POUND GROSS VEHICLE WEIGHT TRUCKS

by

Automotive Environmental Systems, Inc.
7300 Bolsa Avenue
Westminster, California 92683

Contract No. 68-01-0468

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Prepared for

ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Water Programs
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
Ann Arbor, Michigan 48105

June 1973

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Publication No. APTD-1572

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1. INTRODUCTION

Exhaust and evaporative emissions from gasoline powered intermediate duty vehicles contribute significantly to air pollution in the United States. However, the exact portion of the nationwide inventory of air pollutants contributed by intermediate duty vehicles is not known. The United States Environmental Protection Agency has recognized the need for accurate exhaust and evaporative emissions data from these vehicles.

Prior to the design and implementation of an emissions control program for intermediate duty vehicles, information must be obtained which constitutes the parameters of this program. First, an accurate and relatively inexpensive test procedure must be developed for determining and monitoring the mass of effluents from intermediate duty vehicles. Second, the mass of effluents from these vehicles must be determined for the entire vehicle population and for the average vehicle in various subgroups. Third, the effectiveness of emission controls on later model vehicles must be determined.

The EPA has taken a step toward solving these problems by awarding a contract for "A Study of Baseline Emissions on 6,000 - 14,000 Pound Gross Vehicle Weight Trucks" to Automotive Environmental Systems, Inc. The results of this program are presented in this final report.

2. TECHNICAL DISCUSSION

2.1 PROGRAM OBJECTIVES

The following program objectives must be accomplished before an effective emissions control program can be implemented for intermediate duty vehicles.

The first objective is to provide baseline emission data on 6,000 to 14,000 pound GVW vehicles. This data is necessary to determine the contribution of this class of vehicles to air pollution. With this information EPA will be able to determine the relative urgency for implementing an intermediate duty vehicle emissions control program. Fifty vehicles will be replicate tested for a total of 132 emissions tests. The vehicle fleet is comprised of vehicles in proportion to their occurrence in the national 6,000-14,000 pound GVW vehicle population.

The second objective is to determine the suitability of the light duty vehicle test procedure for intermediate duty vehicles. Any changes necessary to the procedures or test equipment are to be determined. All problems unique to the testing of intermediate duty vehicles must be encountered so that they can be resolved prior to any large scale test program.

Also, the effectiveness of tuning vehicles as an emissions control strategy is to be determined. Sixteen test vehicles of 1972 and 1973 model years will be duplicate tested, tuned to manufacturer's specifications and then duplicate tested again.

2.2 VEHICLE PROCUREMENT

2.2.1 Test Vehicle Selection

The objective of the test vehicle procurement task was to obtain test vehicles of the appropriate make, model year and gross vehicle weight (GVW) from 6,000 to 14,000 pounds in proportion to their occurrence in the national population. To satisfy this goal, AESi developed from motor vehicle sales information an initial truck vehicle matrix for 150 program vehicles (Figure 2.2-1). Information was obtained from Automotive News, 1973, for 1970-71 model years and from the 1970 issue of Motor Truck Facts for 1969 through 1965 model years. The number of vehicles for 1972 and 1973 was based on projected sales volume. The matrix was then adjusted for attrition as reported in the Automotive News Almanac, 1970 and 1972 issues. The 150 vehicle matrix was then divided equally between EPA, Southwest Research Institute and AESi. Figure 2.2-2 is the truck vehicle matrix that AESi followed during the course of this program.

A list of 1000 randomly selected 1965 through 1973 truck vehicle owners was purchased from R. L. Polk and Company. A certified mailing was then sent to each of the vehicle owners consisting of:

1. A letter soliciting the truck owner's participation in the program, Figure 2.2-3
2. A postage-paid return postcard, Figure 2.2-4.

Concurrently with the mailing, AESi obtained the telephone numbers of selected vehicle owners. Starting approximately one week after the mailing, AESi called selected vehicle owners and encouraged them to participate in the program. A vehicle owner contact form shown in Figure 2.2-5 was completed for every contact made with the vehicle owner, describing details of the contact in brief.

During the course of the program, 65 percent of the vehicles procured and emissions tested were obtained from this list of randomly selected vehicles. The remainder of the program vehicles were obtained from rental or leasing agencies.

TRUCK VEHICLE MATRIX
6,000-16,000 POUND GROSS VEHICLE WEIGHT

MAKE	G.V.W.	1973	1972	1971	1970	1969	1968	1967	1966	1965	TOTAL
Chev	6-10	7	9	5	5	6	4	4	4	3	47
	10-14	-	-	-	-	-	-	-	-	-	-
Dodg	6-10	3	3	1	1	2	2	1	1	-	14
	10-14	6	5	-	-	-	-	-	-	-	11
Ford	6-10	10	11	5	6	6	5	5	5	3	56
	10-14	-	-	-	-	-	-	-	-	-	-
	14-16	← 2 →		-	-	-	-	-	-	-	2
GMC	6-10	2	2	1	1	1	1	1	1	-	10
	10-14	-	-	-	-	-	-	-	-	-	-
Intl	6-10	1	1	-	1	1	1	1	1	-	7
	10-14	1	-	-	-	-	-	-	-	-	1
	14-16	← 1 →									1
Misc	6-10	1	-	-	-	-	-	-	-	-	1
	10-14	-	-	-	-	-	-	-	-	-	-
Total	6-10	24	26	12	14	16	13	12	12	6	135
	10-14	7	5	-	-	-	-	-	-	-	12
	14-16	← 3 →									3

Figure 2.2-1

PROJECT 2060 TEST FLEET

MAKE	GVW	1973	1972	1971	1970	1969	1968	1967	1966	1965	TOTAL
CHEV	6-10	1	3	2	3	2		1	2	3	17
DODGE	6-10		1			1	1	1	1		5
	10-14	2	1								3
FORD	6-10	2	3	2	2	2	2	2	2	2	19
	14-16		1								1
GMC	6-10		1					1	1		3
INTL.	6-10							1			1
	10-14		1								1
TOTAL		5	11	4	5	5	3	6	6	5	50

Figure 2.2-2

Form approved
OMB No. 178-S-72042

AUTOMOTIVE ENVIRONMENTAL SYSTEMS, INC. ■ 7300 BOLSA AVENUE, WESTMINSTER, CALIFORNIA 92683 ■ 714 897-0331

Dear

You may be able to make an important contribution towards controlling the nation's serious air pollution problem and receive a $50 United States Savings Bond for your efforts!

As you may have read, the Environmental Protection Agency is conducting an important nationwide vehicle testing program to measure pollutants emitted by the nation's 6,000-14,000 pound GVW truck population. Automotive Environmental Systems, Inc., has been selected by the Environmental Protection Agency to perform this program and would like to consider your vehicle as a candidate for testing in this program.

If your truck meets the requirements of mileage and engine size, we will need it for about four days in our laboratory, where it will be tested under simulated, normal driving conditions. Your truck will be fully insured while in our possession. In return for your assistance, we have been authorized by the Environmental Protection Agency to award you a $50 Savings Bond. In addition, if you wish, we will provide you with a late model, fully insured, equivalent truck for the full period that your vehicle is being tested.

We know you will want to be a part of a project so important to our environment. Please fill out and return the enclosed postage paid card and we will contact you shortly to obtain any additional required information, and to schedule your vehicle for testing, if it is selected for the program.

Very truly yours,

M. Van Loan
Vice President

Figure 2.2-3

FILL OUT, TEAR OFF AND RETURN POSTCARD TODAY!

FIRST CLASS
Permit No. 1471
San Bernardino
Ca

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed In The United States

Postage will be paid by

AUTOMOTIVE ENVIRONMENTAL SYSTEMS, INC.
Vehicle Emissions Testing Laboratory
7300 Bolsa Avenue
Westminster, Ca. 92683

Form No. 4505-2

Form Approved
OMB No. 158-S-72033

Vehicle registration lists show that the motor vehicle shown below is registered in your name:

If incorrect, please correct

Do you still own this vehicle? Yes No

If yes, will you be willing to allow us to conduct pollution tests on this vehicle? Yes No

If yes, please indicate a telephone number where we can reach you to make arrangements.

Phone:________________ Best Time to Call:__________

FILL OUT, TEAR OFF AND RETURN POSTCARD TODAY!

Figure 2.2-4

TELEPHONE CONTACT CONTROL SHEET

...r's Name NATHAN Fox	Phone Number (Home) (613) 474-6651	Will Owner Participate? ☐ Yes ☐ No
...r's Address Westwood 90024 0456 1/2 Eastborne	Phone Number (Office) –	☐ Pick-up vehicle ☐ Owner will deliver
...cle Make and Model Pont	Vehicle I.D. Number (VIN) 2-D37M2P101247	Date of Pick-up/Delivery

...i/Vehicle Data ...ect? ☐ Yes ☐ No	If No, What Changes?	Time of Pick-up/Delivery

... of Letter to ...er	Did Owner Receive Letter? ☐ Yes ☐ No	Best Time to Call	Current Mileage

...HONE CONTACT RECORD

Contact 1		Comments
...e -/31	Time 6:30	Call back at 5:30 6/14/73

Contact 2		Comments
...e	Time	

Contact 3		Comments
	Time	

Contact 4		Comments
...e	Time	

...LE ELIGIBILITY RECORD (Comment on back, if necessary.)	Yes	No
Has car been driven on unpaved roads more than 50% of time?		
Has car been entered in competitive speed events?		
Has car been used to haul or transport loads for which it was not designed?		
Has car been in accident which damaged frame, gas tank, or engine?		
Has car's engine been modified by installation of headers, etc?		
Has car been maintained according to manufacturer's recommendations?		
Does owner have proof of oil and oil filter changes?		
If "no" to question 7, will owner sign statement of required maintenance?		
Has any major work been performed on engine? (Valves, Distributor, Carburetor, Emission Control Devices)		

...s Owner Want Tour? Yes ☐ No	Date & Time of Tour	Suggested Pick-up/Delivery Dates and time

Figure 2.2-5

2.2.2 Test Vehicle Logistics

The vehicle owner was contacted well in advance of the intended test date to ensure that the proposed test date was compatible with his situation. The night before vehicle testing, a procurement specialist called the vehicle owner to reconfirm the appointment time. On the day prior to testing, in accordance with the vehicle owner's instructions, an AESi technician picked up the test vehicle and provided the participant with a loan car.

At this time, the procurement specialist examined the vehicle to determine its compliance with the program. Then a preliminary check was taken on the following items: exhaust, tires, hoses, oil, water, unusual noises, etc. A loan vehicle agreement and test vehicle agreement were then signed by both the AESi procurement specialist and the vehicle owner. An agreement was made between AESi and the vehicle owner with regard to existing damage to both the loan vehicle and the candidate test vehicle. Upon completion of the above items, the AESi procurement specialist delivered the participant's vehicle to the laboratory.

Upon completion of all testing, the procurement specialist called the participant to confirm the appointment time with him for return of his vehicle. When returning the test vehicle, the technician examined the condition of the loan car to ensure that it had not been damaged or misused, then signed the appropriate documents indicating that the vehicles had been exchanged. At that time the technician received information from the participant about application for the 50 dollar U. S. Savings Bond.

2.3 TEST PROCEDURE

2.3.1 Equipment Preparation

All test equipment was thoroughly warmed up, calibrated and inspected for proper operation prior to the performance of any tests. When the dynamometer had not been used during the previous two hours, the chassis dynamometer was thoroughly warmed up for 15 minutes at 30 mph using a non-test vehicle. During the dynamometer warmup procedure, inertia and road load of the dynamometer were properly set for the test car following. In addition, the dynamometer speed indicator was calibrated and checked against the driver's aid to ensure that both speed indications were identical.

The exhaust analysis console (EAC) was operated continuously during and between emissions tests. All instruments were left in a standby status with either dry nitrogen or dry air continuously flowing through the instruments. Therefore it was not necessary to perform any preparation on the EAC prior to testing other than routine calibration procedures. The NO_X instrument ozone generator was turned off each night. About 10 minutes warmup time was provided prior to use of the NO_X instrument. This warmup time occurred while other instruments were being calibrated or while the vehicle was being prepared for testing.

The constant volume sampler (CVS) required approximately one-half hour warmup prior to testing for precise measurement if it had not been operated during the previous 24-hour period. The CVS is equipped with controls to permit rapid heating of the heat exchanger and blower. The CVS was turned on and operated early in the morning to ensure that the temperature was stabilized by the time testing was initiated for the day. The CVS was connected to the vehicle used for dynamometer warmup thereby warming the flexible duct and mixing plenum. At least one propane recovery test (Figure 2.3-1) was performed to verify the CVS and EAC prior to testing each day.

2.3.2 Vehicle Preparation

Test vehicles were standardized prior to testing by running one FTP driving schedule on tank fuel, draining the fuel, adding three or more gallons of Indolene 30 then running another FTP. Vehicles equipped with

PRT

CVS PROPANE RECOVERY TEST NO. ______

Prj.No.	Site	Date

FID DEFLECTIONS	PPM_C
S1	
B1	

TECH: ______

E.T.: ______

Δ P: ______

(-0.00136 • T_A ______ °F + 13.6912) • P_A ______ "Hg

$-P_p$ ______ "H_2O ÷ T_p ______ °R • 2.2454 • NET ______ PPM_C

• V_o ______ Ft.^{3}/Rev. • 0.00001 • N ______ = HC MASS ______ GRAMS

+ PROPANE CYLINDER EMPTY ______

- PROPANE CYLINDER FULL ______ • 100 ÷ HC MASS = ______ % ERROR

☐ + GAIN

☐ - LOSS

Comments: ______________________________

Figure 2.3-1

evaporative emission control systems were given two additional FTP driving schedules for a total of thirty preconditioning miles. While the fuel tanks were empty after the first FTP, the test vehicle's fuel system was pressure tested to 14 inches of H_2O using nitrogen. The pressure test determined possible sources of evaporative emissions which could be trapped during the emission tests. Fuel tank capacity was also determined at that time.

After the preconditioning cycles, the vehicles were pushed into a 76-86°F soak area where they would remain for 12 to 16 hours. Canisters for trapping evaporative emissions were prepared during the soak period by placing them in an oven at 300°F while purging them with laboratory grade nitrogen for three hours. The test vehicle was prepared for the diurnal soak by adapting tubing, thermocouples, plugs, a method of heating the tank, etc. so that the diurnal soak could be started without delay at the end of the cold soak.

2.3.3 Federal Exhaust and Evaporative Emissions Testing Procedures

All cold start exhaust emissions tests were performed in accordance with the procedures stipulated in 37 Federal Register, No. 221, dated November 15, 1972, Sections 85.075-9 through 85.075-27, with the exception that a different dynamometer road load power versus inertia curve was provided by EPA (see Figure 2.3-2). Also shown on this figure is the indicated horsepower calculated by AESi. The equivalent inertia used in accordance with this table was based on curb weight and GVW. The curb weight used was that listed in the Kelly Blue Book (March-April, 1973) or, in the case of motor homes, the curb weight was obtained directly from the manufacturer. The gross vehicle weight used was that listed on the vehicle's registration slip.

Data accumulated during the Federal Test Procedure consisted of both volumetric and mass measurements for each of the portions of the procedure; i.e., cold transient, cold stabilized and hot transient. Mass results were calculated on each test phase and presented as grams per test phase and grams per mile. In addition, the 1975 Federal Test Procedure results were calculated by combining the mass values from the cold transient, cold stabilized, and hot transient portion of the test in accordance with the weighting factors provided by the 1975 Testing Procedure. Fuel consumption in miles per gallon was calculated from bag data mass emissions using the carbon atom mass balance

TRUCK DYNAMOMETER SETTINGS

I = Equivalent Inertia

I = Curb Weight + 500 pounds if 0 $\leq$ Payload $\leq$ 2000
+ 1000 pounds if 2001 $\leq$ Payload $\leq$ 4000
+ 1500 pounds if 4001 $\leq$ Payload $\leq$ ∞

I	Inertia Setting	RLHP	Indicated HP
0-4750	4500 2K+2K+.5K	13.1	5.6
4751-5250	5000 2K+2K+1K	17.9	8.9
5251-5750	5500 2K+2K+1K+.5K	22.7	12.2
5751-6250	6000 4K+2K	27.5	14.0
6251-6750	6500 4K+2K+.5K	32.3	17.4
6751-7250	7000 4K+2K+1K	37.1	20.7
7251-7750	7500 4K+2K+1K+.5K	41.9	24.0
7751-8250	8000 4K+2K+2K	46.7	27.3
8251-8750	8500 4K+2K+2K+.5K	51.5	30.6
8751-9250	9000 4K+2K+2K+1K	56.3	34.0
9251-9750	9500 4K+2K+2K+1K+.5K	61.1	37.3
9751-10250	9500 4K+2K+2K+1K+.5K	65.9	40.6

EXCEPTION: All motor homes $\geq$8500 pounds shall be run at 51.5 RLHP, 30.6 indicated.

FIGURE 2.3-2

technique for cold transient, cold stabilized and hot transient portions of the testing procedures. In addition, fuel consumption was calculated for the 1975 weighted test procedure.

Fuel consumption was calculated from HC, CO and CO_2 grams per mile as follows:

$$MPG = \frac{2400}{0.8665\ HC\ gpm + 0.4288\ CO\ gpm + 0.2729\ CO_2\ gpm}$$

This formula assumes that the test fuel weighs 6.1 pounds per gallon and contains 1.84 hydrogen atoms per carbon atom. The actual density and H/C ratio were not determined, therefore the results listed are approximations.

Evaporative losses were collected during the cold transient and cold stabilized test phases. After the hot transient phase evaporative losses were collected during a one-hour soak period. At the end of the hour, the traps were sealed, removed and weighed. An emission test served as preconditioning for subsequent emission tests.

In summary, one complete emission test consisted of a 12-16 hour soak, a diurnal breathing loss test, a running loss test concurrent with the 1975 Federal Exhaust Emissions Test, and a hot soak test. Data generated by these tests included six sample bag readings, the net canister weights, all pertinent ambient conditions and the operating parameters for the instruments.

2.3.4 Tuneup to Manufacturer's Specifications

On 1972 and 1973 model year test vehicles, a tuneup was rendered after the first two emissions tests. The guiding philosophy of the tuneup was to set the vehicle to manufacturer's specifications in a manner similar to that which a vehicle owner would request. In other words, parts were replaced only as required such that the tuneup consisted primarily of adjustments to timing, dwell, idle RPM and CO concentration. Most air filters and crankcase filters required replacement. Many spark plug sets but few ignition points were replaced. No major components such as carburetor, distributor nor valves were replaced or rebuilt. The decision criteria for replacement was actual performance versus specified performance including tolerance as measured by the best commercial diagnostic techniques and apparatus. Figure 2.3-3 lists the number of vehicles which required various corrections.

TUNEUP WORK PERFORMED ON 1972 & 1973 TEST VEHICLES

Item	NUMBER OF VEHICLES				
	Pass	Adjust or Clean	Replace		Total
			Part	All	
Spark Plugs	5	2		9	16
Plug Wires	10		4	2	16
Timing	1	15			16
Dwell	8	8			16
Points	11			5	16
Air Filter	1			15	16
Choke	1	15			16
Vacuum Lines, etc.	11	2	3		16
PCV Valve	7	1		8	16
Crankcase Filter		4		12	16
Cooling System	11		5		16
Valve Lash	16				16
Valve Seal	16				16
Average, %	47	23	6	24	100

FIGURE 2.3-3

2.4 DATA HANDLING

2.4.1 Data Acquisition and Preservation

The systematic acquisition and preservation of data is the cornerstone of AESi's data handling effort. A program of redundancy and cross checks was initiated for this project. Three forms (Phase I, Phase II and Phase III) served as the structure in the acquisition and verification of data. These forms and at least one copy of any data sheet were kept in a packet which in turn was kept with the test vehicle through all processes.

The procurement department assembled a data packet consisting of the following in order (Figures 2.4-1 through 2.4-9):

1. Customer & Vehicle Information
2. Vehicle Information
3. Standard Test Vehicle Agreement
4. Standard Loan Vehicle Agreement
5. Phase I form (PI)
6. Phase II form (PII)
7. TCR form
8. Test Data Sheet (TDS)
9. Phase II
10. TCR form
11. TDS
12. Phase III form (PIII)
13. For 1972 and 1973 vehicles only, insert another set of items 6 through 12.

The Phase I, II and III forms are flow diagrams which give instructions in sequence. Each block of instructions was crossed off and initialed upon completion. Whenever data was to be recorded, the Phase form either provided a place for it or required that the data be written on another form. In addition to a number of detail checks, the Phase II form has a block which says: "Review all data for completeness and accuracy." This occurs at the end of an emissions test prior to all subsequent steps. An additional safeguard was to place the driving trace, analytical system strip charts, temperature records, canister weight chart and raw data sheet in the vehicle data packet as work progressed.

Tuneup parameters were measured after all emissions tests. Also, the vehicle data packet was reviewed by the Test Supervisor and the Project Engineer after the vehicle was returned to the owner. Then the data was

CUSTOMER and VEHICLE INFORMATION

#2066

KEY PUNCH ______
VERIFY ______

VEHICLE INFORMATION

VEH. #	CYL.	CID	TRN	BBL	DATE
0677	8	390	0	2	041173

VEH. MAKE	VEH. MODEL	VEH. YEAR
ford	F250	1969

LIC #	STATE	SERIAL #
31 Z6 2E	CALIF	F25HRF93665

ASSEMBLY PLANT ______ CLASS ______

CUSTOMER CONTACT

CONTACT DATE 4/11/73

NAME: D. L Campbell

ADDRESS: 424 Jade Cove Way

CITY: Seal Beach STATE: Calif ZIP 90740

HOME PHONE 598-1253 WORK PHONE 430-0561

DATE PURCHASED Aug 69 ODO. at PURCHASE 0

PRESENT ODO. ______

PAINTED/UNDERCOATED; PAST 60 DAYS NO

STATE WHERE FIRST SOLD CALIF

SCHEDULING

SCHEDULED BY: R. F. [illegible]

INCOMING DATE: 4/11/73 TIME: 6:00

PROMISED COMPLETION DATE ______

SPECIAL INSTRUCTIONS ______

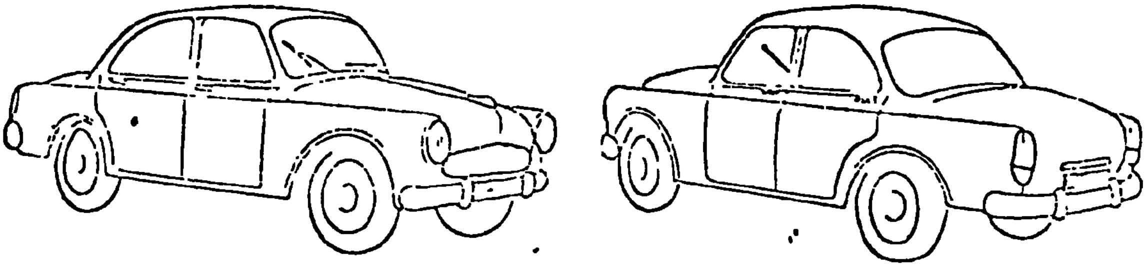
VEH. #	CYL.	CID	TRN	BBL	DATE	
2002	8	390	4	4	041173	#2060

VEH. MAKE	VEH. MODEL	VEH. YEAR
Ford	F250	1969

LIC #	STATE	SERIAL #
312023E	Calif	F25HRF93665

Name: D.L Campbell Address: 424 Jade Cove Way

City: Seal Beach State: CALIF Zip Code 90740



GLASS	MISSING	CRACK	CHIP	PITS
Windshield				
RF Window				
RR Window				
R Window				
LR Window				
LF Window				
BODY		DENT	CHIP	SCRATCH
Top				
Grill				
Front Bumper				
RF Fender				
RR Door				
RF Door				
~~RR Fender~~				
~~R Rocker Panel~~				
Rear Deck				
Rear Bumper				
LR Fender				
L Rocker Panel				
LR Door				
LF Door				
LF Fender				
Hood				
WHEELS				
RF Wheel				
RF Hub Cap				
RR Wheel				
RR Hub Cap				
LR Wheel				
LR Hub Cap				
LF Wheel				
LF Hub Cap				
NO. of KEYS		IGN.	TRUNK	GAS

LIGHTS	CRACK	BROKEN	MISSING
RF Headlight			
RF Turn Signal			
RF Sidemarker			
RR Sidemarker			
RR Taillights			
Lic. Plate Light			
RT Back-up			
L Back-up			
L Tail			
LR Sidemarker			
LF Sidemarker			
LF Headlight			
LF Turn Sig			
INTERIOR	GOOD	SOILED	TORN
Headliner			
RF Seat			
Rear Seat			
LF Seat			
Dash			
Front Carpet			
Rear Carpet			
TRUNK CONTENTS			
Jack			
Lug Wrench			
Spare			
Other			

TIRE COND.	RF	RR	LR	LF
Good	X	X	X	X
Fair				
Poor				

Duncan Campbell — Owner's Signature

4/11/73 — Date

Robert f. Rau... — ALSI Representative

Figure 2.4-2

2P031273w-2040

#2060

AESi
AUTOMOTIVE ENVIRONMENTAL SYSTEMS, INC

VEHICLE NUMBER ____________

STANDARD TEST VEHICLE AGREEMENT

0078

Your vehicle is being loaned to Automotive Environmental Systems, Inc. (herein called AESi) for use in an important new vehicle pollution testing program. This agreement, signed by the vice president of AESi is your assurance of full protection against any loss sustained by accident or damage to the vehicle while in the possession of AESi or its representatives.

1. In consideration of $50 U.S. Savings Bond agree to loan my vehicle described as a 1960 Ford registered in the State of Calif, license plate number 31 202 E to AESi for a period of time not to exceed 4 days. I understand that I may refuse to loan the vehicle to AESi at any time and that I am under no obligation whatever to AESi.

2. AESi agrees to be fully responsible for any and all damage to the vehicle occurring while the vehicle is in the possession of AESi or its representatives. Possession is hereby defined as care, control, custody, operation, inspection or storage between the time the vehicle is received from the owner by AESi or its representatives and the time the vehicle is returned to the owner by AESi or its representatives.

3. AESi agrees to indemnify and hold harmless the vehicle owner of any repairs, damage, loss or liability sustained by the vehicle owner by reason of accident or damage to the vehicle while in the possession of AESi or its representatives.

4. AESi agrees to be extremely careful in the use of the vehicle, and agrees to return the vehicle to the vehicle owner in as good exterior, interior and operating condition, except for normal wear and tear, as when the vehicle was received by AESi or its representatives.

5. Agreed to this 11th day of April, 1973 by

Vehicle Owner

M. Van Loan (signature) and X Duncan Campbell (signature)

M. Van Loan, Vice President — Vehicle Owner

Condition of vehicle when received: Condition of vehicle when returned:

Initial RJR Date 4/11/73 Initial X DC Date ______

Figure 2.4-3

PARTICIPANT VEHICLE NO. 0022

0088

STANDARD LOAN VEHICLE AGREEMENT

In consideration of the Participant undersigned (herein called the Participant) who has agreed to participate in an important new vehicle pollution testing program, Automotive Environmental Systems, Inc. (herein called AESi) hereby loans to Participants the loan vehicle described below, subject to terms and conditions of this agreement.

1. Participant agrees to be extremely careful in the use of loan vehicle and agrees to return loan vehicle within a period of time not to exceed 4 days, together with all tires, tools, and accessories to AESi in as good exterior, interior, and operating condition, except for normal wear and tear, as when vehicle was received by Participant.

2. Participant agrees that loan vehicle will not be operated to carry passengers or property for a consideration express or implied; or to push or tow any vehicle or trailer. Loan vehicle will be operated only by Participant or any member of Participant's immediate family; provided that Participant's permission first be given and that all such operators shall be at least 21 years of age and duly qualified and licensed.

3. Participant acknowledges personal liability for: (a) all charges, fines, and costs for parking, traffic, or other legal violations assessed against loan vehicle, Participant or AESi except where caused through fault of AESi, (b) AESi's costs including reasonable attorney's fees where permitted by law, incurred collecting payments due from Participant hereunder.

4. Participant will not be liable for non-collision losses to loan vehicle caused by perils normally protected against by a comprehensive physical damage insurance policy.

5. Participant agrees to release AESi from any liability for loss of or damage to any property left, stored, or transported by Participant or any other person in or upon vehicle after receipt, during term of this loan or after return of loan vehicle to AESi. Participant further agrees to indemnify and hold harmless AESi against all claims arising out of such loss or damage.

6. Agreed to this 11th day of April, 1973 by

M. Van Loan, Vice President and Duncan Campbell

Drivers License No. F567407 State Calif Expiration Date 1975

Automotive Environmental Systems, Inc. Vehicle:

Make Olds Model Cutlass License No. 201 BPF

Condition When Received: Condition When Returned:

Initial ____ Date ____ Initial ____ Date 4/16

Figure 2.4-4

Sq. No.	Car No.	Prj. No.	Site	Date

2060 VEHICLE PROCESSING

PHASE I

RECEIVING & PRECONDITIONING

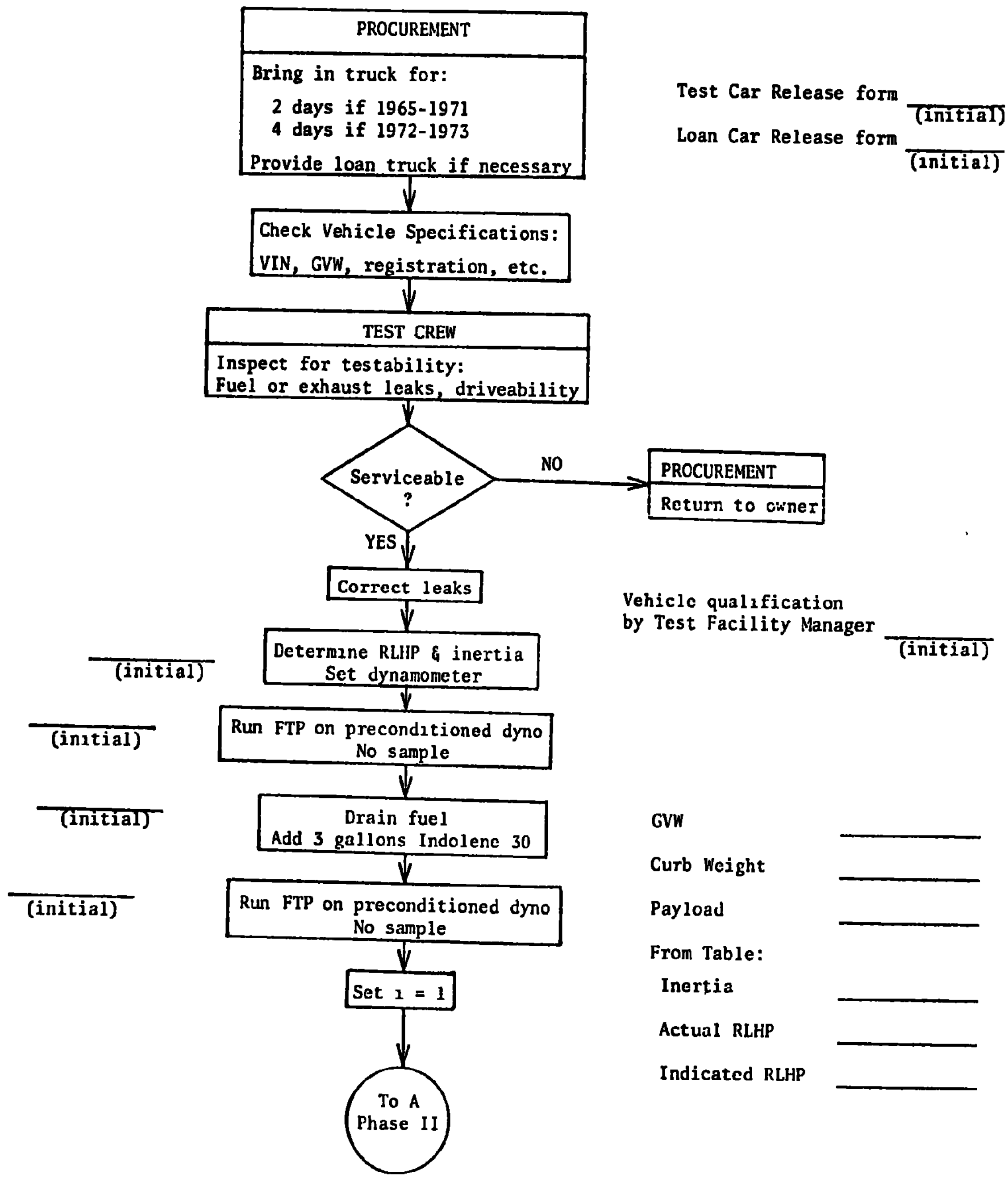


Figure 2.4-5

2060 VEHICLE PROCESSING
PHASE II
EMISSION TESTING

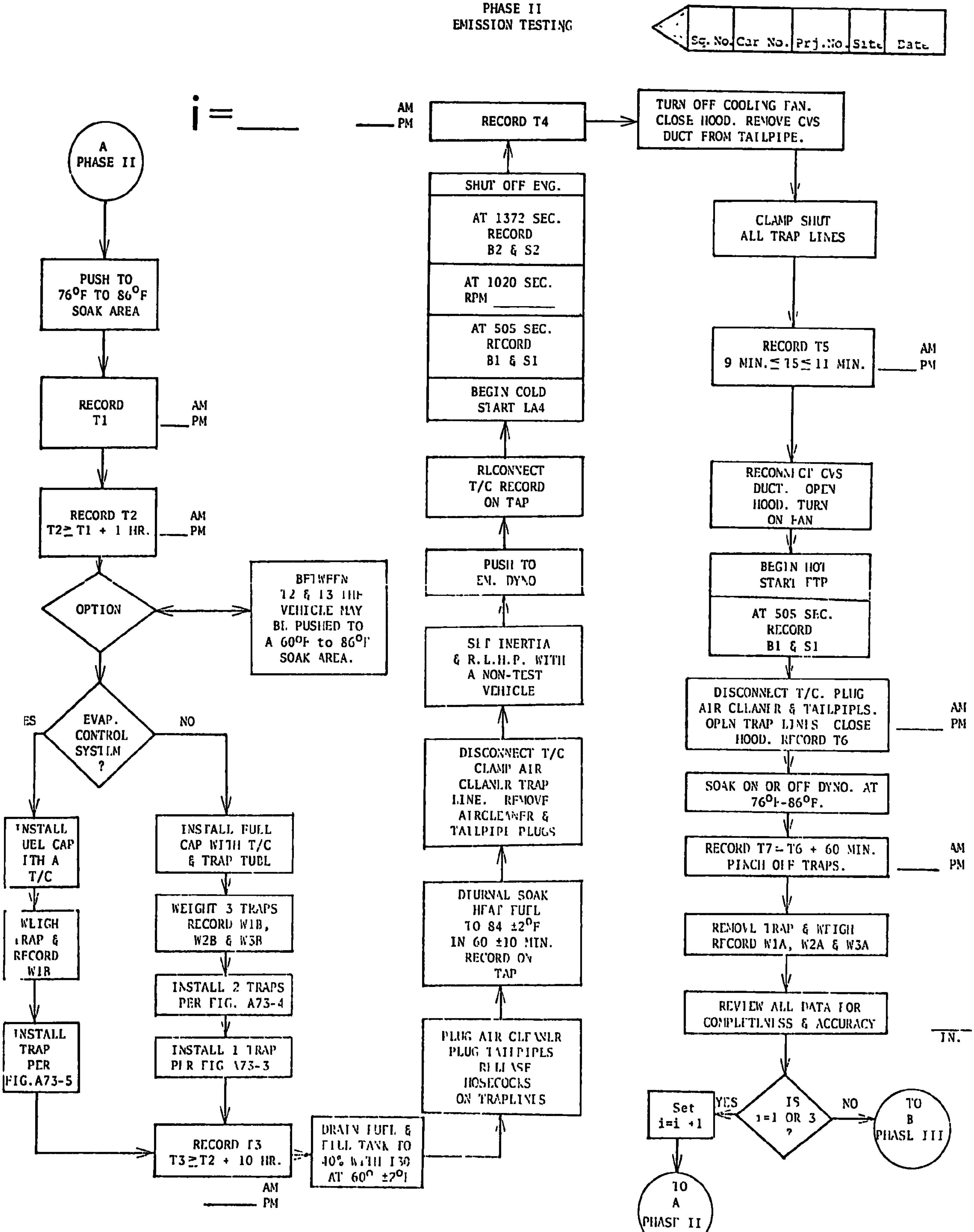


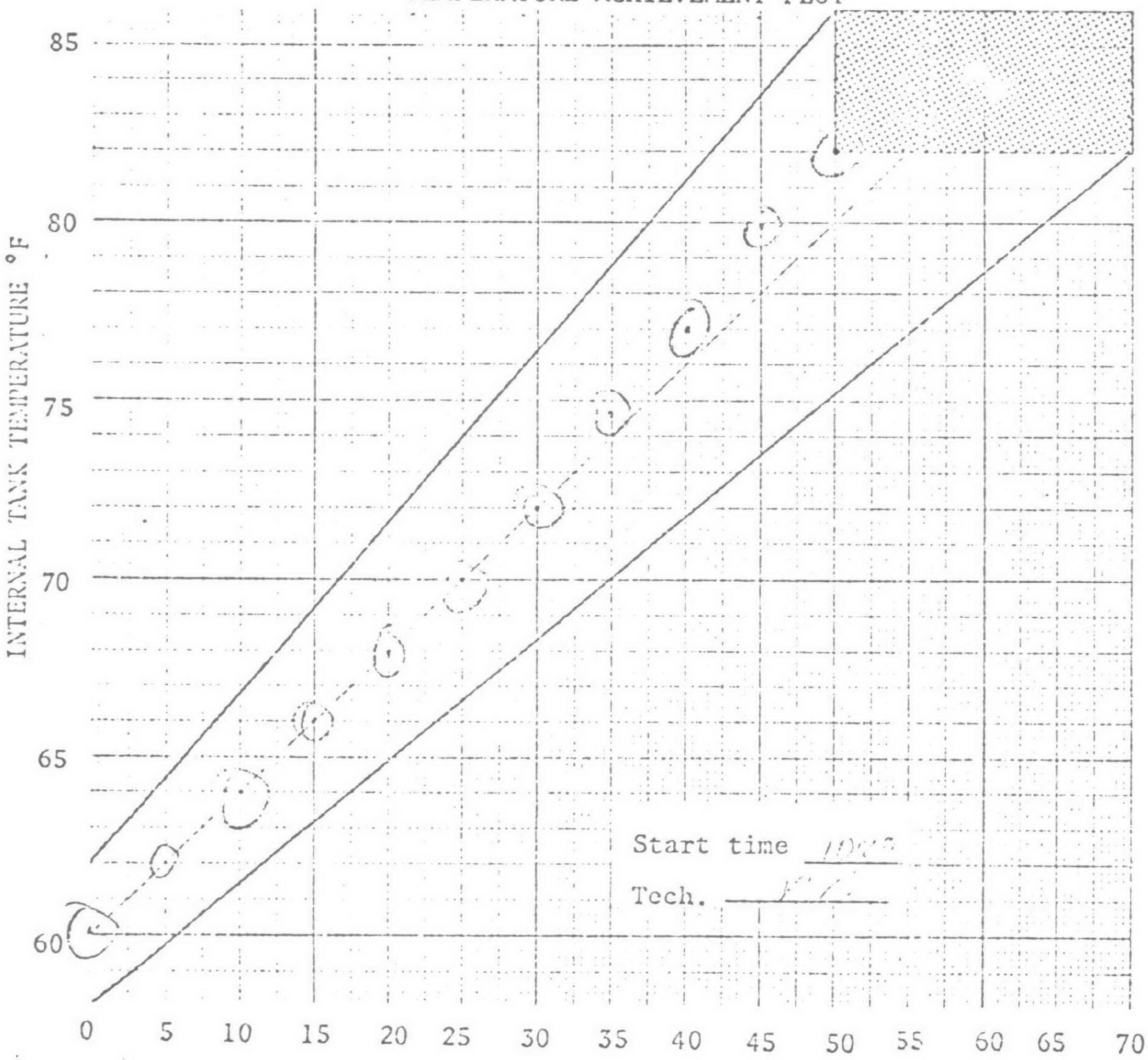
FIGURE 2.4-6

I = 1

	Sq. No.	Car No.	Prj. No.	Site	Date
		[illegible]	[illegible]	[illegible]	[illegible]

TAP

TEMPERATURE ACHIEVEMENT PLOT



ELAPSED MINUTES

Figure 2.4-7

CWD

Canister Weight Data

Canister No.	[illegible]	[illegible]		
Location	[illegible]	[illegible]		
Weight after	30[illegible].11	[illegible]		
Weight before	[illegible]	30[illegible].[illegible]		
Absorbed wt.	.11	.5[illegible]		

Total Grams [illegible] Tech. [illegible]

ROD

Record on Dyno

Fuel Temp°F	80°	80°	80°	80°	81°
Time Min.	11:2[illegible] am/pm	+5	10	15	20
Tech. [illegible]					
82°	82°	82°	83	83	
25	30	35	40	45	50

TEST DATA SHEET

	PRJ NO.	CAR NO.	RUN NO.	DATE	TIME	YR	MAKE	MODEL	VTP
0 1	02060	00022	00309	041373	1130	69	Ford	F-250	50

	CID	BBL	TRN	INRT	CURB WT	GVW		RDHP	DB	WB	BARO	CYL	A/C	EVP	EXH	PCV
0 1	0390	2	Ø	05000	03885	07500	0 2	17.9	76.0	62.0	30.14	8	1	0	1	1

	ODOMR	FLC	FX	FV	HUCF	PIC	TEC	DRI	TVP	ENG	10		IRPM	D-N	DWEL
0 2	32177	19.5	1	1	0.930	RGM	555	GLM	1	02	Ø	0 3	325	D	29.0

	IGNT	A	RPM	TTAD	MECA		HC	CO %	CO_2	NO	NO_x	NO_2
0 3	+10	0	325.	.	.	0 4		10.0				

COLD TRANSIENT:		R	HC DEF.	R	CO DEF.	R	CO_2 DEF.	R	NO_x DEF.	R	NO DEF.	TEMP	PRESS	COUNT	DELTA P	MPH
1 1	S	3	13.7	6	44.9	3	54.1	6	25.6	6	15.3	120	11.8	9621	14.5	.
1 2	B	2	28	6	0.1	3	1.6	5	0.3	5	0.[illegible]					

COLD STABILIZED:		R	DEF.	R	DEF.	R	DEF	R	DEF.	R	DEF	TEMP	PRESS	COUNT	DELTA P	MPH
1 3	S	3	5.8	6	47.4	3	32.4	5	54.8	5	36.8	120	11.8	25129	14.5	.
1 4	B	2	30	6	0.1	3	1.3	5	0.9	5	0.[illegible]					

HOT TRANSIENT:		R	HC DEF.	R	CO DEF.	R	CO_2 DEF	R	NO_x DEF.	R	NO DEF	TEMP	PRESS	COUNT	DELTA P	MPH
1 5	S	3	6.4	6	42.3	3	47.3	6	26.4	6	16.[illegible]	120	11.8	9527	14.5	.
1 6	B	2	32	6	0.0	3	1.3	5	0.3	5	0.[illegible]					

HOT STABILIZED:		R	DEF.	R	DEF.	R	DEF.	R	DEF.	R	DEF	TEMP	PRESS	COUNT	DELTA P	MPH
1 7	S		.		.		.		.		.					.
1 8	B															

Figure 2.4-8

Sq. No.	Car No.	Prj.No.	Site	Date

2060 VEHICLE PROCESSING

PHASE III

TUNE CENTER

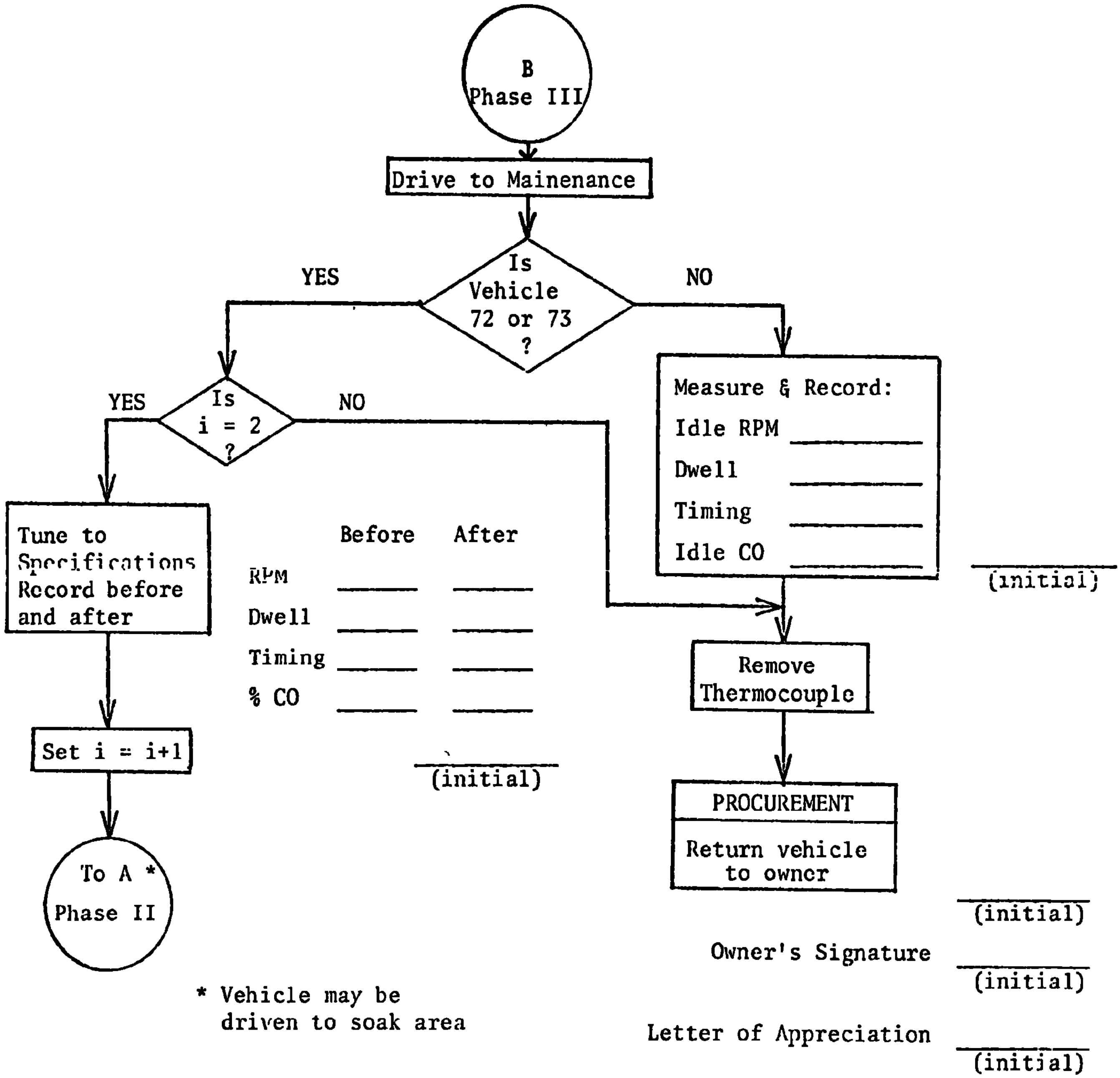


Figure 2.4-9

calculated and results were reviewed by the Project Engineer. Data which passed this review was keypunched, verified and forwarded to EPA in the following interim report.

All the original data was kept in flame resistant storage cabinets as were the punched cards. Calculated and raw data were also kept on magnetic discs to facilitate statistical analysis.

2.4.2 Data Analysis

Data analysis was based on arithmetic means and standard deviations using the following method:

$$S.D. = \left(\frac{N\sum X^2 - (\sum X)^2}{N(N-1)} \right)^{1/2}$$

For the interim reports, means and standard deviations of 1975 weighted grams per mile were presented by make, year and GVW.

In this report four more analyses are presented. First, the before and after tune-up emissions for 1972 and 1973 vehicles are presented as grams per mile, 1975 weighted. Means and standard deviations are calculated by make and GVW for tests 1 and 2 (before tuneup) and for tests 3 and 4 (after tuneup). The percent change is presented with means and standard deviations.

The second set of data lists grams per test phase for phase 1 (cold transient), phase 2 (cold stabilized) and phase 3 (hot transient). Means and standard deviations are presented by make, year, GVW and test phase.

The third set of data lists the average emission values for tests 1 and 2 individually for each test vehicle. The average for tests 3 and 4 is included where it exists.

The last table presents the average miles per gallon for each inertia category tested.

3. RESULTS AND CONCLUSIONS

3.1 BASELINE EMISSIONS ON 6,000 to 14,000 POUND GVW VEHICLES

The exhaust emissions of hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen plus evaporative emissions of hydrocarbons plus the calculated fuel consumption in miles per gallon of the fifty test vehicles are presented in the following tables.

Figures 3.1-1 through 3.1-6 list mean exhaust emissions with standard deviations of the vehicles as grams per mile (1975 weighted) per test versus make, model year, and gross vehicle weight. Figure 3.1-7 and 3.1-8 follow the same format but summarize evaporated grams per test and miles per gallon per test respectively. Figures 3.1-9 through 3.1-13 summarize mean exhaust emissions with standard deviations as grams per test phase versus make, model year, and gross vehicle weight. Figure 3.1-14 follows the same format but summarizes miles per gallon per test phase.

Figure 3.1-15 lists the average values for tests 1 and 2 and for tests 3 and 4 for each 1972 or 1973 vehicle individually. Figure 3.1-16 lists the average values for tests 1 and 2 for the model years 1965 through 1971. Figure 3.1-17 lists the average miles per gallon for each inertia category.

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN GRAMS PER MILE THRU MAY 1973

6,000-16,000 GVW VEHICLES

HYDROCARBONS

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	6.81	4.12	4.42	3.42	7.12		16.83	8.66	10.51	6.95	4.05
			2	2.33	3.79	4.86	3.22	6.81		20.55	8.28	10.42	6.77	4.74
			3	2.28	3.89								3.49	1.25
			4	2.25	3.92								3.50	1.49
COCG	N=			0	1	0	0	1	1	1	1	0	5	
	N=				1								1	
		6-10	1		6.10			9.08	19.27	7.77	9.02		10.25	5.19
			2		5.39			7.99	23.80	6.02	8.24		10.29	7.65
			3		3.58								3.58	
			4		4.23								4.23	
	N=			2	1	0	0	0	0	0	0	0	3	
	N=			2	1								3	
		10-14	1	11.37	12.59								11.78	3.29
			2	8.21	8.37								8.26	2.43
			3	5.57	7.71								6.28	1.63
			4	6.14	6.89								6.39	0.44
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	4.41	5.15	6.65	6.80	4.19	6.97	7.85	11.77	13.03	7.31	3.22
			2	3.81	5.57	6.05	6.62	4.64	6.79	6.63	11.12	13.21	7.08	3.27
			3	3.81	5.04								4.55	1.53
			4	3.71	4.25								4.03	1.02
	N=			0	1	0	0	0	0	0	0	0	1	
	N=				1								1	
		14-16	1		8.05								8.05	
			2		6.85								6.85	
			3		5.55								5.55	
			4		5.16								5.16	
GMC	N=			0	1	0	0	0	0	1	1	0	3	
	N=				1								1	
		6-10	1		4.27		0.0	0.0	0.0	8.24	6.79	0.0	6.44	2.01
			2		4.58		0.0	0.0	0.0	7.72	4.97	0.0	5.76	1.71
			3		3.46								3.46	
			4		3.33								3.33	
INTL	N=			0	0	0	0	0	0	1	0	0	1	
	N=												0	
		6-10	1							14.66			14.66	
			2							11.51			11.51	
			3											
			4											
	N=			0	1	0	0	0	0	0	0	0	1	
	N=				1								1	
		10-14	1		8.10								8.10	
			2		6.81								6.81	
			3		4.88								4.88	
			4		6.27								6.27	
AVE/YR	N=			5	11	4	5	5	3	6	6	5	GRAND AVE 50	
	N=			5	11								16	
			1	7.68	6.09	5.53	4.77	6.34	11.07	10.55	9.45	11.52	7.88	
			2	5.27	5.46	5.46	4.58	6.18	12.46	9.64	8.67	11.54	7.36	
			3	4.21	4.72								4.56	
			4	4.39	4.58								4.52	
S.D./YR														GRAND S.D.
			1	4.19	2.76	1.85	2.12	2.61	7.38	4.24	2.79	2.32		3.77
			2	3.24	1.74	1.55	2.01	2.03	10.05	5.79	3.03	2.31		4.24
			3	1.68	1.55									1.55
			4	1.76	1.40									1.46

Figure 3.1-1

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN GRAMS PER MILE THRU MAY 1973

6,000-16,000 GVW VEHICLES

CARBON MONOXIDE

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	71.43	41.15	56.92	41.19	102.78		170.13	74.89	59.87	66.90	38.47
			2	23.08	44.89	55.10	37.89	100.01		169.99	70.60	66.69	65.58	39.48
			3	25.35	35.47								32.91	6.87
			4	21.17	35.50								31.92	9.26
DODG	N=			0	1	0	0	1	1	1	1	0	5	
	N=			0	1								1	
		6-10	1		112.67			157.85	240.22	86.77	105.81		140.67	61.46
			2		119.33			140.25	218.29	92.67	123.29		138.77	47.61
			3		64.70								64.70	
			4		70.71								70.71	
	N=			2	1	0	0	0	0	0	0	0	3	
	N=			2	1								3	
		10-14	1	66.61	195.87								124.36	74.89
			2	82.01	197.25								120.42	74.50
			3	88.43	225.81								134.22	82.55
			4	89.39	238.09								138.96	87.77
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	71.49	62.69	94.05	103.33	55.56	100.16	108.01	125.27	119.68	91.75	31.24
			2	67.71	67.25	83.41	105.13	54.92	98.94	101.57	109.79	121.59	88.84	28.08
			3	66.66	58.73								61.90	32.85
			4	61.95	48.76								54.04	29.2[illegible]
	N=			0	1	0	0	0	0	0	0	0	1	
	N=			0	1								1	
		14-16	1		87.88								87.88	
			2		91.19								91.19	
			3		82.44								82.44	
			4		83.28								83.28	
GMC	N=			0	1	0	0	0	0	1	1	0	3	
	N=			0	1								1	
		6-10	1		53.96					130.41	133.92		106.10	45.19
			2		65.47					135.50	147.59		116.19	44.34
			3		70.26								70.26	
			4		54.66								54.66	
INTL	N=			0	0	0	0	0	0	1	0	0	1	
	N=			0	0								0	
		6-10	1							125.09			125.09	
			2							115.69			115.69	
			3											
			4											
	N=			0	1	0	0	0	0	0	0	0	1	
	N=			0	1								1	
		10-14	1		54.76								54.76	
			2		53.37								53.37	
			3		50.03								50.03	
			4		53.34								53.34	
													GRAND AVE	
AVE/YR	N=			5	11	4	5	5	3	[illegible]	[illegible]	5	50	
	N=			5	11								16	
			1	78.33	74.24	75.47	66.04	94.91	146.85	121.40	106.67	83.79	90.86	
			2	64.50	78.46	74.75	64.79	90.02	136.73	115.50	105.28	88.65	89.33	
			3	67.11	70.52								69.45	
			4	64.77	68.44								67.30	
S.D./YR														GRAND S.D.
			1	33.30	47.21	32.71	35.73	43.16	81.44	37.96	37.13	39.28		45.76
			2	35.54	47.81	25.02	38.72	37.25	69.34	34.99	37.40	38.26		43.36
			3	38.12	55.69									49.58
			4	38.72	59.12									52.28

Figure 3.1-2

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN GRAMS PER MILE THRU MAY 1973

6,000-16,000 GVW VEHICLES

CARBON DIOXIDE

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	697.62	751.36	702.74	769.68	651.30		507.75	483.98	558.89	654.19	126.68
			2	605.98	744.79	747.11	748.13	649.04		504.17	488.42	576.93	652.28	124.34
			3	714.01	760.63								748.98	82.24
			4	742.40	774.59								766.54	58.96
COLG	N=			0	1	0	0	1	1	1	1	0	5	
	N=			C	1								1	
		6-1C	1		725.30			751.02	762.93	697.97	546.C8		696.66	87.81
			2		715.75			701.80	781.13	658.99	546.49		680.83	86.95
			3		698.45								698.45	
			4		777.65								777.65	
	N=			2	1	0	0	0	0	0	C	0	3	
	N=			2	1								3	
		10-14	1	1099.11	1399.37								1199.20	175.83
			2	1104.66	1102.97								1104.10	16.03
			3	1173.03	1206.53								1184.20	41.64
			4	1161.07	1021.14								1114.43	81.01
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	710.77	643.58	722.91	620.82	619.65	691.79	701.93	830.75	639.24	684.55	105.03
			2	716.16	655.20	731.16	603.07	669.84	703.30	687.4C	762.51	639.C3	683.71	103.61
			3	739.01	670.70								698.02	59.36
			4	777.69	633.07								690.92	122.29
	N=			0	1	0	0	0	0	C	C	C	1	
	N=			0	1								1	
		14-16	1		1072.82								1072.82	
			2		1091.60								1091.60	
			3		1157.12								1157.12	
			4		1350.49								1350.49	
GMC	N=			0	1	0	0	0	0	1	1	C	3	
	N=			0	1								1	
		6-10	1		836.78					633.4C	613.97	0.0	694.72	123.41
			2		846.37					627.54	631.63	0.0	701.85	125.18
			3		886.65								886.65	
			4		850.75								850.75	
INTE	N=			0	0	0	0	0	0	1	C	0	1	
	N=			0	0								0	
		6-1C	1							609.19			609.19	
			2							596.67			596.67	
			3											
			4											
	N=			0	1	0	0	0	0	C	C	C	1	
	N=			0	1								1	
		10-14	1		733.78								733.78	
			2		810.06								810.06	
			3		888.66								888.66	
			4		861.10								861.10	
													GRAND AVE	
AVE/YR	N=			5	11	4	5	5	3	6	6	5	50	
	N=			5	11								16	
			1	863.48	813.90	712.83	710.13	658.58	715.51	642.C3	631.59	591.03	714.17	
			2	849.52	796.97	739.14	690.11	667.91	729.24	627.C3	613.33	601.77	707.99	
			3	9C7.62	830.13								854.34	
			4	923.98	825.83								856.50	
S.D./YR														GRAND S.D.
			1	220.26	235.90	31.12	151.69	68.37	53.65	123.88	176.17	68.C2		175.74
			2	242.75	174.37	15.33	145.00	36.88	66.83	106.74	168.58	73.26		157.34
			3	244.08	197.52									208.02
			4	224.17	216.47									216.44

Figure 3.1-3

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN GRAMS PER MILE THRU MAY 1973

6,000-16,000 GVW VEHICLES

NITRIC OXIDE (NO)

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	3.01	5.36	4.26	6.35	4.41		3.88	3.70	4.81	4.77	1.18
			2	3.72	4.70	6.71	6.12	4.49		3.70	3.74	5.26	5.03	1.24
			3	3.74	5.59								5.12	1.22
			4	3.72	5.97								5.41	1.64
DODG	N=			0	1	0	0	1	1	1	1	0	5	
	N=			0	1								1	
		6-10	1		6.99			7.81	2.40	5.53	5.00	0.0	5.55	2.09
			2		7.80			6.64	2.84	4.82	4.85	0.0	5.39	1.90
			3		5.79								5.79	
			4		8.28								8.28	
	N=			2	1	0	0	0	0	0	0	0	3	
	N=			2	1								3	
		10-14	1	10.43	12.35								11.07	2.21
			2	11.31	9.34								10.65	1.71
			3	10.69	8.28								9.88	1.34
			4	10.09	4.18								8.12	3.42
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	3.87	4.12	4.89	4.14	4.52	3.23	5.79	6.70	3.95	4.55	1.64
			2	3.84	4.41	5.09	3.99	5.11	4.81	5.30	6.40	3.84	4.74	1.53
			3	3.78	3.87								3.83	0.65
			4	3.28	4.56								4.05	1.17
	N=			0	1	0	0	0	0	0	0	0	1	
	N=				1								1	
		14-16	1		10.70								10.70	
			2		10.66								10.66	
			3		10.94								10.94	
			4		11.04								11.04	
GMC	N=			0	1	0	0	0	0	1	1	0	3	
	N=				1								1	
		6-10	1		6.74					5.13	2.13		4.67	2.34
			2		6.29					4.51	3.75		4.85	1.30
			3		5.39								5.39	
			4		6.32								6.32	
INTE	N=			0	0	0	0	0	0	1	0	0	1	
	N=												0	
		6-10	1							3.69			3.69	
			2							4.32			4.32	
			3											
			4											
	N=			0	1	0	0	0	0	0	0	0	1	
	N=				1								1	
		10-14	1		6.62								6.62	
			2		7.19								7.19	
			3		6.10								6.10	
			4		5.94								5.94	
AVE/YR	N=			5	11	4	5	5	3	6	6	5	GRAND AVE 50	
	N=			5	11								16	
			1	6.32	6.53	4.57	5.47	5.13	2.95	4.97	4.65	4.47	5.27	
			2	6.81	6.24	5.90	5.27	5.17	4.15	4.66	4.81	4.69	5.42	
			3	6.53	5.90								6.10	
			4	6.09	6.12								6.11	
S.D./YR														GRAND S.D.
			1	4.03	2.81	0.82	2.14	1.70	0.47	1.38	2.19	0.70		2.30
			2	4.23	2.27	1.13	1.98	1.23	1.71	1.00	1.94	1.21		2.10
			3	3.92	2.17									2.71
			4	3.66	2.19									2.60

Figure 3.1-4

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN GRAMS PER MILE THRU MAY 1973

6,000-16,000 GVW VEHICLES

OXIDES OF NITROGEN (NO_x)

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV N=			1	3	2	3	2	0	1	2	3	17	
N=			1	3								4	
	6-10	1	3.77	8.14	5.72	9.45	6.37		4.76	5.02	6.10	6.69	2.15
		2	4.67	7.44	8.82	8.81	6.40		4.08	4.97	6.65	6.93	2.09
		3	4.68	8.11								7.25	2.65
		4	4.65	8.39								7.46	2.88
COLG N=			0	1	0	0	1	1	1	1	C	5	
N=			0	1								1	
	6-10	1		9.17			10.69	2.80	7.77	7.22	C.C	7.53	2.97
		2		10.57			9.84	3.31	6.32	6.94	C.C	7.39	2.92
		3		8.80								8.80	
		4		11.35								11.35	
N=			2	1	0	0	0	0	C	C	C	3	
N=			2	1								3	
	10-14	1	17.18	21.49								18.62	5.26
		2	18.00	13.94								16.65	4.15
		3	16.38	12.06								14.94	3.93
		4	16.00	8.20								13.40	4.62
FORD N=			2	3	2	2	2	2	2	2	2	19	
N=			2	3								5	
	6-10	1	5.15	6.45	7.00	5.74	6.50	4.27	8.13	9.16	4.85	6.37	2.71
		2	4.95	6.41	7.14	5.93	7.22	6.81	7.48	8.69	4.54	6.56	2.54
		3	4.81	5.29								5.10	1.09
		4	4.15	6.40								5.50	2.09
N=			0	1	0	0	0	0	0	C	0	1	
N=			0	1								1	
	14-16	1		16.10								16.10	
		2		17.41								17.41	
		3		16.80								16.80	
		4		16.55								16.55	
GMC N=			0	1	0	0	0	0	1	1	0	3	
N=			0	1								1	
	6-10	1		8.68					6.11	2.73	C.C	5.84	2.98
		2		8.68					5.45	4.79	C.0	6.32	2.07
		3		7.09								7.09	
		4		7.97								7.97	
INTE N=			0	0	0	0	0	0	1	C	C	1	
N=			0	0								0	
	6-10	1							4.57	C.0	0.0	4.57	
		2							4.63	C.C	C.C	4.83	
		3											
		4											
N=			0	1	0	0	0	0	C	C	C	1	
N=			0	1								1	
	10-14	1		8.34								8.34	
		2		9.45								9.45	
		3		7.48								7.48	
		4		7.57								7.57	
AVE/YR N=			5	11	4	5	5	3	6	6	5	GRAND AVE 50	
N=			5	11								16	
		1	9.69	9.78	6.36	7.96	7.29	3.78	6.58	6.39	5.60	7.50	
		2	10.11	9.24	7.98	7.66	7.41	5.64	5.95	6.51	5.81	7.60	
		3	9.41	8.40								8.72	
		4	8.99	8.73								8.81	
S.D./YR													GRAND S.D.
		1	7.64	5.01	1.23	3.50	2.50	0.88	2.33	3.40	0.99		4.07
		2	7.60	3.80	1.49	3.35	2.48	3.00	1.98	3.CC	1.60		3.66
		3	6.72	3.64									4.59
		4	6.45	3.35									4.31

Figure 3.1-5

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN GRAMS PER MILE THRU MAY 1973

6,000-16,000 GVW VEHICLES

OXIDES OF NITROGEN CORRECTED FOR HUMIDITY (NO_{xc})

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	3.01	7.65	5.24	9.43	6.03		4.20	4.76	5.65	6.36	2.22
			2	4.38	7.03	8.16	8.30	6.08		3.82	4.57	5.95	6.45	1.78
			3	4.47	7.75								6.93	2.57
			4	4.56	7.87								7.04	2.56
DODG	N=			0	1	0	0	1	1	1	1	0	5	
	N=			0	1								1	
		6-10	1		8.57			9.38	2.70	7.42	6.75		6.96	2.59
			2		8.96			8.85	3.10	6.08	6.28		6.65	2.41
			3		8.24								8.24	
			4		10.35								10.35	
	N=			2	1	0	0	0	0	0	0	0	3	
	N=			2	1								3	
		10-14	1	16.13	20.54								17.60	4.86
			2	16.92	13.41								15.75	3.45
			3	15.67	11.52								14.28	3.91
			4	14.86	7.73								12.48	4.35
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	4.63	6.58	6.65	5.20	6.07	4.07	6.83	8.51	4.72	5.95	2.52
			2	4.82	6.31	6.75	5.52	6.54	6.49	6.84	8.22	4.45	6.22	2.44
			3	4.51	4.98								4.79	1.02
			4	5.96	6.00								5.19	2.01
	N=			0	1	0	0	0	0	0	0	0	1	
	N=			0	1								1	
		14-16	1		15.39								15.39	
			2		16.09								16.09	
			3		15.71								15.71	
			4		15.45								15.45	
GMC	N=			0	1	0	0	0	0	1	1	0	3	
	N=			0	1								1	
		6-10	1		7.85					6.05	2.66		5.52	2.64
			2		8.12					5.15	4.67		5.98	1.87
			3		6.64								6.64	
			4		7.56								7.56	
INTL	N=			0	0	0	0	0	0	1	0	0	1	
	N=			0	0								0	
		6-10	1							4.28			4.28	
			2							4.62			4.62	
			3										0.0	
			4										0.0	
	N=			0	1	0	0	0	0	0	0	0	1	
	N=			0	1								1	
		10-14	1		7.97								7.97	
			2		8.91								8.91	
			3		6.87								6.87	
			4		7.17								7.17	
													GRAND AVE	
AVE/YR	N=			5	11	4	5	5	3	6	6	5	50	
	N=			5	11								16	
			1	9.03	9.36	5.95	7.74	6.72	3.61	5.54	5.99	5.28	7.06	
			2	9.57	6.64	7.46	7.19	6.82	5.36	5.56	6.09	5.35	7.12	
			3	8.96	7.93								8.25	
			4	8.44	8.17								8.25	
S.D./YR														GRAND S.D.
			1	7.13	4.78	1.22	3.54	2.17	0.79	1.53	3.22	0.74		3.96
			2	7.00	3.59	1.34	3.17	2.13	2.56	1.71	3.01	1.25		3.40
			3	6.50	3.44									4.40
			4	5.95	3.10									3.98

Figure 3.1-6

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF EVAPORATIVE EMISSION VALUES IN GRAMS PER TEST THRU MAY 1973

6,000-16,000 GVW VEHICLES

HYDRO CARBONS

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D./MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	4.39	2.22	1.30	1.71	5.36		4.29	2.40	2.55	2.72	1.56
			2	10.45	1.37	1.99	2.51	5.17		0.58	1.69	2.42	2.80	2.76
			3	21.72	2.19								7.07	9.95
			4	17.41	2.25								6.04	7.65
DODG	N=			0	1	0	0	1	1	1	1	0	5	
	N=			0	1								1	
		6-10	1		1.28			1.04	1.32	3.14	0.48		1.45	1.00
			2		1.25			0.38	1.26	2.83	0.18		1.18	1.05
			3		1.75								1.75	
			4		1.05								1.05	
	N=			2	1	0	0	0	0	0	0	0	3	
	N=			2	1								3	
		10-14	1	1.88	0.99								1.58	0.86
			2	1.23	1.15								1.21	0.37
			3	1.89	1.01								1.60	0.62
			4	0.59	0.74								0.64	0.49
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	1.63	3.62	0.85	1.33	0.87	4.56	1.15	0.67	1.12	1.85	2.03
			2	1.20	5.39	0.58	1.99	0.88	2.57	1.24	1.32	0.31	1.92	2.27
			3	2.10	8.02								5.65	6.05
			4	1.78	3.47								2.79	2.37
	N=			0	1	0	0	0	0	0	0	0	1	
	N=			0	1								1	
		14-16	1		2.50								2.50	
			2		0.98								0.98	
			3		1.47								1.47	
			4		4.40								4.40	
GMC	N=			0	1	0	0	0	0	1	1	0	3	
	N=			0	1								1	
		6-10	1		0.24					1.05	5.96		2.42	3.10
			2		2.11					0.88	0.91		1.30	0.70
			3		1.80								1.80	
			4		2.85								2.85	
INTL	N=			0	0	0	0	0	0	1	0	0	1	
	N=			0	0								0	
		6-10	1							0.78			0.78	
			2							0.65			0.65	
			3										0.0	
			4										0.0	
	N=			0	1	0	0	0	0	0	0	0	1	
	N=			0	1								1	
		10-14	1		1.42								1.42	
			2		0.37								0.37	
			3		0.30								0.30	
			4		0.75								0.75	
													GRAND AVE	
AVE/YR	N=			5	11	4	5	5	3	6	6	5	50	
	N=			5	11								16	
			1	2.28	2.18	1.08	1.56	2.70	3.48	1.93	2.10	1.98	2.11	
			2	3.06	2.38	1.79	2.30	2.50	2.14	1.24	1.19	1.58	1.99	
			3	5.94	3.36								4.17	
			4	4.43	2.45								3.07	
S.D./YR														GRAND S.D.
			1	1.29	1.73	0.40	1.29	2.51	3.86	1.48	2.15	1.05		1.75
			2	4.14	2.71	1.21	0.94	3.14	2.08	0.94	0.97	2.09		2.21
			3	8.83	4.56									6.01
			4	7.32	1.89									4.19

Figure 3.1-7

THESE DATA ARE PRELIMINARY AND BASED UPON INCOMPLETE STATISTICAL SAMPLES

SUMMARY OF 1975 EXHAUST EMISSION VALUES IN MILES PER GALLON, MAY 1973

6,000-16,000 GVW VEHICLES

MAKE		GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	S.D /MAKE
CHEV	N=			1	3	2	3	2	0	1	2	3	17	
	N=			1	3								4	
		6-10	1	10.58	10.66	10.92	10.58	10.63		10.62	14.44	12.83	11.50	1.86
			2	13.54	10.75	10.16	10.69	10.68		10.51	14.70	12.35	11.59	2.03
			3	11.56	10.71								10.92	1.14
			4	11.23	10.48								10.67	0.79
COLO	N=			0	1	0	0	1	1	1	1	C	5	
	N=			0	1								1	
		6-10	1		9.54			8.56	7.32	10.24	11.87		9.51	1.72
			2		9.56			9.28	7.33	10.68	11.48		9.67	1.58
			3		10.84								10.84	
			4		9.75								9.75	
	N=			2	1	0	0	0	0	C	C	C	3	
	N=			2	1								3	
		10-14	1	6.90	5.03								6.28	1.09
			2	6.99	6.11								6.70	0.53
			3	6.61	5.55								6.26	0.62
			4	6.65	6.21								6.51	0.28
FORD	N=			2	3	2	2	2	2	2	2	2	19	
	N=			2	3								5	
		6-10	1	10.52	11.74	9.86	11.10	12.21	10.13	10.44	8.29	10.12	10.56	1.62
			2	10.57	11.45	10.01	11.35	11.41	10.05	10.63	9.28	10.12	10.59	1.46
			3	10.34	10.32								10.33	0.63
			4	10.15	12.44								11.52	2.37
	N=			0	1	0	0	0	0	C	C	C	1	
	N=			0	1								1	
		14-16	1		7.11								7.11	
			2		7.00								7.00	
			3		6.74								6.74	
			4		5.87								5.87	
GMC	N=			0	1	0	0	0	0	1	1	C	3	
	N=			0	1								1	
		6-10	1		9.40					10.17	10.40		9.99	0.52
			2		9.13					10.17	10.00		9.77	0.56
			3		8.72								8.72	
			4		9.29								9.29	
INTE	N=			0	0	0	0	0	0	1	C	C	1	
	N=			0	0								0	
		6-10	1							10.32			10.32	
			2							10.79			10.79	
			3											
			4											
	N=			0	1	0	0	0	0	C	C	C	1	
	N=			0	1								1	
		10-14	1		10.40								10.40	
			2		9.61								9.61	
			3		8.95								8.95	
			4		9.12								9.12	
AVE/YR	N=			5	11	4	5	5	3	6	6	5	GRAND AVE 50	
	N=			5	11								16	
			1	9.07	9.86	10.39	10.79	10.85	9.20	10.37	11.29	11.75	10.40	
			2	9.73	9.92	10.08	11.07	10.69	9.14	10.57	11.57	11.46	10.47	
			3	9.09	9.45								9.34	
			4	8.97	9.91								9.61	
S.D./YR														GRAND S.D.
			1	2.02	2.26	0.69	1.61	1.68	1.75	1.64	3.26	1.57		2.04
			2	2.22	2.06	0.52	1.55	1.05	1.75	1.47	3.33	1.45		2.01
			3	2.39	1.90									1.99
			4	2.41	2.55									2.46

Figure 3.1-8

SUMMARY OF EXHAUST EMISSION VALUES

IN GRAMS PER TEST PHASE

[illegible] VEHICLES

HYDROCARBONS

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	SD/MAKE
CHEV	6-10												
	N=		1	3	2	3	2	0	1	2	3	17	
		1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	40.64	20.74	[illegible]
		2	7.51	14.[illegible]	15.83	12.[illegible]	25.3[illegible]		43.17	34.35	42.25	20.51	14.[illegible]
		3	7.5[illegible]	12.39	13.72	10.58	19.[illegible]		53.40	25.[illegible]	[illegible].01	20.54	[illegible]
DODG	6-10												
	N=		0	1	0	0	1	1	1	1	0	5	
		1		18.26			34.79	97.49	39.24	47.82		47.52	29.9
		2		19.53			35.15	80.21	[illegible]	31.26	[illegible]	37.86	24.[illegible]
		3		14.59			27.22	59.10	21.06	[illegible]	[illegible]	30.[illegible]	21.[illegible]
	10-14												
	N=		2	1	0	0	0	0	0	0	0	3	
		1	36.59	49.[illegible]								41.06	8.1
		2	32.23	32.19								32.22	6.4
		3	18.77	22.77								20.10	6.0
FORD	6-10												
	N=		2	3	2	2	2	2	2	2	2	19	
		1	23.27	28.61	37.65	34.57	25.96	25.32	3[illegible].61	49.01	52.19	34.9	13.4
		2	12.03	15.73	19.62	23.14	15.7[illegible]	26.[illegible]3	28.49	47.03	52.07	25.22	14.7
		3	13.8	16.[illegible]	20.39	21.53	11.62	22.42	23.69	29.57	35.70	21.62	8.5
	14-16												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		35.8								35.6[illegible]	
		2		21.39								21.39	
		3		19.67								19.67	
GMC	6-10												
	N=		0	1	0	0	0	0	1	1	0	3	
		1		18.25					46.91	29.85		31.67	14.8
		2		15.73					27.8	20.93		21.[illegible]	6.[illegible]
		3		11.32					20.65	18.35		16.75	4.9
INTE	6-10												
	N=		0	0	0	0	0	0	1	0	0	1	
		1							74.71			74.71	
		2							45.16			45.16	
		3							36.59			35.59	
	10-14												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		41.[illegible]								41.[illegible]	
		2		21.92								21.92	
		3		16.[illegible]								16.05	
												OVERALL AVG	
	AVG/YR												
	N=		5	11	9	5	5	3	[illegible]	6	5	50	
		1	20.[illegible]	27.71	31.7[illegible]	[illegible]	31.56	51.38	49.30	40.96	[illegible]	34.[illegible]	
		2	19.21	19.27	17.67	16.85	23.37	[illegible]	38.67	30.27	46.15	27.67	
		3	14.57	15.62	17.3[illegible]	16.97	17.39	37.98	23.56	25.96	34.[illegible]	21.83	
	S.D./YR												OVERALL SD
		1	7.56	1[illegible].89	12.6	1[illegible].37	12.31	41.15	17.06	12.36	12.32		16.[illegible]
		2	12.31	5.29	9.07	5.52	7.51	31.31	23.73	13.71	9.32		15.5
		3	6.19	4.81	5.74	6.2[illegible]	6.1[illegible]	27.70	13.23	7.16	7.49		1[illegible].8

Figure 3.1-9

SUMMARY OF EXHAUST EMISSION VALUES

IN GRAMS PER TEST PHASE

6001-1[illegible] GVW VEHICLES

CARBON MONOXIDE

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	SD/MAKE
CHEV	6-10												
	N=		1	3	2	3	2	0	1	2	3	17	
		1	305.21	17[illegible]	[illegible]	2[illegible]0.65	40[illegible]		5[illegible]7	251.[illegible]3	[illegible]	3[illegible]	1[illegible]
		2	[illegible]	1[illegible]	1[illegible]	1[illegible]57	13[illegible]97		[illegible]	[illegible]	[illegible]	2[illegible].16	1[illegible]
		3	51.64	109.95	131.58	10[illegible]	216.30		517.10	[illegible]14.[illegible]	21[illegible]	174.36	1[illegible]
DODG	6-10												
	N=		0	1	0	0	1	1	1	1	0	5	
		1		2[illegible]			47[illegible].24	[illegible]	[illegible]	[illegible]		[illegible]	2[illegible]
		2		42[illegible]			693.04	450.09	3[illegible]0.53	360.95		[illegible]1.43	265.4
		3		256.18			396.05	719.2	3[illegible]0.15	256.[illegible]		389.42	191.7
	10-14												
	N=		2	1	0	0	0	0	0	0	0	3	
		1	531.2[illegible]	11[illegible]								7[illegible]	[illegible]
		2	280.[illegible]	872.[illegible]								477.05	36[illegible].1
		3	252.65	427.3[illegible]								310.[illegible]	132.0
FORD	6-10												
	N=		2	3	2	2	2	2	2	2	2	19	
		1	386.8[illegible]	3[illegible]	7[illegible]	61[illegible]	197.1[illegible]	314.5[illegible]	3[illegible]	[illegible]	[illegible]	[illegible]	17[illegible]
		2	240.71	217.[illegible]	26[illegible].[illegible]5	3[illegible]7.69	25[illegible].98	4[illegible]0.50	479.[illegible]	528.26	5[illegible].74	360.13	15[illegible]
		3	160.79	14[illegible].23	181.49	312.61	131.90	243.07	27[illegible].34	3[illegible].27	3[illegible].05	233.17	[illegible]7.0
	10-16												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		3[illegible]								371.[illegible]	
		2		152.19								152.19	
		3		20[illegible].51								20[illegible].51	
GMC	6-10												
	N=		0	1	0	0	0	0	1	1	0	3	
		1		268.[illegible]					414.74	458.48		380.[illegible]5	[illegible].4
		2		245.73					597.[illegible]	609.84		484.48	206.[illegible]
		3		168.2[illegible]					387.67	438.04		331.31	145.[illegible]
INTL	6-10												
	N=		0	0	0	0	0	0	1	0	0	1	
		1							437.03			437.03	
		2							512.87			512.[illegible]	
		3							354.5[illegible]			354.5[illegible]	
	10-14												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		257.[illegible]3								257.[illegible]3	
		2		19[illegible]								19[illegible]	
		3		15[illegible].23								15[illegible].23	
	AVG/YR											GRAND AVG	
	N=		5	7	[illegible]	[illegible]	[illegible]	3	6	[illegible]	5	[illegible]	
		1	[illegible]6.28	3[illegible]7.[illegible]	[illegible]73.1[illegible]	37[illegible]	359.[illegible]	[illegible].06	[illegible]	[illegible].00	[illegible]2.0	[illegible].78	
		2	2[illegible]1.7	[illegible]	2[illegible]	2[illegible]1.	[illegible].19	[illegible]	[illegible].57	[illegible].70	3[illegible]	3[illegible]	
		3	17[illegible]	17[illegible].79	15[illegible]	1[illegible].95	21[illegible].05	[illegible]3.7[illegible]	357.93	290.28	20[illegible]	2[illegible].[illegible]	
	S.D./YR											GRAND SD	
		1	[illegible]	3[illegible]	[illegible]79.[illegible]	2[illegible].[illegible]	[illegible]50.7[illegible]	[illegible]07.[illegible]	[illegible]7.[illegible]	218.56	[illegible]		[illegible]
		2	12[illegible].3[illegible]	2[illegible].5[illegible]	[illegible].03	1[illegible]	1[illegible]	[illegible]	17[illegible].1[illegible]	1[illegible].7	1[illegible].00		20[illegible].[illegible]
		3	102.65	10[illegible]	6[illegible].[illegible]1	1[illegible]	104.[illegible]3	2[illegible].[illegible]7	10[illegible].[illegible]	108.[illegible]	[illegible].05		1[illegible].4

Figure 3.1-10

3-12

SUMMARY OF EXHAUST EMISSION VALUES

IN GRAMS PER TEST PHASE

6,001-16,000 GVW VEHICLES

CARBON DIOXIDE

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	SD/MAKE
CHEV	6-10	N=	1	3	2	3	2	0	1	2	3	17	
		1	2512.83	3098.[?]	2641.74	2516.38	2436.52		1325.32	1771.38	2139.23	2470.43	512.1
		2	2775.49	[illegible]	[illegible]	3354.87	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		3	2314.08	2601.40	2405.87	2592.31	23[?].64		1753.04	1568.91	1473.25	2093.90	436.6
DODG	6-10	N=	0	1	0	0	1	1	1	1	0	5	
		1		2976.72			2921.33	2629.6[?]	2677.29	2090.25		2721.03	591.8
		2		2840.72			2738.47	2730.13	2678.80	2271.64		2610.83	305.9
		3		2443.24			2560.91	2739.67	2297.48	2031.96		2490.35	257.9
	10-14	N=	2	1	0	0	0	0	0	0	0	3	
		1	4660.76	4592.86								4632.79	175.1
		2	4273.86	4569.20								4372.63	263.3
		3	3998.69	4915.18								394[?].19	103.2
FORD	6-10	N=	2	3	2	2	2	2	2	2	2	19	
		1	2651.25	2977.13	2631.22	2325.53	2598.57	2694.99	2909.94	3157.90	2477.23	2637.50	437.8
		2	3015.54	2582.28	285[?].39	2367.04	2457.75	2730.35	25[?].10	3026.47	253[?].05	2677.18	40[?].6
		3	2392.59	2167.58	255[?].12	214[?].81	2356.29	2353.83	2454.20	2799.19	2156.39	2352.14	367.6
	14-16	N=	0	1	0	0	0	0	0	0	0	1	
		1		4152.36								4152.36	
		2		4679.68								4679.68	
		3		4034.87								4034.87	
GMC	6-10	N=	0	1	0	0	0	0	1	1	0	3	
		1		3372.63					2525.38	2626.82		2841.61	462.7
		2		3257.56					2385.35	2320.52		2654.54	523.9
		3		2972.54					2204.59	2141.98		2439.77	473.9
INTE	6-10	N=	0	0	0	0	0	0	1	0	0	1	
		1							2349.41			2349.41	
		2							2332.57			2332.57	
		3							2068.49			2068.49	
	10-14	N=	0	1	0	0	0	0	0	0	0	1	
		1		3221.13								3221.13	
		2		3209.31								3209.31	
		3		2773.89								2773.89	
	AVG/YR	N=	5	11	4	5	5	3	6	6	5	GRAND AVG 50	
		1	3829.77	3174.87	2636.73	2620.16	2570.13	2674.31	2535.31	2015.75	2143.63	2760.6[?]	
		2	3470.86	3193.63	2830.[?]	2279.37	259[?].46	2726.95	2413.67	240[?].91	2375.85	2793.50	
		3	2983.29	27[?].53	2456.[?]	2350.31	2219.75	2525.1[?]	2[?]05.[?]	2138.69	1936.[?]7	2473.56	
	S.D./YR	1	1208.63	723.89	137.[?]	510.92	213.56	659.14	573.51	709.06	276.85		GRAND SD 609.[?]
		2	758.56	786.[?]6	91.[?]	650.29	1[?].56	[?]7.15	[illegible]	619.79	283.98		690.5
		3	863.56	768.62	[illegible]	4[?]1.37	179.92	917.14	[illegible]	625.19	900.85		606.0

Figure 3.1-11

SUMMARY OF EXHAUST EMISSION VALUES

IN GRAMS PER TEST PHASE

6,000-16,000 GVW VEHICLES

NITRIC OXIDE (NO)

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	STD/MAKE
CHEV	6-10												
	N=		1	5	2	3	2	0	1	2	3	17	
		1	12.18	23.69	17.35	22.03	19.51		16.62	15.39	21.67	19.37	5.5
		2	12.31	18.02	21.37	22.69	13.7		17.50	13.14	17.38	17.50	4.9
		3	15.89	27.31	20.50	24.37	21.45		15.31	18.23	19.40	20.20	4.5
DODG	6-10												
	N=		0	1	0	0	1	1	1	1	0	5	
		1		29.41			31.0	12.00	18.9	14.8		21.39	8.4
		2		25.35			24.71	7.78	19.35	18.07		19.05	7.1
		3		24.25			29.35	11.80	19.90	21.86		21.41	7.1
	10-14												
	N=		2	1	0	0	0	0	0	0	0	3	
		1	43.01	30.49								38.91	10.2
		2	37.85	31.63								35.77	6.4
		3	41.00	34.91								38.09	4.2
FORD	6-10												
	N=		2	3	2	2	2	2	2	2	2	19	
		1	14.09	19.05	18.09	13.52	19.69	15.79	23.7	24.51	15.23	18.07	5.7
		2	12.13	14.41	17.07	15.23	16.86	15.31	19.03	24.29	13.95	16.37	6.2
		3	16.74	16.35	2[illegible].07	16.59	19.90	14.10	21.60	25.1[illegible]	15.31	18.50	5.8
	14-16												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		31.86								31.86	
		2		42.09								42.09	
		3		4[illegible].87								48.87	
GMC	6-10												
	N=		0	1	0	0	0	0	1	1	0	3	
		1		24.69					20.69	12.72		19.37	6.1
		2		21.25					15.43	7.47		14.72	6.9
		3		25.48					20.78	15.94		20.73	4.9
INTE	6-10												
	N=		0	0	0	0	0	0	1	0	0	1	
		1							17.17			17.17	
		2							13.78			13.78	
		3							15.53			15.53	
	10-14												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		26.23								26.2[illegible]	
		2		21.38								21.38	
		3		27.78								27.78	
	AVG/YR											GRAND AVG	
	N=		5	11	4	5	5	3	6	6	5	50	
		1	25.24	23.53	17.72	19.20	21.8	14.73	20.17	17.0[illegible]	19.10	20.59	
		2	2[illegible].45	21.46	16.62	19.74	15.79	12.60	16.62	16.74	16.01	18.65	
		3	26.28	25.25	21.29	21.56	21.81	13.16	19.10	19.41	17.76	21.41	
	STD/YR											GRAND STD	
		1	17.01	5.46	2.67	7.[illegible]1	5.39	1.92	4.70	6.03	3.06		7.6
		2	14.63	8.91	3.43	7.31	6.12	6.50	4.90	8.[illegible]	4.23		7.9
		3	13.56	8.76	2.61	8.55	4.97	1.63	4.56	4.96	2.86		7.[illegible]

Figure 3.1-12

SUMMARY OF EXHAUST EMISSION VALUES

IN GRAMS PER TEST PHASE

6,001-16,000 GVW VEHICLES

OXIDES OF NITROGEN CORRECTED FOR HUMIDITY (NO_{xc})

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	SD/MAKE
CHEV	6-10												
	N=		1	3	2	3	2	0	1	2	3	17	
		1	15.15	30.58	23.23	36.91	28.31		19.21	19.55	27.13	27.09	7.8
		2	14.04	24.59	25.45	29.20	14.95		12.03	16.02	13.39	20.93	7.6
		3	19.93	33.26	26.30	37.56	32.11		17.17	18.51	23.51	27.46	8.6
DODG	6-10												
	N=		0	1	0	0	1	1	1	1	0	5	
		1		40.8[illegible]			52.[illegible]	15.02	27.[illegible]	19.[illegible]		29.[illegible]	12.[illegible]
		2		29.01			23.2[illegible]	7.04	23.73	21.75		22.14	5.5
		3		37.13			38.04	12.84	26.07	32.40		29.31	10.4
	10-14												
	N=		2	1	0	0	0	0	0	0	0	3	
		1	63.2[illegible]	51.90								59.[illegible]	[illegible]
		2	54.15	46.05								51.45	12.4
		3	65.45	57.12								62.67	10.[illegible]
FORD	6-10												
	N=		2	3	2	2	2	2	2	2	2	19	
		1	17.94	27.11	24.29	17.46	26.85	21.94	31.9[illegible]	34.[illegible]	19.9[illegible]	24.69	9.[illegible]
		2	13.70	18.19	20.42	19.84	21.12	18.55	20.72	28.5[illegible]	15.14	19.51	8.6
		3	21.84	26.19	34.02	27.56	35.[illegible]	20.[illegible]	29.42	36.02	1[illegible]	26.[illegible]	[illegible]
	14-16												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		48.46								48.46	
		2		58.90								58.90	
		3		65.15								65.15	
GMC	6-10												
	N=		0	1	0	0	0	0	1	1	1	3	
		1		31.8[illegible]					27.36	16.21		25.15	8.1
		2		23.04					16.9[illegible]	9.43		16.43	7.7
		3		35.20					23.[illegible]	21.09		26.01	6.1
INTE	6-10												
	N=		0	0	0	0	0	0	1	0	0	1	
		1							20.86			20.86	
		2							13.83			13.83	
		3							18.49			18.49	
	10-14												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		35.27								35.27	
		2		22.96								22.96	
		3		34.78								34.79	
												GRAND AVG	
	AVG/YR												
	N=		5	11	4	5	5	3	6	6	5	50	
		1	35.49	30.6[illegible]	23.76	22.13	30.6[illegible]	19.[illegible]	26.[illegible]	28.[illegible]	23.87	28.59	
		2	29.[illegible]	28.[illegible]	2[illegible].95	25.86	20.77	15.92	1[illegible]	1[illegible]	17.[illegible]	2[illegible]	
		3	39.12	36.79	30.31	31.56	39.76	17.36	24.03	26.44	21.55	29.[illegible]	
	S.D./YR												GRAND SD
		1	26.95	10.2	4.96	14.50	8.07	4.[illegible]	7.[illegible]	12.35	5.17		12.[illegible]
		2	23.57	13.93	3.96	11.30	8.52	8.24	5.72	11.61	3.93		12.1
		3	25.67	13.[illegible]	5.0[illegible]	13.73	9.[illegible]	9.56	6.19	12.16	[illegible]		13.5

Figure 3.1-13

SUMMARY OF EXHAUST EMISSION VALUES

PER TEST PHASE

6,0[illegible]-16,[illegible] GVW VEHICLES

MILES PER GALLON

MAKE	GVW	TEST NO	1973	1972	1971	1970	1969	1968	1967	1966	1965	AVE/MAKE	SD/MAKE
CHEV	6-10												
	N=		1	3	2	3	2	0	1	2	3	17	
		1	10.91	9.60	9.32	9.96	9.70		10.52	14.6[illegible]	11.95	10.73	2.[illegible]
		2	11.92	10.79	10.[illegible]	10.59	10.49		10.15	13.6[illegible]	12.35	11.3[illegible]	1.[illegible]
		3	13.13	1[illegible].36	11.91	1[illegible].59	11.93		11.54	10.[illegible]7	13.68	12.09	2.[illegible]
DODG	6-10												
	N=		0	1	0	0	1	1	1	1	[illegible]	5	
		1		9.36			8.35	6.14	9.68	9.16		8.59	1.4
		2		9.70			8.76	7.68	10.55	12.55		9.85	1.9
		3		10.92			9.77	7.78	10.95	12.59		10.40	1.8
	10-14												
	N=		2	1	0	0	0	0	0	0	0	3	
		1	5.63	4.93								5.40	0.4
		2	7.15	5.71								6.67	0.8
		3	7.28	6.57								7.07	0.5
FORD	6-10												
	N=		2	3	2	2	2	2	2	2	2	19	
		1	9.68	9.05	8.20	9.43	10.75	9.67	9.36	8.17	9.89	9.40	1.[illegible]
		2	10.1[illegible]	1[illegible].73	10.36	1[illegible].77	11.8[illegible]	9.91	10.70	8.70	9.70	10.59	1.6
		3	1[illegible].79	13.08	10.84	1[illegible].84	12.6[illegible]	1[illegible].09	1[illegible].28	9.53	1[illegible].25	11.[illegible]7	1.7
	14-16												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		5.61								5.61	
		2		7.92								7.92	
		3		7.13								7.13	
GMC	6-10												
	N=		0	1	0	0	0	0	1	1	0	3	
		1		8.21					9.49	9.17		8.96	0.7
		2		9.35					10.67	10.29		9.90	0.[illegible]
		3		9.59					10.96	10.93		10.50	0.8
INTE	6-10												
	N=		0	0	0	0	0	0	1	0	0	1	
		1							9.67			9.67	
		2							10.48			10.48	
		3							11.51			11.51	
	10-14												
	N=		0	1	0	0	0	0	0	0	0	1	
		1		8.41								8.41	
		2		9.60								9.60	
		3		10.32								10.30	
	AVG/YR											GRAND AVG	
	N=		5	11	[illegible]	5	5	3	6	6	4	50	
		1	8.13	8.65	8.76	9.77	9.85	8.40	9.66	10.67	1[illegible].[illegible]3	9.49	
		2	9.29	9.91	10.43	11.06	10.78	9.13	10.6	11.26	1[illegible].29	10.40	
		3	10.25	10.72	11.38	11.69	11.79	[illegible]	11.26	12.65	12.71	11.58	
	S.D./YR												GRAND SD
		1	2.08	1.97	1.61	1.49	1.92	2.17	1.67	3.84	1.34		2.1
		2	2.12	2.16	0.91	1.35	1.59	1.08	1.57	2.83	1.5		1.[illegible]
		3	2.87	2.[illegible]	0.72	1.58	1.5[illegible]	1.96	1.70	4.07	1.62		2.[illegible]

Figure 3.1-14

1972 & 1973 MODEL YEAR AVERAGES FOR TESTS 1&2 (as-received) AND TESTS 3&4 (after tune)

Vehicle Number	Make	Year	Inertia	GVW	HC 1&2	HC 3&4	CO 1&2	CO 3&4	CO_2 1&2	CO_2 3&4	NOX_C 1&2	NOX_C 3&4	MPG 1&2	MPG 3&4
001	Ford	1972	4500	6900	3.766	2.977	47.835	32.33	567.355	562.13	8.478	6.746	13.44	14.20
003	Chev	1973	4500	6400	4.570	2.268	47.28	23.26	652.3	728.21	3.996	4.517	12.06	11.40
005	Ford	1973	4500	6000	4.312	3.048	85.32	31.46	648.07	711.76	4.551	3.902	11.05	11.42
007	Ford	1972	5000	6900	6.229	5.128	55.40	44.18	745.4	728.6	7.356	6.346	10.32	10.80
010	Ford	1972	4500	6000	6.088	5.828	91.68	84.73	635.4	665.0	3.498	3.387	11.02	10.78
011	Chev	1972	5500	7500	4.049	3.466	40.34	29.9	855.4	829.3	9.911	10.02	9.445	9.91
015	Chev	1972	5000	7500	5.361	5.41	62.34	34.08	642.3	673.8	6.848	8.132	11.62	11.825
027	Dodge	1972	5000	7700	5.743	3.903	116.0	67.70	720.5	738.0	8.76	9.294	9.55	10.30
035	Ford	1973	5000	6900	3.910	4.472	53.88	97.15	778.9	805.0	4.898	4.56	10.04	9.075
037	GMC	1972	6000	10000	4.428	3.396	59.72	62.46	841.6	868.6	7.986	7.100	9.264	9.004
039	Dodge	1973	8500	11000	6.97	6.420	123.1	109.4	1079.1	1145.6	13.057	13.023	6.792	6.573
040	Dodge	1972	8500	11000	10.481	7.297	196.6	232.0	1251.2	1113.8	16.98	9.623	5.572	5.876
043	Intern	1972	6000	14000	7.459	5.578	54.06	51.68	772.0	874.9	8.438	7.018	10.00	9.032
044	Ford	1972	8500	15000	7.449	5.356	89.54	82.86	1082.2	1253.8	15.741	15.58	7.056	6.308
045	Dodge	1973	8500	13000	12.61	5.292	47.50	68.36	1124.6	1188.6	20.00	17.50	7.096	6.7
050	Chev	1972	5000	7500	2.454	2.825	26.38	42.42	746.4	799.7	5.252	5.278	11.06	10.05

Figure 3.1-15

1965 - 1971 AVERAGES FOR TESTS 1 & 2

(as-received)

Vehicle Number	Make	Year	Inertia	GVW	HC 1&2	CO 1&2	CO_2 1&2	NOX_C 1&2	MPG 1&2
002	Chev	1970	4500	7500	3.379	42.71	620.47	10.13	12.60
004	Ford	1965	4500	6149	14.004	117.23	594.94	4.456	10.68
006	Chev	1969	5000	7500	4.935	89.24	603.59	7.03	11.58
0008	Ford	1968	5000	6100	8.935	108.26	739.6	4.451	9.38
0009	Chev	1966	4500	7500	11.088	104.54	550.0	3.620	11.74
012	Chev	1969	5000	7500	8.995	113.6	696.7	5.080	9.734
014	Chev	1966	4500	7500	5.859	40.95	422.4	5.712	17.41
015	Ford	1968	5000	7500	4.824	90.84	655.6	6.108	10.81
016	Ford	1970	4500	7500	7.79	111.8	492.4	1.892	12.7
017	Ford	1970	5000	7500	5.626	96.70	731.4	8.830	9.758
018	Ford	1969	4500	6100	4.528	56.00	633.7	4.136	11.96
019	Ford	1967	4500	6000	5.238	69.30	551.8	4.835	12.98
020	Ford	1971	5000	7500	7.767	111.5	714.0	5.855	9.610
021	Ford	1971	5000	7500	4.931	65.98	738.5	7.54	10.261
022	Ford	1969	5000	7500	4.306	54.48	655.8	8.46	11.67
023	Dodge	1966	5000	7500	8.634	114.6	546.3	6.51	11.68
024	Chev	1971	5000	7500	3.777	43.20	730.0	6.856	10.88
025	Chev	1970	5000	7500	2.670	24.00	876.1	6.944	9.542
026	Chev	1970	5000	6700	3.906	51.92	780.1	9.520	10.06
028	Chev	1965	4500	7500	7.954	68.46	522.0	5.970	13.43
029	Chev	1965	4500	7500	12.56	29.50	645.9	6.705	12.02
030	Chev	1965	4500	7500	10.89	91.88	535.8	4.726	12.31
031	Chev	1971	5000	7500	5.502	79.82	719.9	6.546	10.20

Figure 3.1-16

1965 - 1971 AVERAGES FOR TESTS 1 & 2 (cont.)

(as-received)

Vehicle Number	Make	Year	Inertia	GVW	HC 1&2	CO 1&2	CO_2 1&2	NOX_C 1&2	MPG 1&2
032	Dodge	1969	5000	7500	8.538	149.0	726.4	9.118	8.918
033	Ford	1966	4500	7500	9.756	132.9	668.4	4.853	9.774
034	Ford	1967	5000	6900	9.283	140.3	837.4	8.835	8.094
036	Chev	1967	5000	7500	18.69	170.1	506.0	4.01	10.56
038	Dodge	1965	5000	7500	6.895	89.72	678.5	6.748	10.46
041	Dodge	1968	5000	7500	21.54	229.2	772.0	2.896	7.324
042	Intern	1967	4500	7300	13.10	120.4	603.0	4.446	10.56
046	Ford	1966	6000	10000	13.14	102.2	924.8	11.88	7.803
047	GMC	1967	5000	7500	7.976	133.0	630.4	5.600	10.17
048	GMC	1966	5000	7500	5.884	140.8	622.8	3.664	10.20
049	Ford	1965	5000	7500	12.24	124.0	686.1	4.717	9.562

Figure 3.1-16 (cont.)

MILES PER GALLON

1975 Weighted

Inertia	Model Year	N	Tests 1 & 2	Tests 3 & 4
4500	1965-1971	12	12.36	
	1972-1973	4	11.96	12.00
	1965-1973	16	12.26	
5000	1965-1971	21	10.03	
	1972-1973	5	10.52	10.41
	1965-1973	26	10.12	
5500	1972	1	9.44	9.91
6000	1966	1	7.80	
	1972	2	9.63	9.02
	1966 & 1972	3	9.02	
8500	1972-1973	4	6.63	6.36

Figure 3.1-17

3.2 FEASIBILITY OF LIGHT DUTY TEST PROCEDURES USED FOR INTERMEDIATE DUTY TESTING

3.2.1 Test Equipment

Constant Volume Sampler (CVS)

The constant volume sampler used for light duty vehicles is directly applicable for testing 6,000 to 10,000 pound GVW intermediate duty vehicles. The constant volume sampler is also applicable for the 10,000 to 14,000 pound GVW intermediate duty vehicles when blower flowrate is increased to a nominal 500 CFM. This increased flowrate is necessary to ensure that sufficient exhaust gas dilution is maintained for reducing dew point temperature while collecting bag samples and to ensure that concentrations are reduced to a level that will allow use of light duty vehicle exhaust gas analytical systems.

Exhaust Analysis Console (EAC)

AESi's EAC worked well without modification in analyzing exhaust samples for this program. The instrument ranges commonly used for light duty vehicle emissions analysis using a 300-350 CFM CVS were ideal for analyzing intermediate duty vehicle emissions gathered with a 500 CFM CVS.

Chassis Dynamometer

It may be concluded that suitable dynamometers for intermediate duty vehicle emissions testing are available. The Clayton CE-50 chassis dynamometer is suitable for testing the 6,000 to 10,000 pound GVW vehicles without any modifications. The Clayton CT-200 chassis dynamometer with modifications as described in Section 4.1.4 is suitable for testing 10,000 to 14,000 pound GVW vehicles.

Summary of Equipment Needs

For vehicles in the 6,000 to 10,000 pound GVW range, light duty vehicle emissions testing equipment works well without alteration. For 10,000 to 14,000 pound GVW vehicle emission testing, the modifications or specifications listed above are necessary. These modifications present no problems in technology and present only a small increase in initial equipment costs.

3.2.2 Test Procedures

Evaporative Emissions Determination

Evaporative emissions testing was found to be more than twice as difficult with trucks as with passenger cars for three reasons.

1. Trucks have an average of two fuel tanks each.
2. The location of auxiliary fuel tanks in many trucks impedes heating during the diurnal soak test.
3. Many of the fuel tanks were of a vertical configuration reducing wetted area which in turn impedes heating during the diurnal soak test.

Exhaust Emissions Testing

Two conclusions can be drawn from this study relating to exhaust emission testing. First, the light duty Federal Test Procedure driving schedule in general worked very well with the intermediate duty vehicles. All of the test vehicles achieved the accelerations, decelerations and cruises required by the FTP driving schedule. None of the vehicles overheated nor did wheelspin occur at high horsepower settings. However, in the course of calibrating the dynamometer for this program, a maximum road load horsepower of 65.9 was anticipated (see Figure 2.3-2). At this setting the vehicle used for the calibration had difficulty accelerating beyond 50 mph and its tires became overheated. These problems were alleviated by cooling the tires with fans, applying rosin to the tires and reducing the rate of acceleration.

Second, the tolerance on the FTP driving schedule should be increased for trucks. Most of the trucks cannot be started out as smoothly as cars nor can they be shifted as easily. The transmission ratios of trucks tend to include a very low first gear ratio with wider steps between the gear ratios compared to light duty vehicles. In comparison to light duty vehicles, the trucks tend to jump momentarily above the driving schedule when accelerating from a standstill. When shifting, however, the trucks tend to fall momentarily below the driving schedule because the wider ratio spread and higher mass of the gears in a truck transmission compared to that of an automobile increase the length of time required during shifting.

Intermediate duty vehicles in the 6,000 - 10,000 pound GVW category are no more difficult than automobiles to test by the Federal Procedures. The 10,000 - 14,000 pound GVW vehicles are slightly more difficult to test and could benefit from the minor changes in the Federal Test Procedure mentioned above.

3.3 EFFECT OF TUNEUP UPON 1972-1973 MODEL YEAR VEHICLE EXHAUST EMISSIONS

Exhaust emissions of HC, CO and NO_{xc} were reduced substantially by the minor tuneup procedure applied in this program on 1972 and 1973 test vehicles. Figures 3.3-1 through 3.3-5 list means and standard deviations of emissions by make and GVW for the before and after tuneup test pairs. The percent change in the after tune tests compared to the as-received tests is listed with as-received emissions as the base figure. It appears likely that HC, CO and NO_x exhaust emissions could be greatly reduced by maintaining proper tune on 1972 and 1973 model year intermediate duty vehicles.

COMPARISON OF 1975 WEIGHTED EXHAUST EMISSIONS VALUES
(in grams per mile)
BEFORE & AFTER TUNEUP
1972 & 1973 Vehicles

HYDROCARBONS

MAKE	GVW	N	BEFORE TUNE TESTS 1&2 MEAN	BEFORE TUNE TESTS 1&2 S.D.	AFTER TUNE TESTS 3&4 MEAN	AFTER TUNE TESTS 3&4 S.D.	PERCENT CHANGE
CHEV	6-10	4	4.11	3.04	3.49	1.28	-15.09
DODGE	6-10 10-14	1 3	5.74 10.02	3.22	3.90 6.34	1.07	-32.04 -36.77
FORD	6-10 14-16	5 1	4.86 7.45	1.19	4.29 5.36	1.26	-11.72 -28.10
GMC	6-10	1	4.45		3.40		-23.53
INTL	10-14	1	7.46		5.58		-25.16
MEAN			5.99		4.54		-24.21
S.D.			3.63		1.52		

Figure 3.3-1

COMPARISON OF 1975 WEIGHTED EXHAUST EMISSIONS VALUES
(in grams per mile)
BEFORE & AFTER TUNEUP
1972 & 1973 Vehicles

CARBON MONOXIDE

MAKE	GVW	N	BEFORE TUNE TESTS 1&2		AFTER TUNE TESTS 3&4		PERCENT CHANGE
			MEAN	S.D.	MEAN	S.D.	
CHEV	6-10	4	44.09	19.29	32.41	7.75	-26.48
DODGE	6-10	1	116.00		67.71		-41.63
	10-14	3	122.39	66.97	136.59	76.44	11.60
FORD	6-10	5	66.83	19.20	57.97	29.61	-13.26
	14-16	1	89.53		82.86		-7.45
GMC	6-10	1	59.72		62.46		4.59
INTL	10-14	1	54.06		51.69		-4.39
MEAN			74.81		68.37		-8.61
S.D.			42.31		52.93		

Figure 3.3-2

COMPARISON OF 1975 WEIGHTED EXHAUST EMISSIONS VALUES
(in grams per mile)
BEFORE & AFTER TUNEUP
1972 & 1973 Vehicles

CARBON DIOXIDE

MAKE	GVW	N	BEFORE TUNE TESTS 1&2 MEAN	BEFORE TUNE TESTS 1&2 S.D.	AFTER TUNE TESTS 3&4 MEAN	AFTER TUNE TESTS 3&4 S.D.	PERCENT CHANGE
CHEV	6-10	4	724.0	96.0	757.8	66.9	4.66
DODGE	6-10	1	720.5		738.1		2.43
	10-14	3	1151.6	123.2	1149.3	69.1	-0.20
FORD	6-10	5	675.0	81.5	694.5	90.7	2.88
	14-16	1	1082.2		1253.8		15.86
GMC	6-10	1	841.6		868.7		3.22
INTL	10-14	1	771.9		874.9		13.34
MEAN			821.4		855.4		4.14
S.D.			152.0		157.4		

Figure 3.3-3

COMPARISON OF 1975 WEIGHTED EXHAUST EMISSIONS VALUES
(in grams per mile)
BEFORE & AFTER TUNEUP
1972 & 1973 Vehicles

NO_{xc}

MAKE	GVW	N	BEFORE TUNE TESTS 1&2 MEAN	BEFORE TUNE TESTS 1&2 S.D.	AFTER TUNE TESTS 3&4 MEAN	AFTER TUNE TESTS 3&4 S.D.	PERCENT CHANGE
CHEV	6-10	4	6.50	2.40	6.99	4.73	7.46
DODGE	6-10	1	8.76		9.29		6.09
	10-14	3	16.68	17.51	13.38	7.27	-19.74
FORD	6-10	5	5.76	2.84	4.99	2.30	-13.34
	14-16	1	15.74		15.58		-1.01
GMC	6-10	1	7.99		7.10		-11.08
INTL	10-14	1	8.44		7.02		-16.81
MEAN			9.11		8.25		-9.40
S.D.			7.52		4.13		

Figure 3.3-4

COMPARISON OF 1975 WEIGHTED EXHAUST EMISSIONS VALUES

BEFORE & AFTER TUNEUP

1972 & 1973 Vehicles

MILES PER GALLON

MAKE	GVW	N	BEFORE TUNE TESTS 1&2		AFTER TUNE TESTS 3&4		PERCENT CHANGE
			MEAN	S.D.	MEAN	S.D.	
CHEV	6-10	4	11.04	1.34	10.80	.009	-2.25
DODGE	6-10	1	9.55		10.29		7.80
	10-14	3	6.49	.008	6.38	.004	-1.60
FORD	6-10	5	11.18	1.28	10.93	1.75	-2.23
	14-16	1	7.06		6.31		-10.60
GMC	6-10	1	9.26		9.00		-2.81
INTL	10-14	1	10.00		9.03		-9.71
MEAN			9.74		9.47		-2.74
S.D.			2.005		2.20		

Figure 3.3-5

4. APPENDIX

4.1 FACILITIES AND EQUIPMENT

4.1.1 Test Location

Testing was performed by AESi under this contract at the Westminster, California, laboratory. The dynamometers are placed approximately fifty feet above sea level. The laboratory is in the southern portion of the Los Angeles metropolitan area, the area from which test vehicles were selected.

4.1.2 Constant Volume Sampler (CVS)

Two Constant Volume Samplers were used in this program. One CVS was operated at 300 to 350 CFM as is usual for testing light duty vehicles. Another CVS was operated at approximately 500 CFM to provide sufficient dilution of test vehicle exhaust at the high road load horsepower settings required to simulate road conditions encountered by the larger vehicles. Complete calibration data for both CVS's are presented in the Appendix.

The constant volume sampler physically qualifies all exhaust emissions data. Its specific purpose is to measure the mass of a given exhaust effluent without affecting the data by imposing unnatural operating conditions on the test vehicle. The basic specifications of the CVS are listed in 37 Federal Register, No. 221, November 15, 1972, Part II. The following table lists on the left, the specifications as itemized under Section 85.073-20 of said Federal Register and on the right, the performance specifications of AESi's constant volume sampler.

SPECIFICATION	AESi CVS PERFORMANCE
1. Must have two particulate filters plus one charcoal filter with a total pressure drop of less than 1" H_2O	0.3 - 0.4" H_2O Drop
2. Tailpipe pressure within ±1" H_2O during driving cycle with CVS and without CVS.	+0.0",-0.55" H_2O as measured with a 350 CID Chevelle during the first 250 seconds of the Federal cycle. The static pressure t/p was located 3-1/2" from the end of the tailpipe.
3. Preheater to bring CVS within ±10°F of set point prior to test startup.	± 2°F

4. A heat exchanger to maintain set point within ±10°F during the Federal test cycle.	±5°F
5. A positive displacement pump of 300 to 350 CFM capacity calibrated per Appendix III, <u>Federal Register</u>.	Sutorbilt 5LV running a 1125 RPM producing approximately 343 CFM. See calibration section for calibration information.
6. Temperature sensor within ±2°F allowing continuous recording.	±2°F
7. Gauge (G1) with accuracy of ±3mm Hg.	±0.2mm Hg
8. Gauge (G2) with accuracy of ±3mm Hg.	±0.2mm Hg
9. Sample probes (S1 and S2)	(5) Specially designed probes (S1, S2, continuous S1 and S2 plus raw exhaust)
10. Filters (F1 and F2)	F1 and F2
11. Pumps (P1 and P2)	Stainless steel Metal Bellows pumps (P1 and P2) plus 1 to 3 additional pumps for other purposes.
12 & 13. Flow control valves (N1 and N2) and flowmeters (FL1 and FL2) to insure constant sample flow.	Flowmeters (FL1 and FL2) with integral valves (N1 and N2) plus, in some cases, flow control pressure regulators.
14. Three-way solenoid valves (V1 and V2)	Stainless steel skinner 3-way valves (V1 and V2)
15. Quick connect leak tight fittings (C1 and C2) to connect sample bags to CVS, EAC, purge cylinder and evacuation pump.	Specially designed leak tight pneumatic system using solenoid and/or rotary valves to perform sample and bag management without any fittings or make/break operations. This facilitates rapid and accurate sample analysis.
16. Sample collection bags of sufficient capacity.	Four large sample bags made of Tedlar. These bags can be analyzed, evacuated, purged and re-evacuated in alternate pairs such that the 1975 procedure calling for six samples can be performed with four bags.
17. A revolution counter for pump revolutions.	Two revolution counters electrically latched to the sample solenoid valves. As a backup the elapsed time of each test phase is recorded. The blower is driven by a synchronous motor such that blower RPM is constant. Thus N = E.T.· RPM.

In addition to the above features which satisfy EPA specifications, the AESi constant volume samplers are fitted with the following items. Each CVS has snubbers fitted to both inlet and outlet sides of the mass pump. The damping of blower pulsations facilitates calibration and reduces the noise level of the CVS to less than 72 dB(A), well beneath standards set by the Walsh-Healy Act. This reduces operator fatigue and minimizes operator error. The AESi CVS design includes an integral flow control valve and other design details which enable the entire CVS to be operated at the identical conditions under which the entire CVS is calibrated. This is the only operating condition at which CVS calibration is not speculation. Also, the blower is driven by a synchronous motor such that the constant volume sampler is truly constant.

Other design details of the AESi CVS ensure thorough sample mixing combined with a low pressure drop flow circuit. The AESi designed heat exchanger is not subject to clogging and the consequent rise in pressure drop which affects calibration of the mass pump.

Another important feature unique to the AESi CVS is an integral system for checking the entire CVS and EAC sample circuit with calibration gas. The CVS can be made to pump calibration gas instead of dilute exhaust sample. The calibration gas is not under pressure but must be pulled at the same sub-ambient pressure as the normal sample. The gas is routed to the sample bag, then analyzed by the EAC. This is an exact simulation of the EAC sampling process but using a known calibration gas. Under conditions equivalent to one CVS cold start test we allow no more than an 0.5% error in this span check. This is an important system check which is beyond EPA requirements. The process is initiated by push-button so that it can frequently and conveniently be used by AESi technicians.

4.1.3 Exhaust Analysis Console (EAC)

The EAC used during this program was qualified by EPA representatives prior to testing. Laboratory standard gases were named by EPA and are listed in Figure 4.1-1.

LABORATORY STANDARD CALIBRATION GASES

Instrument	AESi Range	Nominal Concentration
FID	2	29.55 ppm Carbon in Air
"	2	99.3 " " " "
"	2	200.7 " " " "
"	2-3	306.6 " " " "
"	3	585.0 " " " "
"	3	933.0 " " " "
"	3-4	1,465.5 " " " "
"	3-4	4,068.0 " " " "
"	4	8,432.0 " " " "
"	4	12,058.0 " " " "
CO	6	1,071 ppm CO in N_2
"	6	2,170 " " " "
"	6-3	3,150 " " " "
"	6	4,997 " " " "
"	3	8,100 " " " "
"	2	12,800 " " " "
"	3	13,100 " " " "
"	2-1	15,900 " " " "
"	3-1	20,400 " " " "
"	2-1	39,100 " " " "
"	2-1	56,500 " " " "
"	1	91,400 " " " "
CO_2	3	6,000 ppm CO_2 in N_2
"	2	10,007 " " " "
"	3	14,960 " " " "
"	3	20,500 " " " "
"	2	24,800 " " " "
"	3	30,000 " " " "
"	3-2	38,200 " " " "
"	2	59,100 " " " "
NO_x	5	54 ppm NO in N_2
"	5	100 " " " "
"	5	176 " " " "
"	5-6	196 " " " "
"	6	315.75 ppm NO in N_2
"	6	464.25 " " " "
"	6	626.95 " " " "
"	6	784.65 " " " "

Figure 4.1-1

The purpose of the exhaust analysis console is to determine the concentration of effluents present in collected or continuous exhaust emission samples. The AESi EAC meets or exceeds all requirements as specified in 37 Federal Register, Number 221, November 15, 1972, Part II. The following table describes, on the left, the specifications as itemized in section 85.073-20(c) of the Federal Register mentioned above; and on the right, the performance specifications of the AESi Exhaust Analysis Consoles.

SPECIFICATION	AESi EAC PERFORMANCE
1. Quick-connect leak tight fitting (C3) to attach sample bags to analytical system.	Specially designed leak tight system using solenoid valves to manage sample and background bag analysis without disturbing system fittings or seals.
2. Filter (F3) to remove any residual particulate matter from the collected samples.	Three filters are used. One filter for the FID instrument; one filter for the NOx instrument; and one filter for both the CO and CO_2 NDIR instruments.
3. Pump (P3).	Three sample pumps are used aligned in the same manner as described above for the filters.
4. Selector valves (V3, V4 and V5)	Selector valves and solenoid selector valves.
5. Flow control valves to regulate the gas flow rates.	Flow control valves and sample by-pass flow control valves.
6. Flowmeters (FL3, FL4 and FL5).	Four flowmeters, one for each instrument and sample by-pass flowmeters.
7. Manifold to collect expelled gases from each analyzer.	Manifold to collect expelled gases.
8. Pump (P4) to transfer expelled gases to a vent external to the test room (optional).	Pump not necessary. Expelled gases are vented to outlet side of the CVS positive displacement pump, which is exhausted external to the test facility.
9. Analyzers to determine hydrocarbon, carbon monoxide and oxides of nitrogen concentrations.	Analyzers to determine hydrocarbon, carbon monoxide, oxides of nitrogen and carbon dioxide concentrations.
10. An oxides of nitrogen converter to convert any NO_2 present in the samples to NO before analysis.	An oxides of nitrogen converter to convert any NO_2 present in the samples to NO before analysis.

11. Selector valves (V6 and V7) to allow gases to bypass the converter. — Stainless steel solenoid selector valves to manage bypass of the oxides of nitrogen converter.

12. Recorders (R1, R2 and R3). — Two Honeywell dual pen recorders.

In addition to the above described features which satisfy EPA specification, the AESi Exhaust Analysis Consoles contain the following items:

1. Water trap to partially remove water from the sample gases.
2. Ability to analyze continuous dilute and raw undilute exhaust gas and collect expelled analyzer gases for return to the AESi CVS. (Raw undilute sample is expelled into the CVS before dilution air is mixed with exhaust gases.) The obvious benefit is continuous analysis of vehicle operation which can be achieved without affecting the collection and analysis of any bag sample.
3. Three to four calibration gas inlet ports per instrument to facilitate instrument curve and calibration results.
4. Large selection of full scale ranges available for each instrument.

4.1.4 Chassis Dynamometer

A Clayton CE-50 variable inertia emission chassis dynamometer was used for the 6,000-10,000 pound GVW vehicles in this program. This dynamometer has been designed specifically to meet the requirements in the Federal Register for emissions testing. The total absorption, torque and speed measuring systems utilized in the CE-50 provide an overall accuracy within 1.0% of full scale. AESi has added a tachometer generator driven by the front roll to the CE-50 to operate the driver's aid chart and facilitate calibration.

AESi modified a Clayton CT-200 chassis dynamometer to perform tests on the 10,000-14,000 pound GVW vehicles. A custom-made declutchable single flywheel of 4,000 pound equivalent inertia was added to a Clayton VIF unit of 2,000-5,500 pound inertia. The complete VIF provided inertia of 2,000-9,500 pounds in 500 pound increments. The power absorption unit and meter were calibrated for approximately 65 road load horsepower full scale. Also, a tachometer generator driven by the front roll was added to the CT-200. This dynamometer proved quite sufficient for testing intermediate duty vehicles.

4.1.5 Additional Laboratory Test Equipment

Precise weighing of evaporative emissions canisters was accomplished using a Sartorius Balance which can weigh up to 2.2 Kg with a resolution of 10 mg and an accuracy of ± 7 mg. The balance contains Class S weights which are traceable to the National Bureau of Standards. For less precise measurement, an O'Haus Scales with an accuracy of ± 50 mg was used.

Absolute pressure was measured with a Meriam Model 310EF10 Mercury Manometer incorporating a 0.01 inch of Hg vernier scale and a thermometer. Calibration is traceable to the National Bureau of Standards and is within 0.009 inch of Hg throughout the working range.

Temperature measurements were made with certified ASTM 64F or 50F thermometers or pyrometers and thermometers calibrated against the ASTM thermometers. Calibration is traceable to the National Bureau of Standards.

4.1.6 Vehicle Inspection and Maintenance Equipment

To ensure accurate and meaningful comparisons of exhaust emissions before and after tuneup, precision tuneup equipment was used. An Autoscan 4040 Analyzer provided complete ignition performance information. An Olson-Horiba Mexa 300 Infrared Exhaust Analyzer was used for adjusting carburetors. Test vehicles were analyzed while under load on a Clayton CE-200 chassis dynamometer.

4.1.7 Calibration Equipment

The most important calibration equipment is the Laminar Flow Element used to determine mass flow through the CVS. AESi used Meriam Model 50 MC2 [illegible]

[illegible] curves traceable to the National Bureau of Standards. Moreover, these instruments have been operated in series such that total meas[illegible]

Instruments used to monitor the laminar flow elements include the temp[illegible] and pressure devices listed above plus inclined manometers for [illegible] pressure drop across the laminar flow element.

AESi used two Meriam Model 40 HE35 WM inclined manometers. One has an 8 inches of H_2O range graduated in 0.01 inch increments. The other has a special scale matched to the flow curve of the 50 MC2-4SF laminar flow element.

AESi also used a Meriam Model 40 GD10 inclined manometer with a 4 inches of H_2O range in 0.02 inch increments. These three inclined manometers have calibrations traceable to the National Bureau of Standards.

To determine the pressure drop across the blower of the CVS and the inlet depression AESi used "U" tube manometers reading in 0.10 inches of H_2O increments with ranges of 40 inches and 50 inches.

4.2 INITIAL CALIBRATION AND QUALIFICATION

4.2.1 Constant Volume Sampler (CVS)

AESi's CVS's were calibrated with the laminar flow elements and accessories listed in Section 4.1.7 by the basic procedure specified in the Federal Register. AESi personnel are experienced in this calibration procedure having qualified test cells eleven times at eleven locations for major EPA-sponsored programs. AESi personnel attended the CRC-EPA-sponsored symposium on CVS technique held in Ann Arbor, Michigan, in December, 1972. AESi personnel have also discussed CVS calibration at length with EPA experts.

In addition to measuring CVS flow at ten pressure differentials using the recommended practices discussed at the Ann Arbor symposium, AESi measured flow at several points at inlet temperatures above and below the set point temperature. During flow testing all possible variables were measured and accounted for. This includes an important parameter--measurement of the temperature of manometer fluid in the barometer and the inclined manometer. Blower motor speed was verified by means of a 60 Hz strobe light. The inlet and outlet pressures and temperatures were varied over ranges which surround and include in every dimension, the set of conditions at which the CVS is operated during emissions testing. Results are tabulated on CVS Flow Test forms (Figures 4.2-1 through 4.2-12).

Before inviting EPA personnel to the test site for qualification, AESi performed ten propane recovery tests in the 0-300 ppm carbon range to ensure proper calibration. For inspecting EPA officers, AESi repeated propane tests to EPA's satisfaction. (Figures 4.2-13 through 4.2-36).

4.2.2 Exhaust Analysis Console (EAC)

Calibration and qualification of the Exhaust Analysis Console (EAC) was performed as stipulated by the EPA Project Officer. Some of the procedures discussed here were performed prior to the arrival of the Project Officer. Also, many of these procedures were repeated for qualification to the satisfaction of the Project Officer.

DESCRIPTION: ☑ INLET ☐ OUTLET — 1800 RPM — TRUCK CVS – WI… GEAR

2063	[illegible]	~~4-2~~ 4-3-73
Prj.No.	Site	Date

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 596250$

ΔP [illegible] ΔPL·127+4, … ΔPL·126+10, … ΔPL·124+18 — @ 1800, 954 000

TECH JGS

$P_A \text{ cor } H_2O'' = (-0.00136 \cdot T_A\,°F + 13.5912) P_A \text{ Hg}''$

SH 1 OF 1

STEP NO.	ΔP H_2O''	V_o $Ft^3/Rev.$	T_A °F	P_A Hg'' / P_A cor H_2O''	ΔP_L H_2O''	T_M / fT_M	T_L / fT_L	☐+ $P_L\ \Delta H_2O''$ / ☑− $P_L\ A\ H_2O''$	$P_P\ \Delta H_2O''$ / $P_P\ A\ H_2O''$	T_P °F / T_P °R	TIME SET / READ
1.	~~23.5~~		~~[illegible]~~	~~[illegible]~~ ~~410.4~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~4.35~~	~~119~~	~~8:[illegible] AM~~
1.	23.3	[illegible] 0.2997	79	30.22 410.7	3.745	81 [illegible]	75.2 .9835	6.09 - 3.75 2.3 408.4	19.15 391.55	118.5 578.5	12:20 12:32
2.	25.00	0.2983			3.71		75.0 .9835	 408.4	20.85 389.85	118.5 578.5	12:33 12:43
3.	27.0	0.2983			3.69	79	76.0 .9802	 408.4	22.9 387.8	[illegible] [illegible]	12:44 12:54
4.	30.0	0.2956			3.613		77.0 .9769	 408.4	25.9 384.8	120.0 580.0	12:55 1:05
5.	33.0	0.2955			3.605	80	77.0 .9769	[illegible] 408.5	28.9 381.8	121.0 581.0	1:06 1:16
6.	36.	0.2949		 114°F @ 26	3.565		76.9 .9769	[illegible] 408.5	31.95 378.75	121. 581.5	1:17 1:25
7.	27.0	0.2989			3.70	80	76.8 .9769	 408.4	22.9 387.8	122.0 582.0	1:26 1:35
8.	23.35	0.2994			3.76		76.8 .9769	 408.4	19.15 391.55	120.5 580.5	1:35 1:45

Figure 4.2-1

C. S FLO[illegible] [illegible]ST

DESCRIPTION: ☒ INLET ☐ OUTLET TRUCK CVS 1125 RPM

Prj. No.	Site	Date
2063	W	4-3-73

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 599250$

TECH JGS

$P_A \text{ cor } H_2O'' = (-0.00135 \cdot T_A\,°F + 13.5912) P_A \text{ Hg}''$

SH 1 OF 1

STEP NO.	ΔP H_2O''	V_o Ft.³/Rev.	T_A °F	P_A Hg" / P_A cor H_2O''	ΔP_L H_2O''	T_M / $f T_M$	T_L / $f T_L$	☐+ P_L Δ H_2O'' / ☐− P_L A H_2O''	P_P Δ H_2O'' / P_P A H_2O''	T_P °F / T_P °R	TIME SET / READ
1.	11.15	0.3060	74	30.22	2.45	80	76.5	[illegible] 2.45 1.4	9.45	120.0	1:56 pm
				410.7	[illegible]	[illegible]	0.9786	409.3	401.25	580.0	2:08
2.	13.0	0.3035			2.418		76.9	[illegible]	11.35	120.0	2:08
							.9786	409.35	397.35	580	2:21
3.	15.0	0.3023			2.395		76.2	[illegible] 1.3	13.4	120.0	2:21
							.9802	409.4	397.3	580	2:31
4.	18.0	0.2997			2.352		76.2	[illegible] 1.3	16.4	120.0	2:32
							.9802	409.4	394.3	580	2:41
5.	22.0	0.2960			2.30		76.1		20.[illegible]	119.5	2:41
							.9802	[illegible].4	390.2	579.5	2:52
6.	26.0	0.2926			2.247	78.5	76.0	[illegible] 1.25	24.6	120.0	2:53
							.9802	409.45	386.1	580.0	3:03
7.	31.0	0.2887			2.187		76.0		29.7	120.0	3:04
							.9802	409.45	381.0	580.0	3:13
8.	36.0	0.2851			2.13	77.0	75.8	[illegible] 1.75	34.8	120.0	3:14
							.9802	409.5	375.9	580.0	3:26
9.	24.0	0.2937			2.27		75.0		22.6	119.5	3:26
							.9802	409.4	388.1	579.5	3:35
10.	16.0	0.3013			2.375		75.6		14.4	119.5	3:35
							.9818	409.4	396.3	579.5	3:45
11.	14.0	0.3025			2.349		75.[illegible]		12.3[illegible]	119.0	3:45
							.9818	409.4	397.35	579.0	3:55
12.	12.0	0.3043			2.421		7[illegible]		10.[illegible]	1[illegible]	3:[illegible]
							.98[illegible]	[illegible].3	4[illegible].4	[illegible].5	4:[illegible]

Figure 4.2-2

DESCRIPTION: ☑ INLET 14.60 · 1800 420 RPM

☐ OUTLET 6" LFE [illegible]

2063	W	4-3-73
Prj.No.	Site	Date

$V_o = (\Delta P_L \cdot .27 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 599250$ 222600

TECH JGS

P_A cor H_2O" $(-0.00136 \cdot T_A {}^\circ F + 13.6912) P_A$ Hg" ΔPL · 13

SH 1 OF 1

STEP NO.	ΔP H_2O"	V_o Ft.³/Rev.	T_A °F	P_A Hg" / P_A cor H_2O"	ΔP_L H_2O"	T_M / fT_M	T_L / fT_L	P_L Δ H_2O" / P_L A H_2O"	P_P Δ H_2O" / P_P A H_2O"	T_P °F / T_P °R	TIME SET / READ
1.	2.5	0.3111	71	[illegible] [illegible]	0.93	78.0	75.2 .9835	1.41 - .93 410.2	2.25 408.45	120.0 580.0	4:25 pm 4:34
2.	6.0	0.2961			0.878		75.1 .9835	 410.2	5.80 404.9	119.5 579.5	4:34 4:41
3.	10.0	0.2852			0.835		75.0 .9835	[illegible] 410.3	1.8 400.9	121.0 581.0	4:41 4:47
4	15.0	0.2136			0.791		75.0 .9835	1.18 .88 410.3	14.85 395.85	121.0 581.0	4:47 4:54
5.	20.05	0.2619			0.748		75.0 .9835	1.11 .36 410.35	19.4 390.8	120.5 580.5	4:54 5:01
6.	25.0	0.2485			0.700		75.0 .9835	1.05 [illegible] 410.35	24.95 385.75	121.0 581.0	5:01 5:08
7.	30.0	0.2372			0.66		74.1 .9835	[illegible] 410.4	29.65 380.75	120.5 580.5	5:08 5:16
8.	~~34.0~~ 35.9	0.2236			0.612	77.0	74.[illegible] .9835	.92 410.4	[illegible] 379.8	[illegible] 581.0	5:17 5:26
9.	14.0	0.2722			0.789		74.[illegible] 0.9843	1.11 410.3	13.85 396.85	120.[illegible] 580.5	5:27 5:34
10.	8.0	0.2897			0.854		74.[illegible] .9835	[illegible] 410.25	7.8 402.9	120.0 580.0	5:34 5:43
11.	4.0	0.3050			0.902		7[illegible] .9835	[illegible] 410.25	3.8 406.9	12[illegible] 580.0	5:43 5:51

Figure 4.2-3

'.'/S ·L(' ' ''S I ·_:'_

DESCRIPTION: ☑ INLET 420 RPM

ΔP_L 56.0 ☐ OUTLET 4" LFE TRICL CUS

2063	W	4-3-73
Prj. No.	Site	Date

$V_o = (\Delta P_L \div 127.4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 590250$ 222 600

TECH JGS

P_A cor $H_2O" = (-0.00135 \cdot T_A {}^\circ F + 13.6912) P_A$ Hg"

SH 1 OF 1

STEP NO.	ΔP $H_2O"$	V_o Ft^3/Rev.	T_A °F	P_A Hg" / P_A cor $H_2O"$	ΔP_L $H_2O"$	T_M / $f T_M$	T_L / $f T_L$	☐+ P_L Δ $H_2O"$ / ☑− P_L A $H_2O"$	P_P Δ $H_2O"$ / P_P A $H_2O"$	T_P °F / T_P °R	TIME SET / READ
1.	4.55	0.3039	73	30.24	2.101	77	75.6	311 - 211 [illegible]	4.3	120.0	6:59 AM
				411.0			0.9818	410.0	406.7	580.0	7:01
2.	7.0	0.2935			2.025		75.8	3.0 - 1.0	6.8	119.5	7:02
							0.9802	410.0	404.2	579.5	7:11
3.	9.0	0.2875			1.965		75.2	2.1 - 4	8.8	120.0	7:11
							0.9835	410.35	402.2	580.0	7:19
4.	12.05	0.2801			1.903		75.5	2.1	11.85	120.0	7:19
							0.9818	410.15	399.15	580.0	7:27
5.	17.0	0.2680			1.749		76.1	2.0	16.9	120.5	7:27
							0.9802	410.15	394.1	580.5	7:36
6.	23.0	0.2544			1.683		75.7	1.7	22.9	120.0	7:36
							0.9802	410.2	388.1	580.0	7:45
7.	28.0	0.2443			1.592		76.0	1.7	27.45	121.0	7:45
							0.9802	410.25	383.05	581.0	7:56
8.	35.00 ~~36.0~~	0.2273			1.452		76.0	2.0 -	~~[illegible]~~	120.5	7:56
							0.9802	410.3	375.2	580.5	8:00
9.	19.9 ~~20.0~~	0.2589			1.728		76.4	[illegible]	[illegible]	120.5	8:00
							0.9786	410.2	391.2	580.5	8:09
10.	19.5	0.2722			1.842	79	76.6	2.1 -	14.5	120.5	8:10
							0.9786	410.15	396.65	580.5	8:18
11.	7.0	0.2927			2.028		77.2	2.0	6.8	121	8:18
							0.9769	410.0	404.2	581.0	8:21

Figure 4.2-4

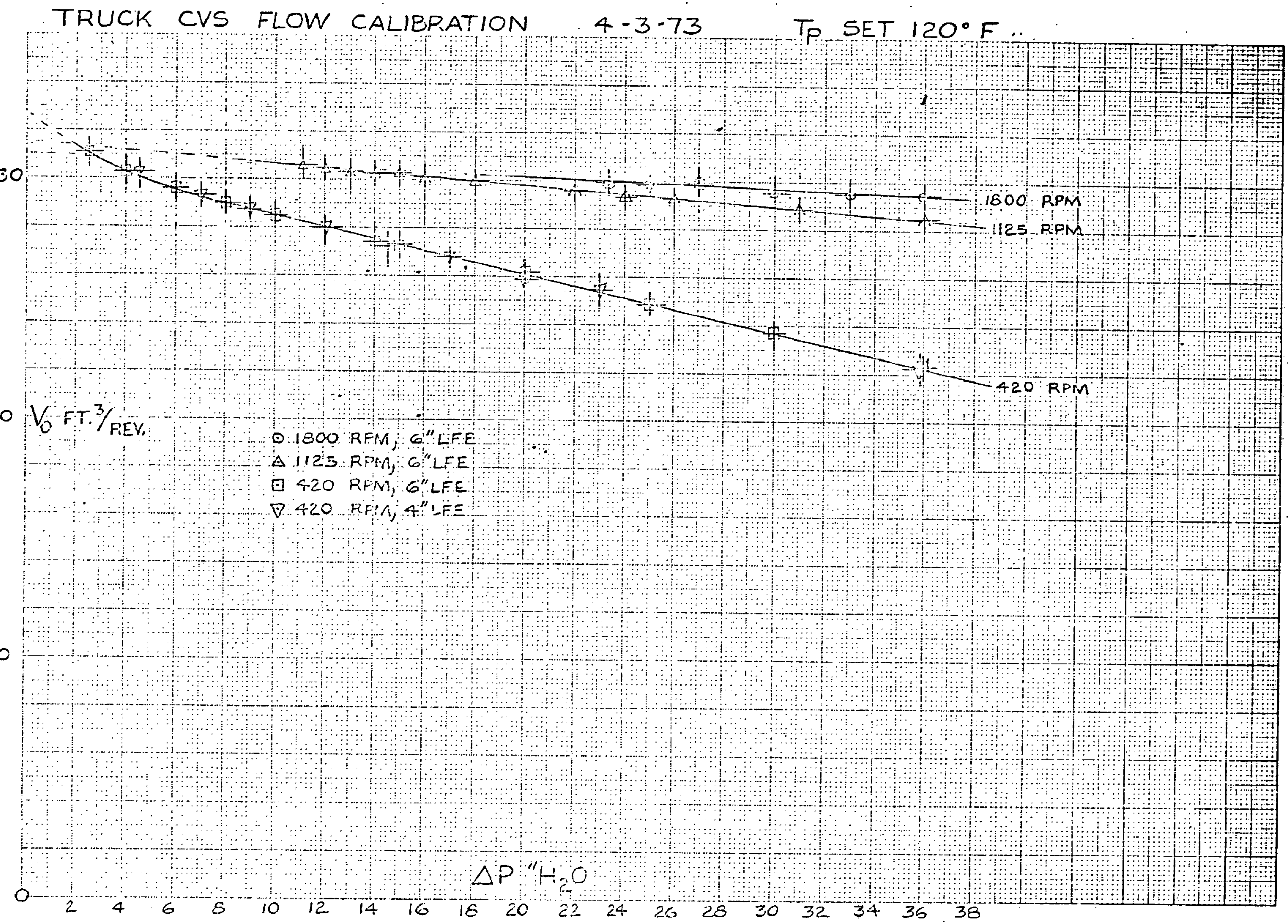

TRUCK CVS FLOW CALIBRATION 4-3-73 T_P SET 120° F
0.30
0.20
0.10
0
V_0 FT.^{3}/REV.
1800 RPM
1125 RPM
420 RPM
⊙ 1800 RPM, 6" LFE
△ 1125 RPM, 6" LFE
⊡ 420 RPM, 6" LFE
▽ 420 RPM, 4" LFE
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38
ΔP "H_2O

Figure 4.2-5

CVS #2 (Truck CVS) Effective 4-5-73

$T_p = 120° F$

RPM	ΔP H_2O	$V_o ft^3/rev$	$\approx$SCFM	$\approx$AMPS
1800	20.0	0.301	470	11
1125	13.5	0.303	300	4.5
420	4.0	0.305	115	3.5
420	20.0	0.260	95	4.0
420	35.0	0.227	80	4.5

INSTRUCTIONS:

1. Determine the desired volume of dilute flow.

2. Find the next higher flow from the above table. Note the RPM and ΔP.

3. Install the belt drive for the desired RPM. 1800 and 1125 RPM require the short belt. 420 RPM requires the long belt.

4. Set the ΔP valve wide open before starting the mass pump. This is very important at 1800 RPM. The slot in the valve shaft end indicates valve angle. It is a butterfly valve. The slot is vertical when the valve is wide open.

5. Start the mass pump, water pump, T_p controller and heater.

6. Once $T_p = 120°$ F set ΔP.

7. After 5 minutes readjust ΔP.

Figure 4.2-6

CVS FLOW TEST # 1 MKII # 2

DESCRIPTION: ☒ INLET ☐ OUTLET

2043 2053	W	11-13-72
Prj. No.	Site	Date

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 596250$

TECH JGS

P_A cor $H_2O'' = (-0.00136 \cdot T_A\,°F + 13.6912) P_A$ Hg"

SH 1 OF 1

STEP NO.	ΔP H_2O''	Ft/Rev.	T_A °F	P_A Hg" / P_A cor H_2O''	ΔP_L H_2O''	T_M / fT_M	T_L / fT_L	☐+ $P_L\ \Delta H_2O''$ / ☑− P_L A H_2O''	$P_P\ \Delta H_2O''$ / P_P A H_2O''	T_P °F / T_P °R	TIME SET / READ
1.	11.6	[illegible]			2.37	[illegible]	70.4	1.2	11.1	121	2:00 pm
				407.9	2.37	[illegible]	.9967	406.7	396.8	580.7	2:25
2.	14.0	[illegible] 25			2.365	72	71.5	1.2	12.5	120.5	2:39
				407.9	2.36		.995	406.7	395.4	580.2	2:52
3.	[illegible]	[illegible] 5			2.345		72.[illegible]	1.2	[illegible]	120.3	2:5[illegible]
				407.9	2.3[illegible]	72	.9916	406.7	393.5	580.0	3:06
4.	15.0 / 17.7	[illegible]			2.31	73	72.2	1.2	[illegible]	121.1	3:08
				407.9	2.31[illegible]		.9923	406.7	391.5	581.7	3:2[illegible]
5.	20.[illegible]	[illegible]			2.30	72.[illegible]	71.4	1.1	18.7	121.5	3:23
				407.9	2.293	72.[illegible]	.995	40[illegible]	389.2	581.2	3:34
6.	22.[illegible]	[illegible] 4			2.27	73.[illegible]	70.[illegible]	1.1	[illegible]	124	3:36
				407.9	2.24		.9983	406.8	384.4	583.7	[illegible]
7.	27.2	[illegible]			2.19	73	70.4	1.1	28.[illegible]	124	4:02
				407.9	2.19		.9983	406.8	379.1	583.7	4:17
8.	35.0	[illegible] 7			2.14	73	69.5	1.1	33.6	123.[illegible]	4:18
				407.9	2.14		1.0[illegible]7	406.8	374.3	583.2	4:34
9.	[illegible].1	[illegible]			2.07	72.5	69.8	1.0	28.8	122	4:36
				407.9	2.07		1.0[illegible]	407.8	379.1	581.7	4:45
10.	17.2	[illegible]			2.33	72.5	[illegible]	1.2	15.7	121	4:47
				407.9	2.33		1.000	406.7	392.2	[illegible]7	4:55
11.	12.0	[illegible]			2.37	72.5	[illegible]	1.2	11.5	122	4:57
				407.9	2.39		.9967	406.7	396.4	581.7	5:11
12.	[illegible]	[illegible]			2.325	[illegible]	71.7	1.2	17.5	122	5:13
				407.9	2.32[illegible]		.995	406.7	390.4	581.7	5:26

Figure 4.2-7

[illegible]

DESCRIPTION: ☒ INLET ☐ OUTLET

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 596250$

TECH JGS

P_A cor $H_2O'' = (-0.00136 \cdot T_A\,°F + 13.6912) P_A$ Hg"

2043 / 2043 Prj. No.	W Site	11-13-72 Date

SH 1 OF 1

STEP NO.	ΔP H_2O''	V_o Ft.³/Rev.	T_A °F	P_A Hg" / P_A cor H_2O''	ΔP_L H_2O''	T_M / $f T_M$	T_L / $f T_L$	☐+ $P_L \Delta H_2O''$ / ☒− P_L A H_2O''	$P_P \Delta H_2O''$ / P_P A H_2O''	T_P °F / T_P °R	TIME SET / READ
1.	12.9	0.3067 ~~0.3122~~			2.41 / 2.41	70	66.5	1.2	11.3	112.5	8:40
				407.9			1.0051	406.7	396.6	572.5	9:02
2.	16.0	0.3048 ~~[illegible]~~			2.31 / 2.35?	70	66.3	1.2	14.5	111.5	9:03
				407.9			1.0051	406.7	393.4	571.5	9:13
3.	20.0	0.3033			2.34 / 2.34	70.5	66.4	1.2	18.5	112	9:15
				407.9			1.0051	406.7	389.4	572	9:24
4.	25.0	0.3000			2.28 / 2.28	71	67.0	1.2	23.5	112	9:25
				[illegible]			1.0067	406.7	384.4	572	9:34
5.	18.0	0.3039			2.345 / 2.35	71	67.0	1.2	16.5	112	9:35
				407.9			1.0101	406.7	391.4	572	9:45
6.	15.0	0.3065			2.395 / 2.39	70.5	67.2	1.2	13.5	112.5	9:46
				407.9			1.0067	406.7	394.4	572.5	10:04

Figure 4.2-8

[illegible]

DESCRIPTION: ☒ INLET ☐ OUTLET

2043	W	11-13-72
Prj. No.	Site	Date

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 596250$

TECH JGS

P_A cor $H_2O'' = (-0.00135 \cdot T_A\,°F + 13.6912) P_A$ Hg"

SH 1 OF 1

STEP NO.	ΔP H_2O''	V_o Ft.³/Rev.	T_A °F	P_A Hg" / P_A cor H_2O''	Δ P_L * H_2O''	T_M / $f T_M$	T_L / $f T_L$	☐+ P_L Δ H_2O'' / ☐− P_L A H_2O''	P_P Δ H_2O'' / P_P A H_2O''	T_P °F / T_P °R	TIME SET / READ
1.	12.5	0.3087	1		2.36	71	67.6	1.2	11.0	128.5	10:25 pm
				407.9	2.36		1.0051	406.7	396.9	588.5	10:45
2.	14.9	0.3062			2.32	71	68.3	1.2	13.4	130.0	10:46
				407.9	2.32	73	1.0051	406.7	394.5	590.0	11:02
3.	18.1	0.3057			2.29	71.5	68.4	1.2	16.6	130.5	11:03
				407.9	2.295		1.0051	406.7	391.3	590.5	11:13
4.	24.9	0.3012			2.21	71.5	68.3	1.2	23.4	132.0	11:15
				407.9	2.215	73	1.0051	406.7	384.5	592.0	11:25
5.	20.0	0.3046			2.265	71.5	68.4	1.2	18.5	132.0	11:27
				407.9	2.27		1.0051	406.7	389.4	592.0	11:35
6	16.0	0.3061			2.30	71.5	68.3	1.2	14.5	132.0	11:37
				407.9	2.305		1.0051	406.7	393.4	592.0	11:43

Figure 4.2-9

DESCRIPTION: ☒ INLET ☐ OUTLET

2-43 2053	W	11-13-72
Prj.No.	Site	Date

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot T_P \div 596250$

TECH JGS

P_A cor $H_2O'' = (-0.00135 \cdot T_A\,°F + 13.6912) P_A$ Hg″

SH 1 OF 1

STEP NO.	△P H_2O''	V_o Ft.³/Rev.	T_A °F	P_A Hg″ / P_A cor H_2O''	△P_L H_2O''	T_M / fT_M	T_L / fT_L	☐+ P_L △ H_2O'' / ☒− P_L A H_2O''	P_P △ H_2O'' / P_P A H_2O''	T_P °F / T_P °R	TIME SET / READ
1.	12.6	0.3075		 407.9	2.385 2.385	71 73	6[illegible] 1.0067	1.2 406.7	10.1 411.8	120.5 580.5	11:44 pm 12:08 am
2.	14.9	0.3065		 407.9	2.355 2.355	71.5	6[illegible] 1.0067	1.2 406.7	15.4 394.5	121.[illegible] 581.0	12:09 12:20
3.	18[illegible]	0.3051		 407.9	2.325 2.325	71.5	68.[illegible] 1.0067	1.2 406.7	16.6 391.3	121.0 581.0	12:21 12:31
4.	24.9	0.3006		 407.9	2.25 2.25	71.5	6[illegible] 1.0067	1.2 406.7	23.4 384.5	121.0 581.0	12:32 12:42
5.	20.2	0.3042		 407.9	2.305 2.305	71	67.0 1.0067	1.2 406.7	17.7 389.2	121.0 581.0	12:43 12:53
6.	15.9	0.3051		 407.9	2.34 2.34	71	[illegible] 1.0067	1.2 406.7	14.4 393.5	120.5 580.5	12:59 1:03

Figure 4.2-10

DESCRIPTION: ☐ INLET ☒ OUTLET [illegible]

2043 2053 Prj.No.	W Site	11-14-72 Date

$V_o = (\Delta P_L \cdot 127 + 4) f T_M \cdot f T_L \cdot P_L \div P_P \cdot {}^{-}P \div 596250$ [illegible] 1.5 Tp 1:30

TECH JGS

P_A cor $H_2O'' = (-0.00135 \cdot T_A\,°F + 13.6912) P_A$ Hg"

SH 1 OF 1

STEP NO.	ΔP H_2O''	V_o $Ft^3/Rev.$	T_A °F	P_A Hg" / P_A cor H_2O''	ΔP_L H_2O''	T_M / fT_M	T_L / fT_L	☒+ P_L Δ H_2O'' / ☐− P_L A H_2O''	P_P Δ H_2O'' / P_P A H_2O''	T_P °F / T_P °R	TIME SET / READ
1.	12.4	0.3026		[illegible] / 405.4	2.773 / 2.795	73 / 73	12[illegible].2 / .8438	[illegible]4.0 / 409.4	7.0 / 397.4	12[illegible] / 58[illegible].0	1:30 PM / 1:56
2.	15.1	0.3014		/ 405.4	2.78 / 2.78	[illegible] /	12[illegible].9 / .[illegible]6	4.0 / 401.4	9.7 / [illegible].7	1[illegible] / 5[illegible].0	1:57 / 2:12
3.	17.9	0.2985		/ 405.4	2.745 / 2.745		121.[illegible] / .[illegible]48	3.9 / 409.3	12.5 / 392.9	12[illegible] / [illegible].5	2:12 / 2:23
4.	25.0	0.2945		/ 405.4	2.68 / 2.675		12[illegible]. / .8273	3.8 / 4[illegible].2	15.7 / 385.7	121.0 / 581.0	2:24 / 2:43
5.	20.0	0.2971		/ 405.4	2.74 / 2.745	75 / 74.3	12[illegible].[illegible] / .831	3.9 / 409.3	14.7 / 390.7	12[illegible] / 581.0	2:44 / 2:53
6.	15.9	0.3014		/ 405.4	2.78 / 2.78	75 / 75	12[illegible].0 / .8[illegible]1	3.9 / 409.3	10.4 / 395.0	121.0 / 581.0	2:54 / 3:07
7.	15.9	0.3017		/ 405.4	2.78 / 2.78		12[illegible].7 / .7361	3.9 / 409.3	10.4 / 395.0	121.5 / 581.5	3:37 / 4:00
8.	13.0	0.3037		/ 405.4	2.8[illegible] / 2.81		124.[illegible] / .7986	4.00 / 409.4	7.5 / 397.9	121.5 / 581.5	4:01 / 4:12
9.	13.0	0.3031		/ 405.4	2.805 / 2.805		124.3 / .7976	[illegible].00 / 409.4	7.5 / 397.9	121.5 / 581.5	/ 4:17

Figure 4.2-11

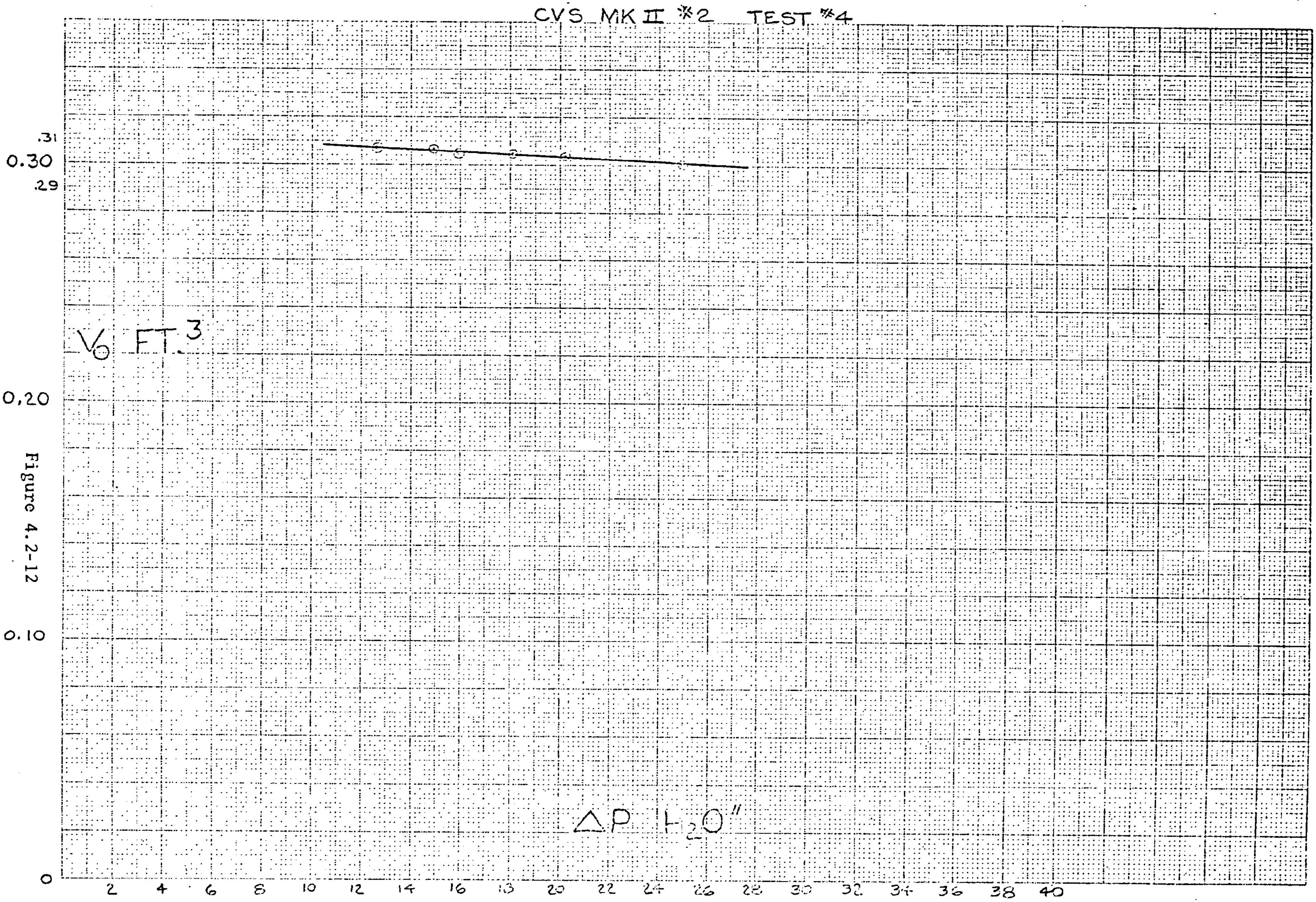

CVS MK II #2 TEST #4
.31
0.30
.29
V₀ FT.³
0,20
0.10
0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
ΔP H2O"

Figure 4.2-12

CVS PROPANE [illegible] ERY TEST NO. 1

[illegible]	[illegible]	[illegible]	
Prj. No.	Site	Date	

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

FID DEFLECTIONS	PPM$_C$
S1 [illegible]	[illegible]
B1 3.1	7.1

(-0.00136 ∘ T_A 77.5 °F + 13.6912) ∘ P_A [illegible] "Hg

-P_p [illegible] "H_2O ÷ T_p [illegible] °R ∘ 2.2454 ∘ NET [illegible] PPM$_C$

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ [illegible] = HC MASS [illegible] GRAMS

+ PROPANE CYLINDER EMPTY [illegible]

- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = -2.71 % ERROR

☐ + GAIN

☑ LOSS

Comments:

2T020372y

Figure 4.2-13

TRI

CVS PROPANE RECOVERY TEST NO. 2

Prj. No.	Site	Date
		72

FID DEFLECTIONS		PPM_C
S1	86.5	265.4
S1	4.2	12.8

TECH: [illegible]

E.T.: ~~15:03~~ 14.00

△ P: 20.0

$(-0.00136 \cdot T_A$ 76 $°F + 13.6912) \cdot P_A$ 30.11 "Hg

$-P_p$ 15.6 "$H_2O \div T_p$ 580 $°R \div 2.2454 \cdot$ NET 257.6 PPM_C

$\cdot V_o$ 0.301 Ft.^{3}/Rev. $\cdot$ 0.00001 $\cdot$ N [illegible] = HC MASS 29.18 GRAMS

\+ PROPANE CYLINDER EMPTY 781.13

\- PROPANE CYLINDER FULL 810.21 $\cdot$ 100 $\div$ HC MASS = .3 % ERROR

[✓] + GAIN

[ ] - LOSS

810.21
781.13
29.08

Comments:

2T020372y

CVS PROPANE RECOVERY TEST NO. [illegible]

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
[illegible]	[illegible]
[illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

ΔP: [illegible]

(-0.00136 ∘ T_A [illegible] °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R ∘ 2.2454 ∘ NET [illegible] PPM_C

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS [illegible] GRAMS

\+ PROPANE CYLINDER EMPTY [illegible]

\- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = [illegible] % ERROR

☐ + GAIN

☒ - LOSS

Comments: ______

Figure 4.2-15

2T020372y

FRT

CVS PROPANE RECOVERY TEST NO. 4

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
S: 76.6	[illegible]
B: 3.3	10.0

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

(-0.00136 ∘ T_A 75 °F + 13.6912) ∘ P_A 30.12 "Hg

$-P_p$ [illegible] "H_2O ÷ T_p 580 °R ∘ 2.2454 ∘ NET [illegible] PPM_C

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS 25.[illegible] GRAMS

+ PROPANE CYLINDER EMPTY [illegible]

- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = .44 % ERROR

☐ + GAIN

☑ - LOSS

Comments:

2T020372y

Figure 4.2-16

CVS PROPANE RECOVERY TEST NO. [illegible]

Prj. No	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
S1 [illegible]	[illegible]
31 [illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

(-0.00136 • T_A [illegible] °F + 13.6912) • P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R • 2.2454 • NET [illegible] PPM_C

• V_o [illegible] Ft.^{3}/Rev. • 0.00001 • N [illegible] = HC MASS [illegible] GRAMS

+ PROPANE CYLINDER EMPTY [illegible]

- PROPANE CYLINDER FULL [illegible] • 100 ÷ HC MASS = [illegible] % ERROR

[✓] + GAIN

[ ] - LOSS

Comments: ____________________

____

____

____

2T020372y

Figure 4.2-17

CVS PROPANE RECOVERY TEST NO. 6

2-XX	2/7	4/12/7
Prj. No.	Site	Date

FID DEFLECTIONS	PPM_C
S1 67.3	20.1
P1 54	16.4

TECH: RWV

E.T.: 10.0

Δ P: ~~[illegible]~~ 2.0

(-0.00136 • T_A 76 ^oF + 13.6912) • P_A 30.04 "Hg

$-P_p$ 14.9 "H_2O ÷ T_p 581 ^oR • 2.2454 • NET 1.77 PPM_C

• V_o [illegible] /Ft.^{3}/Rev. • 0.00001 • N [illegible] = HC MASS 15.61 GRAMS

+ PROPANE CYLINDER EMPTY 801.05

- PROPANE CYLINDER FULL 816.66 • 100 ÷ HC MASS = ~~[illegible]~~ .06 % ERROR

[✓] + GAIN

[ ] - LOSS

Comments: ______________________

15

2T020372y

Figure 4.2-18

CVS PROPANE RECOVERY TEST NO. 7

2060	[illegible]	[illegible]
Prj. No.	Site	Date

FID DEFLECTIONS	PPM_C
51 [illegible]	[illegible]
31 4.5	113

TECH: [illegible]

E.T.: [illegible]

△ P: [illegible]

(-0.00136 ∘ T_A 77 °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R ÷ 2.2454 ∘ NET [illegible] PPM_C

∘ V_o [illegible] Ft.³/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS [illegible] GRAMS

\+ PROPANE CYLINDER EMPTY [illegible]

\- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = [illegible] % ERROR

[ ] + GAIN

[✓] LOSS

Comments: ____________________

2T020372y

Figure 4.2-19

CVS PROPANE RECOVERY TEST NO. 8

Prj. No	Site	Date
2000		1/25/83

FID DEFLECTIONS	PPM_C
S1 83.0	245.3
B1 7.5	22.9

TECH: [illegible]

E.T.: 12:00

Δ P: 20.5

(-0.00136 ∘ T_A 80 °F + 13.6912) ∘ P_A 29.55 "Hg

$-P_p$ 15.6 "H_2O ÷ T_p 526 °R ∘ 2.2454 ∘ NET 222.4 PPM_C

∘ V_o .301 Ft.^{3}/Rev. ∘ 0.00001 ∘ N 21150 = HC MASS 21.91 GRAMS

\+ PROPANE CYLINDER EMPTY 752.23

\- PROPANE CYLINDER FULL 773.52 ∘ 100 ÷ HC MASS = 1.50 % ERROR

[x] + GAIN

[ ] - LOSS

Comments:

Figure 4.2-20

2T020372y

CVS PROPANE RECOVERY TEST NO. [illegible]

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS		PPM_C
S1	[illegible]	[illegible]
B1	[illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

(-0.00136 ∘ T_A [illegible] °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_{DB} [illegible] °R ∘ 2.2454 ∘ NET [illegible] PPM_C

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS [illegible] GRAMS

+ PROPANE CYLINDER EMPTY [illegible]

− PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = [illegible] % ERROR

[ ] + GAIN

[✓] LOSS

Comments: ______

______

______

______

2T020372y

Figure 4.2-21

CVS PROPANE RECOVERY TEST NO. 10

2060	070	4/21/73
Prj. No.	Site	Date

FID DEFLECTIONS	PPM_C
SI 72.0	220.6
BI 7.0	21.3

TECH: [illegible]

E.T.: 10100

Δ P: 22.0

(-0.00136 ∘ T_A 80 °F + 13.6912) ∘ P_A 30.06 "Hg

-P_p 15.2 "H_2O ÷ T_p 576 °R ∘ 2.2454 ∘ NET 199.3 PPM_C

∘ V_o .301 Ft.^{3}/Rev. ∘ 0.00001 ∘ N 15000 = HC MASS 16.52 GRAMS

+ PROPANE CYLINDER EMPTY 1527.57

- PROPANE CYLINDER FULL 1544.22 ∘ 100 ÷ HC MASS = 1.45 % ERROR

16.62

☒ + GAIN

☐ - LOSS

Comments:

Figure 4.2-22

CVS PROPANE RECOVERY TEST NO. 11

2060	[illegible]	[illegible]
Prj. No.	Site	Date

FID DEFLECTIONS		PPM_C
SI	162	147.3
BI	53	16.1

TECH: [illegible]

E.T.: 10 [illegible]

Δ P: 20[illegible]

(-0.00136 ∘ T_A 78 °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ 114 "H_2O ÷ T_p 580 °R ∘ 2.2454 ∘ NET 131.2 PPM_C

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS 10.81 GRAMS

\+ PROPANE CYLINDER EMPTY 1051.14

\- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = 2.14 % ERROR

☐ + GAIN

☒ - LOSS

11.16 Comments:

2T020372y

Figure 4.2-23

4-32

1 R''

CVS PROPANE RECOVERY TEST NO. 13

2060		4/22/83
Prj. No.	Site	Date

TECH: [illegible]

E.T.: 10:00

Δ P: 22.0

FID DEFLECTIONS	PPM_C
S1 62.0	1828
B1 10.2	31.0

$(-0.00136 \bullet T_A$ 79 $°F + 13.6912) \bullet P_A$ 30.04 "Hg

$-P_p$ 15.4 "$H_2O \div T_p$ 582 $°R \bullet 2.2454 \bullet$ NET ______ PPM_C

$\bullet V_o$ 0.201 $Ft.^3/Rev. \bullet 0.00001 \bullet N$ 18000 = HC MASS 13.04 GRAMS

\+ PROPANE CYLINDER EMPTY 1025.11

\- PROPANE CYLINDER FULL 1038.17 $\bullet$ 100 $\div$ HC MASS = .13 % ERROR

[ ] + GAIN

[✓] - LOSS

1038.17
1025.11
13.06

Comments: ______

3.36
22.0

2T020372y

Figure 4.2-24

R'

CVS PROPANE RECOVERY TEST NO. 13

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

△ P: [illegible]

FID DEFLECTIONS	PPM_C
S1 23.5	[illegible]
B1 [illegible]	15.0

(-0.00136 ∘ T_A 77 °F + 13.6912) ∘ P_A 29.96 "Hg

$-P_p$ 15.6 "H_2O ÷ T_p 580 °R ∘ 2 2454 ∘ NET [illegible] PPM_C

∘ V_o 0.301 Ft.^{3}/Rev. ∘ 0.00001 ∘ N 21500 = HC MASS [illegible] GRAMS

\+ PROPANE CYLINDER EMPTY 811.45

\- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = [illegible] % ERROR

☐ + GAIN

☒ LOSS

929.31
811.45
117.86

Comments:

140
.45 x2

2T020372y

Figure 4.2-25

ERC

CVS PROPANE RECOVERY TEST NO. 14

40037	9/71	—
Prj. No.	Site	Date

4/27/73

FID DEFLECTIONS	PPM_C
S1 54.0	115.6
B1 10.5	30.6

TECH: KNK

E.T.: 10 00

Δ P: 20.0

(-0.00136 • T_A 77 °F + 13.6912) • P_A 20.20 Hg

$-P_p$ 15.7 "H_2O ÷ T_p 578 °R • 2.2454 • NET 135.0 PPM_C

• V_o 0.301 Ft.^{3}/Rev. • 0.00001 • N 18000 = HC MASS 11.32 GRAMS

+ PROPANE CYLINDER EMPTY 994.82

- PROPANE CYLINDER FULL 1005.76 • 100 ÷ HC MASS = 3.37 % ERROR

[✓] + GAIN

[ ] - LOSS

Comments: ____________________

2T020372y

Figure 4.2-26

CVS PROPANE RECOVERY TEST NO. 14

Prj. No.	Site	Date
20[illegible]	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
S1 72.5	251.5
B1 9.5	24.1

TECH: [illegible]

E.T.: 13:50

Δ P: [illegible]

(-0.00136 ∘ T_A 72 °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ 15.? "H_2O ÷ T_p 520 °R ∘ 2.2454 ∘ NET 227.4 PPM_C

∘ V_o .301 Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS 21.[illegible] GRAMS

\+ PROPANE CYLINDER EMPTY 948.44

\- PROPANE CYLINDER FULL 970.[illegible] ∘ 100 ÷ HC MASS = .22 % ERROR

21.[illegible]

☐ + GAIN

☑ LOSS

Comments: ____

Figure 4.2-27

2T020372y

CVS PROPANE RECOVERY TEST NO. 15

Prj.No.	Site	Date
2030	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
S1 82.5	253.0
B1 8.7	26.7

TECH: [illegible]

E.T.: [illegible]

Δ P: 22.0

(-0.00136 ∘ T_A 79 °F + 13.6912) ∘ P_A 30.29 "Hg

$-P_p$ 15.8 "H_2O ÷ T_p 531 °R ∘ 2.2454 ∘ NET 226.3 PPM_C

∘ V_o .301 Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS 24.37 GRAMS

+ PROPANE CYLINDER EMPTY 953.78

- PROPANE CYLINDER FULL 978.32 ∘ 100 ÷ HC MASS = .69 % ERROR

24.54

☐ + GAIN

☑ LOSS

Comments: ______________________

2T020372y

Figure 4.2-28

CVS PROPANE RECOVERY TEST NO. 16

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

	FID DEFLECTIONS	PPM_C
S1	[illegible]	[illegible]
M1	[illegible]	31.5

TECH: [illegible]

E.T.: [illegible]

△ P: [illegible]

(-0.00136 ∘ T_A 72 °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R ∘ 2 2454 ∘ NET [illegible] PPM_C

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS [illegible] GRAMS

\+ PROPANE CYLINDER EMPTY [illegible]

\- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = 1.2 % ERROR

22.55

[✓] + GAIN

[ ] - LOSS

Comments:

2T020372y

Figure 4.2-29

CVS PROPANE RECOVERY TEST NO. 12

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
S1 85.8	263.2
B1 9.4	28.8

TECH: [illegible]

E.T.: 5.0

Δ P: [illegible]

(-0.00136 • T_A 27 °F + 13.6912) • P_A 30.25 "Hg

$-P_p$ 15.8 "H_2O ÷ T_p 580 °R • 2.2454 • NET 234.4 PPM_C

• V_o .301 Ft.^{3}/Rev. • 0.00001 • N 3100 = HC MASS 25.25 GRAMS

\+ PROPANE CYLINDER EMPTY 925.76

\- PROPANE CYLINDER FULL 931.18 • 100 ÷ HC MASS = .66 % ERROR

25.42

☐ + GAIN

☑ LOSS

Comments: ______________________________

2T020372y

Figure 4.2-30

R

CVS PROPANE RECOVERY TEST NO. [illegible]

[illegible]	[illegible]	[illegible]
Prj. No.	Site	Date

FID DEFLECTIONS	PPM_C
S1 [illegible]	[illegible]
B1 9.0	[illegible]

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

(-0.00136 ∘ T_A 72 °F + 13.6912) ∘ P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R ∘ 2.2454 ∘ NET [illegible] PPM_C

∘ V_o [illegible] Ft.^{3}/Rev. ∘ 0.00001 ∘ N [illegible] = HC MASS [illegible] GRAMS

\+ PROPANE CYLINDER EMPTY 422.05

\- PROPANE CYLINDER FULL [illegible] ∘ 100 ÷ HC MASS = [illegible] % ERROR

28.27

☐ + GAIN

☑ LOSS

Comments: ____________________

Figure 4.2-31

2T020372y

CVS PROPANE RECOVERY TEST NO. 17

Prj. No.	Site	Date

FID DEFLECTIONS	PPM_C
S1 50.6	2423
B1 7.0	23.6

TECH: ____

E.T.: 10:00

Δ P: 22.0

(-0.00136 • T_A 77 °F + 13.6912) • P_A 29.12 "Hg

$-P_p$ 15.7 "H_2O ÷ T_p 581 °R • 2.2454 • NET 223.7 PPM_C

• V_o 0.321 Ft.^{3}/Rev. • 0.00001 • N 18000 = HC MASS 16.93 GRAMS

+ PROPANE CYLINDER EMPTY 85048

- PROPANE CYLINDER FULL 86721 • 100 ÷ HC MASS = .55 % ERROR

[ ] + GAIN

[✓] - LOSS

869.01
850.48
18.53

Comments: ____

2T020372y

Figure 4.2-32

FR

CVS PROPANE RECOVERY TEST NO. 20

2060		5/3/73
Prj. No.	Title	Date

FID DEFLECTIONS	PPM$_C$
S1 71.0	237.0
B1 6.4	14.6

TECH: [illegible]

E.T.: 10:00

Δ P: 20.0

(-0.00136 ∘ T_A 76 °F + 13.6912) ∘ P_A 30.09 "Hg

$-P_p$ 15.8 "H_2O ÷ T_p 580 °R ∘ 2.2454 ∘ NET 222.4 PPM$_C$

∘ V_o 0.201 Ft.^{3}/Rev. ∘ 0.00001 ∘ N 15200 = HC MASS 17.06 GRAMS

+ PROPANE CYLINDER EMPTY 309.44

- PROPANE CYLINDER FULL 326.60 ∘ 100 ÷ HC MASS = .44 % ERROR

[✓] GAIN

[ ] LOSS

326.60
309.44
16.16

Comments:

Figure 4.2-33

4-42

2T020372y

Figure 4.2-34

CVS PROPANE RECOVERY TEST NO. [illegible]

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

Δ P: 200

FID DEFLECTIONS	PPM_C
S1 [illegible]	[illegible]
B1 [illegible]	[illegible]

(-0.00136 • T_A [illegible] °F + 13.6912) • P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R • 2.2454 • NET [illegible] PPM_C

• V_o [illegible] $Ft.^3$/Rev. • 0.00001 • N [illegible] = HC MASS [illegible] GRAMS

+ PROPANE CYLINDER EMPTY [illegible]

- PROPANE CYLINDER FULL [illegible] • 100 ÷ HC MASS = [illegible] % ERROR

☐ + GAIN

☒ - LOSS

Comments: ______________________________

____

____

____

2T020372y

R

CVS PROPANE RECOVERY TEST NO. [illegible]

Proj. No.	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS		PPM_C
S1	[illegible]	[illegible]
B1	[illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

(-0.00136 • T_A ____ °F + 13.6912) • P_A ____ "Hg

$-P_p$ ____ "H_2O ÷ T_p ____ °R • 2.2454 • NET ____ PPM_C

• V_o ____ $Ft.^3$/Rev. • 0.00001 • N ____ = HC MASS ____ GRAMS

+ PROPANE CYLINDER EMPTY ____

- PROPANE CYLINDER FULL ____ • 100 ÷ HC MASS = ____ % ERROR

☐ + GAIN

☐ - LOSS

Comments: ____

Figure 4.2-35

2T020372y

CVS PROPANE RECOVERY TEST NO. [illegible]

Prj. No.	Site	Date
[illegible]	[illegible]	[illegible]

FID DEFLECTIONS	PPM_C
S1 [illegible]	[illegible]
B1 [illegible]	[illegible]

TECH: [illegible]

E.T.: [illegible]

Δ P: [illegible]

(-0.00136 • T_A [illegible] °F + 13.6912) • P_A [illegible] "Hg

$-P_p$ [illegible] "H_2O ÷ T_p [illegible] °R • 2.2454 • NET [illegible] PPM_C

• V_o [illegible] Ft.^{3}/Rev. • 0.00001 • N [illegible] = HC MASS [illegible] GRAMS

+ PROPANE CYLINDER EMPTY [illegible]

- PROPANE CYLINDER FULL [illegible] • 100 ÷ HC MASS = [illegible] % ERROR

[illegible]

[ ] + GAIN

[X] - LOSS

Comments:

Figure 4.2-36

2T020372y

Prerequisite to qualification of the EAC was analysis of on-site laboratory gases by the Office of Air Programs.

Items which were checked and verified prior to individual instrument calibration were the following: 1) total EAC leak check, 2) checked zero air quality with hydrocarbon free air, 3) adjusted all analyzers to optimize performance as specified by individual instrument manuals, 4) checked response times for all instruments. The following paragraphs describe individual analyzer optimization procedures and qualification items.

Hydrocarbon Analyzer (Beckman Model 400)

1. Obtain maximum sensitivity using the following method:
   a. Set fuel pressure to approximately 25 psig.
   b. Set air pressure to approximately 15 psig.
   c. Light burner (allow 30 minutes for warmup).
   d. Set sample pressure to approximately 4 psig.
   e. Flow zero grade air and set zero on meter of recorder.
   f. Flow mid-range calibration gas.
   g. With calibration gas flowing through instrument, adjust air pressure to obtain maximum upscale reading.
   h. Adjust sample pressure to obtain maximum reading and best response.
2. Develop instrument curves for ranges 0-300, 0-3000, and 0-10,000 ppm. Verify results by recording results graphically. (See Figure 4.2-37).

Carbon Monoxide Analyzer (Beckman Model 315A or 315B)

1. Check and/or adjust instrument tuning.
2. Check and/or adjust demodulator switching pattern.
3. Check instrument response to water and 100% carbon dioxide (CO_2) on range 2.
4. Develop instrument curves for suitable ranges.
5. Verify curve results graphically.

Carbon Dioxide Analyzer (Beckman Model 315A,or 315B)

1. Check and/or adjust instrument tuning.
2. Check and/or adjust demodulator switching pattern.
3. Develop instrument curves for suitable ranges.
4. Verify curve results graphically.

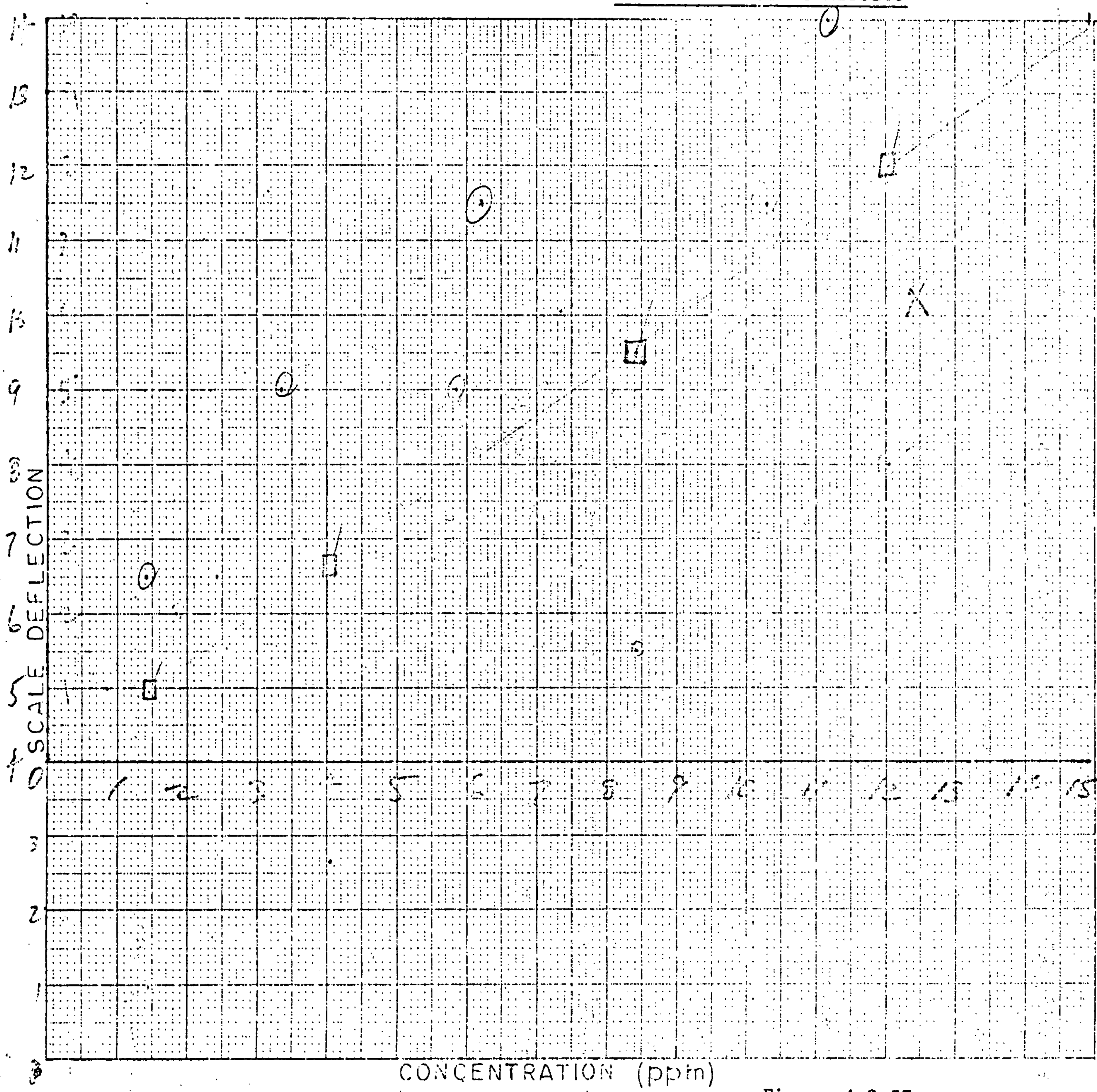
Oxides of Nitrogen Analyzer

1. Verify reaction chamber pressure to be in the 5-12 torr range.
2. Check response time through thermal converter versus bypass of thermal converter.
3. Develop instrument curves for suitable ranges and verify curve results graphically. (Preliminary converter efficiency check can be performed during curve development.)

CCR

CALIBRATION CURVE RESULTS

Prj. No.	Site	Date
	WTK1	3/14/73



EFFECTIVE DATE: 2/26/73

EFFECTIVE RUN: ________

INSTRUMENT: FID

RANGE CODE: 4

INSTRUMENT RANGE: 1000

DEFL.	CONC. (ppm)	CYL. NO.
0	0	
9.4	1465.5	
26.5	4068	
55.1	84032	
80.0	12058	

Figure 4.2-37

4. Converter efficiency check was performed as described in 37 Federal Register 221, November 15, 1972, Part II.

4.2.3 Chassis Dynamometer

The Clayton Ce-50 and CT-200 dynamometers were calibrated by the coast-down technique specified in Appendix II of 37 Federal Register 221, Part II. A precision tachometer generator was fitted to the absorption rolls for this purpose. AESi performed the coast-down at several power settings and at two or more inertia values. The driver's aid was adjusted to match the correct speed according to a 30 and a 60 Hz strobe light. Dynamometer calibration data was plotted graphically on a DRL form (See Figures 4.2-38 through 4.2-40.

4.2.4 Fuel Conditioning Cart

AESi used a fuel conditioning cart of the same manufacture and type as EPA. The cart simply required calibration of the temperature sensor and adjustment of the thermostatic control system.

4.2.5 Pyrometers

AESi used many pyrometers connected to Type J thermocouples. These pyrometers were adjusted for internal temperature compensation while shunted to give correct ambient readings. Then the thermocouple and lead resistance was adjusted to 10 ± 0.05 Ohms using a digital ohmeter. Finally the system was checked in a liquid bath below, at, and above the range for which the pyrometer was used.

CE 50 DYN

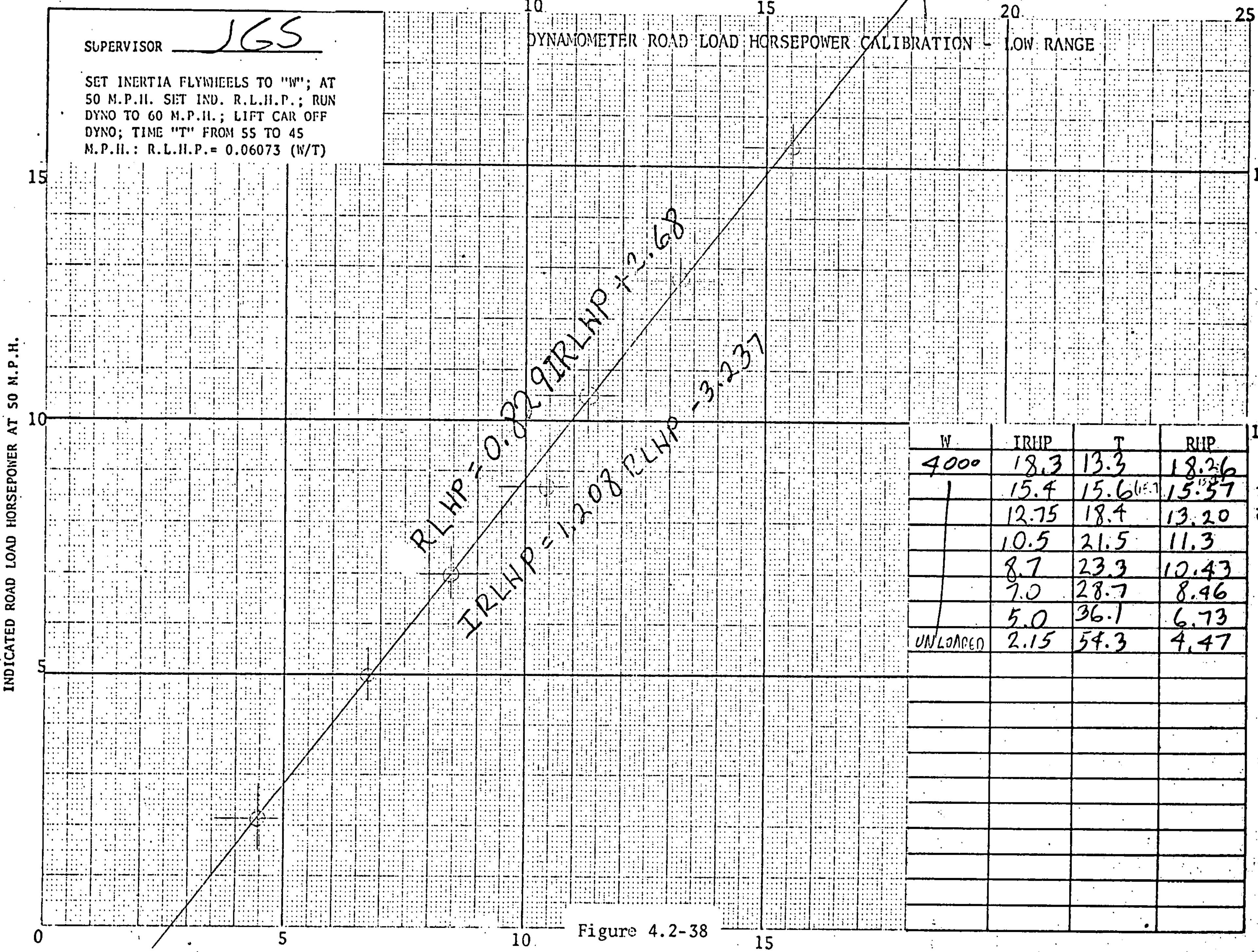
242.92

DRL

2043	W	2-7-73
Prj.No.	Site	Date

SUPERVISOR JGS

SET INERTIA FLYWHEELS TO "W"; AT 50 M.P.H. SET IND. R.L.H.P.; RUN DYNO TO 60 M.P.H.; LIFT CAR OFF DYNO; TIME "T" FROM 55 TO 45 M.P.H.: R.L.H.P.= 0.06073 (W/T)



W	IRHP	T	RHP
4000	18.3	13.3	18.26
	15.4	15.6 (15.7)	15.57
	12.75	18.4	13.20
	10.5	21.5	11.3
	8.7	23.3	10.43
	7.0	28.7	8.46
	5.0	36.1	6.73
UNLOADED	2.15	54.3	4.47

Figure 4.2-38

78103

DYNAMOMETER HP CALIBRATION, TRUCK DYNAMOMETER

4-5-73

Inertia	IRHP	Time	HP
9500	39.5	9.2	62.7
9500	38.4	9.5	60.7
9500	38.4	9.4	61.4
9500	30.0	11.6	49.7
9500	30.3	11.3	51.1
9500	30.4	11.1	52.0
9500	20.2	16.2	35.6
9500	20.2	15.9	36.3
9500	20.2	16.1	35.8
9500	19.8	16.9	34.1
9500	10.0	27.1	21.3
9500	9.9	27.5	21.0
9500	9.9	27.7	20.8
9500	5.0	39.3	14.7
9500	4.9	40.0	14.4
9500	4.9	39.6	14.6

6000	30.4	6.8	53.6
6000	30.7	6.8	53.6
6000	30.6	6.9	52.8
6000	20.2	9.8	37.2
6000	20.2	10.2	35.7
6000	20.2	10.0	36.4
6000	10.0	17.1	21.3
6000	9.9	17.3	21.1
6000	9.9	17.5	20.8
6000	5.0	26.2	13.9
6000	4.8	26.3	13.9
6000	4.8	26.5	13.8
6000	2.0	36.9	9.9
6000	2.0	36.4	10.0
6000	2.0	36.4	10.0

Inertia	IRHP	Time	HP
4000	10.0	12.2	19.9
4000	9.9	12.45	19.5
4000	9.9	12.45	19.5
4000	5.0	20.0	12.15
4000	4.8	20.3	12.0
4000	4.8	19.9	12.2
4000	2.0	30.8	7.9
4000	1.9	30.4	8.0
4000	1.9	30.6	7.9
4000	20.0	7.2	33.7
4000	20.0	7.2	33.7
4000	20.0	7.25	33.5
4000	15.0	9.0	27.0
4000	15.0	9.0	27.0
4000	15.0	9.0	27.0

Figure 4.2-39

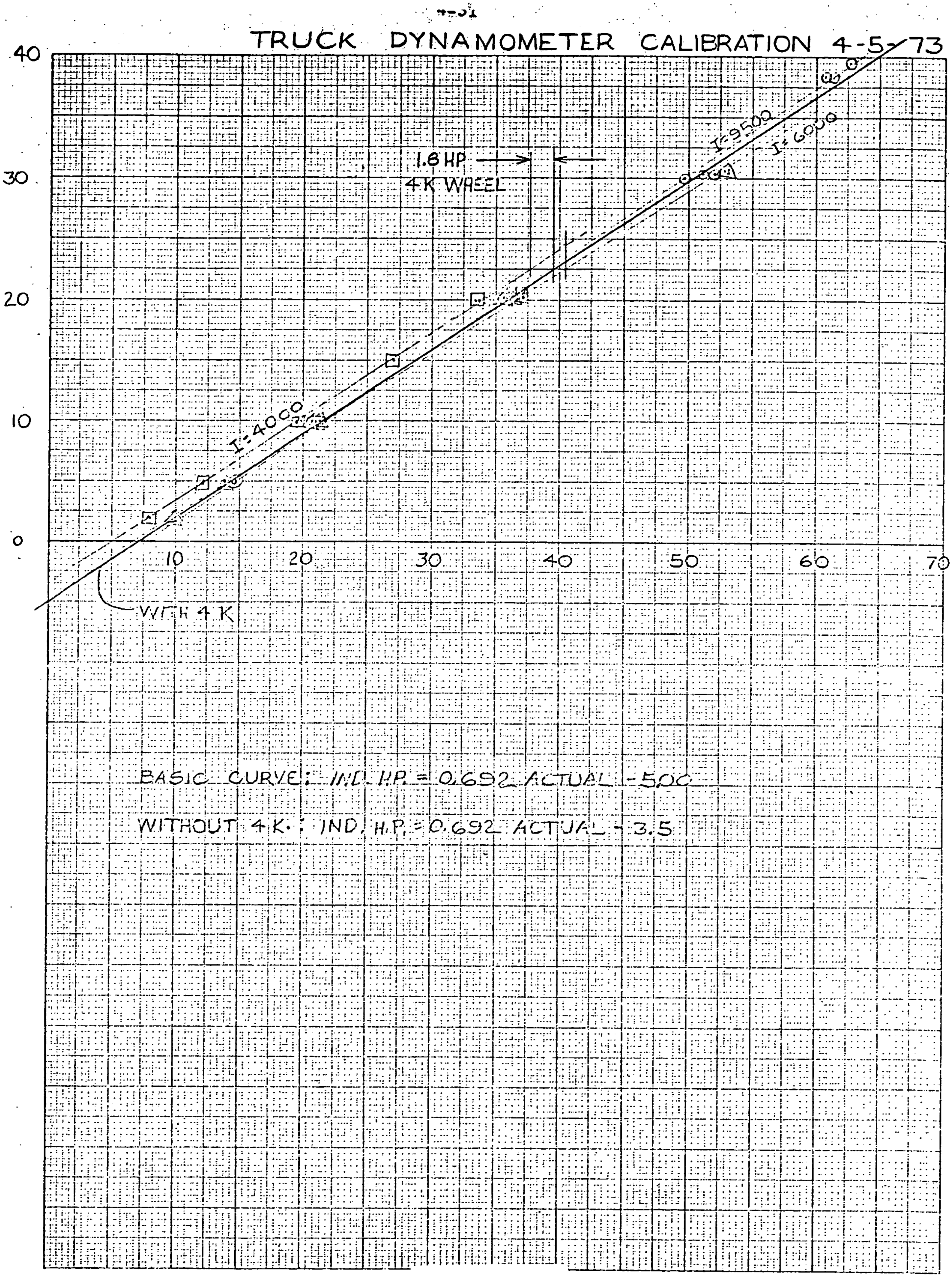

TRUCK DYNAMOMETER CALIBRATION 4-5-73
1.8 HP
4K WHEEL
I=9500
I=6000
I=4000
WITH 4 K
BASIC CURVE: IND. HP = 0.692 ACTUAL -5.00
WITHOUT 4K: IND. H.P. = 0.692 ACTUAL - 3.5
40
30
20
10
0
10
20
30
40
50
60
70

Figure 4.2-40

4.3 CALIBRATION AND CROSSCHECK

4.3.1 Constant Volume Sampler (CVS)

CVS calibration is critical; therefore, continuous checks had to be made. Propane recovery tests were performed in the 0 - 300 ppm carbon range before testing every day. If the test was not within 2%, the cause of error was determined and remedied. Two consecutive propane tests within ±2% were run before testing began.

The propane test results were plotted so that any upward or downward trend could be detected. If such a trend had developed, the CVS would have been immediately recalibrated using a laminar flow element. The CVS was also leak checked every day. Periodically the pyrometer, pressure gauges and other CVS instruments were checked for calibration regardless of need indicated by propane tests. A log book was maintained for the CVS in which all repairs, alterations, calibrations and propane tests were recorded. Moreover, files were maintained on the CVS's in which a history of blower volume and other characteristics was kept.

4.3.2 Exhaust Analysis Console (EAC)

EAC daily and weekly checks which were performed and recorded are described below:

Daily Check

1. Leak check of HC, CO, CO_2 and NO instruments
2. NO vacuum check
3. HC analyzer zero and span.
4. CO analyzer, zero, gain and tune.
5. CO_2 analyzer zero, gain and tune.
6. NO analyzer gain.

Weekly Check

1. Individual instrument curve check of each range used.
2. Converter efficiency
3. CO response to 100% wet CO_2.

Examples of the daily and weekly instrument forms are presented in Figures 4.3-1 and 4.3-2.

Prj. No.	Site	Date
[illegible]	[illegible]	7/3/[illegible]

DAILY CVS & EAC

DAILY EAC

DATE	LEAK CHECK HC	LEAK CHECK CO	LEAK CHECK CO_2	LEAK CHECK NO	VAC CHECK NO	VAC CHECK NO_x	FID ZERO	FID GAIN	CO ZERO	CO GAIN	CO TUNE	CO_2 ZERO	CO_2 GAIN	CO_2 TUNE	NO GAIN	SHED FID ZERO	SHED FID GAIN	FID PRESSURE SMPL	FID PRESSURE FUEL	FID PRESSURE AIR	SHED FID PRESS. SMPL	SHED FID PRESS. FUEL	SHED FID PRESS. AIR	PIC
7/3/[illegible]	0.0	0.0	0.0	0.0	9.8	9.8	822	513	[illegible]	157	57.8	6.8	106	54.2	575			2.5	25	13				[illegible]
[illegible]	0.0	0.0	0.0	0.0	9.8	9.8	301	514	[illegible]	159	[illegible]	[illegible]	103	54.2	581			2.5	25	13				[illegible]
[illegible]	0.0	0.0	0.0	0.0	9.8	9.8	30[illegible]	517	161	159	[illegible]	[illegible]	107	54.2	582			2.5	25	13				[illegible]
[illegible]	0.0	0.0	0.0	0.0	9.8	9.8	300	511	[illegible]	160	[illegible]	6.3	99	54.2	772			2.5	25	13				[illegible]
[illegible]	0.0	0.0	0.0	0.0	9.9	9.8	302	512	[illegible]	158	[illegible]	[illegible]	100	54.2	77[illegible]			2.5	25	13				[illegible]
[illegible]	0.0	0.0	0.0	0.0	9.8	9.8	301	512	[illegible]	151	[illegible]	6.37	106	54.2	77[illegible]			2.5	25	13				[illegible]

DAILY CVS

DATE	LEAK CHECK B1	LEAK CHECK B2	LEAK CHECK S1	LEAK CHECK S2	LEAK CHECK S3	LEAK CHECK S4	LEAK CHECK CONT	BKGD BAG DEF.	BKGD BAG DEF	SMPL BAG DEF.	SMPL BAG DEF.	PROPANE TEST Gr	PROPANE TEST EC	PROPANE TEST △	PROPANE TEST %E	D/A 50		PIC
[illegible]	0.0	0.0	0.0	0.0	—	—	0.0	0.2	0.3	0.4	0.4	8.19	61.8	14.5	1.66	51		[illegible]
[illegible]	0.0	0.0	0.0	0.0	—	—	0.0	0.2	0.4	0.4	0.4	[illegible]	63.9	14.5	1.23	50		[illegible]
[illegible]	0.0	0.0	0.0	0.0	—	—	0.0	0.4	0.5	0.5	0.5	[illegible]	64.4	14.5	2.0%	50		[illegible]
[illegible]	0.0	0.0	0.0	0.0	—	—	0.0	0.3	0.5	0.4	0.4	[illegible]	[illegible]	14.5	[illegible]	51		[illegible]
[illegible]	0.0	0.0	0.0	0.0	—	—	0.0	0.3	0.3	0.4	0.3	[illegible]	[illegible]	14.5	1.77	50		[illegible]
[illegible]	0.0	0.0	0.0	0.0	—	—	0.0	0.3	0.4	0.3	0.2	[illegible]	[illegible]	14.5	1.18	50		[illegible]

MAINTENANCE:

Figure 4.3-1

Sq. No.	Prg. No.	Site	Date
69	2038	[illegible]	9/27/73

WEEKLY CHECK

INST	AESi RANGE	RANGE	SPAN		MID RANGE		MID RANGE		MID RANGE		MID RANGE		MID RANGE		MID RANGE		ZERO	P.I.C
			CONC.	DEF.	CONC.	DEF.	CONC.	DEF.	CONC.	DEF.	CONC.	DEF.	CONC.	DEF.	CONC.	DEF.	DEF.	
FID	2	10	[illegible]	[illegible]	[illegible]	94.1	[illegible]	27.9										[illegible]
	3	100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.0								
	4	1000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.9										
CO	1	1-H	7.14	91.0	3.91	55.2	1.59	27.7										[illegible]
	2	2-H																
	3	3-H	2.67	[illegible]	.81	37.1	[illegible]	15.7										
	4	1-L																
	5	2-L																
	6	3-L	[illegible]	94.6	.2176	61.0	.1011	26.0										
CO_2	1	1																[illegible]
	2	2																
	3	3	3.68	95.0	2.05	96.6	.6066	19.4										
NO-NO_x	4	100																[illegible]
	5	250	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.4										
	6	1000-	[illegible]	90.0	[illegible]	[illegible]	[illegible]	52.1										

	CONVERTER CHECK		
	DEF. START	DEF. END	TIME E.T.
NO	[illegible]	[illegible]	[illegible]
NO_x	[illegible]	[illegible]	[illegible]

	SHED LEAK CHECK		
	DEF. START	DEF. END	TIME E.T.
FID			

	100% CO_2 DEF.	WET 100% CO_2
CO	3.0	3.2

MASTER CURVE

EFF RUN #________

Figure 4.3-2

In addition to the daily and weekly checks, a laboratory log book was maintained for the AESi exhaust analysis console. All repairs, alterations and problems were recorded and initialed by the EAC operator or the laboratory test supervisor.

4.3.3 Dynamometer

The Clayton CE-50 and CT-200 dynamometers were given coast-down calibration checks once a week. If the data points did not lie within tolerance of the standing calibration curve the entire calibration curve set was rerun. A log book and curve file was maintained on all dynamometers.

4.3.4 Other Equipment

The other laboratory instruments, barometer, pyrometers, Weather Measure Station, etc. were checked and maintained weekly. AESi has maintained a schedule which includes one hour each morning, four hours each week, and eight hours each month for calibration checks and maintenance. There was virtually no chance of having a number of emission tests performed inaccurately and without our knowledge of a problem.

4.4 TEST DATA

The following section lists all of the raw data generated by this study. The first four pages are examples of the format of the data. Following this is a set of tables showing the definitions for the abbreviations used on the format.

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

MULTIPLE-CARD LAYOUT FORM

GX24-6599-0
Printed in U.S.A.

Company ____________________

Application Test Data Collection by A. Smith Date 12-11-72 Job No. 2901 Sheet No. 1 of 4

Card 01

Columns	Field
1–5	01
6–10	PROJ
11	CITY
12–15	CAR
16	TEST COND
17–20	RUN
21–26	DATE
27–30	TIME
31–33	X
34–35	YR
36–41	MAKE
42–57	MODEL
58–59	VEH. TYPE
60–63	CID
64	BBL
65	TRN
66–70	INRT WT
71–75	CURB WT
76–80	GVW

Card 02

Columns	Field
1–5	02
6–10	PROJ
11	CITY
12–15	CAR
16	TEST COND
17–20	RUN
21–24	RDHP
25–27	DB
28–30	WB
31–34	BARO
35	CYL
36–37	[illegible]
38–39	[illegible]
40–45	ODOM
46–48	FLC
49	FX
50	FV
51–54	HUCF
55–57	PIC
58–60	TECH
61–63	DRIVER
64–65	TVP
66–67	ENG
68	100%

Card 03

Columns	Field
1–5	03
6–10	PROJ
12–15	CAR
17–20	RUN
21–24	IRPM
25	OPN
26–29	DWL
30–34	IGNT
35–38	@ RPM
60–63	IDLE CO %

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

MULTIPLE-CARD LAYOUT FORM

GX24-6599-0
Printed in U.S.A.

Company ______

Application Test Data Collection by [illegible] Date 12-11-72 Job No. 2901 Sheet No. 2 of 4

Card 21: PROJ. | CAR | RUN | HC | CO | CO_2 | NO | NOX | NOXC | MPG

Card 04: PROJ | CAR | RUN | Raw CO %

Card 31: PROJ | CAR | RUN | HC

Figure 4.4-2

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INTERNATIONAL BUSINESS MACHINES CORPORATION

MULTIPLE-CARD LAYOUT FORM

GX24-6599-0
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Company ____________

Application TEST DATA COLLECTION by A SMITH Date 12-11-72 Job No. 2001 Sheet No. 3 OF 4

41 | PROJ | CD | CAR | TEST | RUN | OWNER NAME

9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

42 | PROJ | CD | CAR | TEST | RUN | OWNER ADDRESS

9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

43 | PROJ | CD | CAR | TEST | RUN | OWNER ADDRESS | TELEPHONE: AREA | NUMBER | EXT

9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

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Application [illegible] by A. SMITH Date 12-11-72 Job No. 2901 Sheet No. 4 of 4

Card	Columns 1–5	Columns 6–10	Column 11	Columns 12–15	Column 16	Columns 17–20	Columns 21–62	Columns 63–70	Columns 71–72	Columns 73–80
1	44	[illegible]	[illegible]	[illegible]	[illegible]	RUN	VIN	LICENSE	STATE	
2										
3	45	[illegible]	[illegible]	QAR	[illegible]	RUN				
4										
5										
6										

Figure 4.4-4

HEADING	DEFINITION
PROJ #	PROJ # is a five digit code designating the AESi assigned project number. The first digit will be blank until further notice.
CAR #	This is a five digit number assigned each test vehicle at each facility. The first digit signifies the city in which the test is being performed. 0 = Westminster; 1 = St. Louis For the 2040 project the car number must be sequential within each class.
RUN #	RUN # is a five digit sequential run number. The first digit is a coded number used to distinguish the types of test procedures used. 0 = EPA Cold Start before tuneup; 1 = Replicate - EPA Cold Start before tuneup; 2 = EPA Cold Start with Evaporative Emission Test before tuneup; 3 = Replicate - EPA Cold Start with Evaporative Emission Test before tuneup; 4 thru 7 = the same as 0 through 3 only after tuneup.
DATE	The date the test is performed.
TIME	Four digit number indicating the time the test was started using the 24 hour clock.
YR	This is a two digit number indicating the model year of the test vehicle.
MAKE	This is a six character word specifying the make of the vehicle. The first six characters of the vehicle make are always to be used.
MODEL	This is a 16 letter word specifying the model of the vehicle. For the 2040 program, the last two digits indicate the vehicle class.
VTP	Vehicle type is a two digit code. 00 = lightweight vehicle; 01 = off-road vehicle.
CID	This is a four digit number indicating the cubic inch displacement of the test vehicle. In the case of small displacement engines round off to the nearest unit displacement. For example: Volkswagen = 96.6 CID. The input should be 97.

Figure 4.4-5

HEADING	DEFINITION
BBL	This indicates the number of carburetor barrels or venturis. If a given vehicle has fuel injection, an F should be inserted instead of the number for venturis. A vehicle with multiple carburetion would be entered as the total number of venturis. Example: 3 - 2 BBLs = 6.
TRN	This is a single digit number. It indicates the type of transmission used. 0 = Automatic; 2 = Semi-automatic; 3, 4, 5, 6 = Manual (Specify number of gears).
INRT	INRT designates the inertia of the vehicle as a five digit number. Correct inertia may be obtained from the Federal Register, Vol. 35, Number 219, Part II, page 17296.
CURBWT	This is a five digit number indicating the actual weight of the vehicle.
GVW	This is a five digit number indicating the actual weight of the vehicle plus its load weight.
RDHP	RDHP is the road horsepower setting for the given test vehicle on the dynamometer. The Federal Register will provide the correct load settings. The data which is to be entered is that which should be used for testing.
DB	This is a three digit number indicating the dry bulb temperature in °F.
WB	This is a three digit number indicating the wet bulb temperature in °F.
BAROM	BAROM is a four digit number indicating the barometric pressure in inches of mercury.
CYL	Indicates the number of cylinders in the test vehicle engine. It is a single digit number.
A/C	A single digit number to indicate the presence of an air conditioning system on the test vehicle. 0 = no air conditioner; 1 = equipped with air conditioner.
EVP	This is a single digit number indicating whether or not the test vehicle is equipped with an evaporative emissions control device. 0 = no evaporative emission device present; 1 = crankcase device; 2 = canister device; 3 = tank device.

Figure 4.4-6

HEADING	DEFINITION
EXH	EXH is a single digit which indicates the presence of an exhaust emissions control system and its type. 0 = no exhaust controls; 1 = engine modifications type; 3 = air injection device; 4 = catalytic reactor; 5 = afterburner.
PCV	This indicates the presence of a positive crankcase ventilation system. 0 = no PCV control unit; 1 = PCV system present.
ODOM	This is a six digit number indicating the odometer reading of the test vehicle at the start of the test.
FLC	A three digit number indicating the fuel tank capacity of the test vehicle.
FX	A one digit number indicating the type of fuel used for the exhaust test. 1 = Indolene; 2 = Summer Grade; 3 = Tank.
FV	The same as FX except for the evaporative portion of the test.
HUCF	A four digit number indicating the humidity correction factor. This is output as K during the teletype analysis of data.
PIC	The initials of the person in charge of testing.
TEC	The initials of the person operating the test equipment.
DRI	The initials of the person driving the test vehicle.
TVR	For the 2040 program the number of tests before valid results are obtained for the vehicle.
ENG	A two digit number indicating the engine type of the test vehicle. 1 = I-Block; 2 = V-Block; 3 = Rotary; 4 = Opposed; 5 = Turbine; 6 = EX (Steam); 7 = EX (Freon); 8 = Diesel; 9 = Stirling; 10 = Electric; 11 = Stratified.

Figure 4.4-7

HEADING	DEFINITION
IRPM	Idle speed in revolutions per minute measured in drive or neutral.
D/N	Drive or neutral.
DWEL	Distributor ignition dwell in degrees.
IGNT	Basic ignition timing; + indicates before top center; - indicates after top center. Absence of + or - indicates that timing was before top center.
@ RPM	RPM at which ignition timing was measured.
IDLE CO	Measurement of undiluted carbon monoxide at idle in percent.

NOTE: The above values are recorded as measured on the test vehicle; these are not manufacturer's specifications.

Figure 4.4-8

NOTE: Values on all #21 cards include two figures to the right of the decimal place. (1347 = 13.47)

```
01   0206000001000400227731620   72FORD  F-250 CUSTOM    00 30010 4500 3490 6900
02   020600000100040 13177069030086101102486419011109 JGSJJ WJ   01
 3   020600000100040 400D 370 +060 400
04   020600000100040          15
21   020600000100040CT 2272 22474 227765 1695 3489 3816 1168
21   020600000100040CS 1313 19340 215928 1580 2352 2573 1373
21   020600000100040HT 1178 10668 195112 1911 3672 4016 1462
21   02060000010004075  395  4693  56677  453  793  867 1347
31   020600000100040                  243
41   020600000100040A-1 RENTALS                                          1
42   0206000001000401115 BEACH BLVD
43   020600000100040SANTA ANA CALIF                               7145311420
 4   020600000100040F258RN24298                               96059K  CA
45   020600000100040
01   0206000001100430228731130   72FORD  F-250 CUSTOM    00 30010 4500 3490 6900
 2   020600000110043 13177066030106101102488419011101 ROMJJ WJ   01
03   020600000110043 400D 370 +060 400
04   020600000110043          15
21   020600000110043CT 1851 19629 227842 1914 3766 3815 1193
21   020600000110043CS 1271 22336 213667 1725 2338 2369 1360
21   020600000110043HT 1090 10138 200558 2136 3815 3865 1435
21   02060000011004375  358  4874  56794  502  818  828 1341
31   020600000110043                  319
41   020600000110043A-1 RENTALS                                          1
42   0206000001100431115 BEACH BLVD
 3   020600000110043SANTA ANA CALIF                               7145311420
44   020600000110043F258RN24298                               96059K  CA
45   020600000110043
01   0206000001400790309731620   72FORD  F-250 CUSTOM    00 30010 4500 3490 6900
02   020600000140079 13178064030016101102488519011096 ROMRWKRAS  01
03   020600000140079 600D 370 +060 600
04   020600000140079          12
21   020600000140079CT 1778 11914 236198 2367 3552 3419 1212
21   020600000140079CS 1094 15360 235971 1880 2406 2315 1305
21   020600000140079HT  874  6180 205441  507  662  829 1449
21   02060000014007975  314  3201  60618  425  590  568 1320
31   020600000140079                 1635
41   020600000140079A-1 RENTALS                                          1
 2   0206000001400791115 BEACH BLVD
 3   020600000140079SANTA ANA CALIF                               7145311420
44   020600000140079F258RN24298                               96059K  CA
45   020600000140079
 1   0206000001500810312731310   72FORD  F-250 CUSTOM    00 30010 4500 3490 6900
```

Figure 4.4-9

```
 2   020600000150081 13176062030006101102488519011094 RQMJSJRAS  01
 3   020600000150081 600D 370 +060 600
04   020600000150081          12
21   020600000150081CT 1241 13575 199589 2081 3612 3383 1404
 1   020600000150081CS 1082 14939 201697 1993 2566 2403 1504
21   020600000150081HT  872  6518 177264 2252 3754 3515 1659
21   02060000015008175  282  3265  51808  556  834  782 1521
 1   020600000150081                631
 1   020600000150081A-1 RENTALS
42   0206000001500811115 BEACH BLVD                                                  1
 3   020600000150081SANTA ANA CALIF
 4   020600000150081F25BRN24298                                          7145311420
45   020600000150081                                                 96059K  CA
01   0206000002000420228731020   70CHEVROC-20                 00 30720 4500 3998 7500
 2   020600000200042 13178070130108103102371320011112 RQMJJ WJ   02
03   020600000200042 550D 240 +080 550
04   020600000200042         008
 1   020600000200042CT 1397 20691 239865 2068 3868 4325 1141
 1   020600000200042CS 1237 15634 241131 2182 3248 3632 1275
21   020600000200042HT 1080 13865 214270 2122 3916 4379 1318
 1   02060000020004275  327  4325  62188  571  952 1065 1256
 1   020600000200042                51
41   020600000200042MICHAEL S POLACEK
42   0206000002000424608 IRONWOOD AVE                                                0
 3   020600000200042SEAL BEACH CALIF 90740
44   020600000200042CE2407107052                                        2134317155
45   020600000200042                                                 13398H  CA
 1   0206000002100510301731600   70CHEVROC-20                 00 30720 4500 3998 7500
 2   020600000210051 13176560530208103102373020011103 RQMJJ WJ   02
03   020600000210051 550D 240 +080 550
 4   020600000210051          08
 1   020600000210051CT 1444 19229 238617 2214 3965 4075 1155
21   020600000210051CS 1408 15962 240258 2199 3198 3286 1275
21   020600000210051HT 1029 12977 213032 2054 3702 3804 1334
 1   02060000021005175  349  4217  61906  576  935  961 1263
31   020600000210051               279
41   020600000210051MICHAEL S POLACEK
 2   0206000002100514608 IRONWOOD AVE                                                0
 3   020600000210051SEAL BEACH CALIF 90740
44   020600000210051CE2402107052                                        2134317155
 5   020600000210051                                                 13398H  CA
     0206000003000500301731300   73CHEVROCHEVY VAN-30          00 35040 4500 3721 6400
02   020600000300050 12678064030258001100736124011096 JGSJJ WJ   02
03   020600000300050 625D 260 +080 625
     020600000300050          05
     020600000300050CT 9072106921 215094  482  551  529  767
21   020600000300050CS  827  5440 293354 1171 1435 1376 1129
     020600000300050HT  670  3789 241003 1538 2026 1943 1268
     02060000030005075  681  7143  69762  301  377  361 1058
31   020600000300050               439
     020600000300050MACHOWARDS LEASING
     020600000300050124 N HARBOR                                                     1
43   020600000300050SANTA ANA CALIF 92703
44   020600000300050CGY353U115264                                       7145310607
     020600000300050                                                 90900L  CA
```

Figure 4.4-10

```
(     020600000310085031273160б   73CHEVROCHEVY VAN-30    00 35040 4500 3721 6400
02    0206000003100A5 131760620299780011007386Z4011094 RQMJSJRAS  02
03    020600000310085 625D 260 +0A0 625
      020600000310085        05
      020600000310085CT 1337 18914 231191 1502 1962 1838 1191
21    020600000310085CS  711  6494 239443 1235 1457 1365 1365
      020600000310085HT  806  4706 202857 1600 2109 1976 1484
      02060000031008575  233  2314  60598  372  467  438 1354
31    020600000310085              1045
41    020600000310085MACHOWARDS LFASING                                        1
      020600000310085124 N HARBOR
43    020600000310085SANTA ANA CALIF 92703                          7145310607
44    020600000310085CGY353U115264                              90900L  CA
      020600000310085
(     0206000003400920314731220   73CHEVROCHEVY VAN-30    00 35040 4500 3721 6400
02    020600000340092 131820650300080011007403Z4011096 JGSJSJRAS  02
03    020600000340092 6500 310 +040 650
      020600000340092        05
21    020600000340092CT 1206 17484 273481 1447 1899 1815 1036
21    020600000340092CS  706  7838 283306 1269 1502 1435 1154
      020600000340092HT  855  6409 236156 1597 2090 1998 1268
21    02060000034009275  228  2535  71402  374  468  447 1156
31    020600000340092              2172
      020600000340092MACHOWARDS LFASING                                        1
      020600000340092124 N HARBOR
43    020600000340092SANTA ANA CALIF 92703                          7145310607
      020600000340092CGY353U115264                              90900L  CA
      020600000340092
01    0206000003501090315731850   73CHEVROCHEVY VAN-30    00 35040 4500 3721 6400
02    020600000350109 12681066030258001100739524011098 JGSRWKWSJ  02
      020600000350109 650D 310 +040 650
      020600000350109        05
21    020600000350109CT 1259 14762 285368 1443 1916 1879 1010
      020600000350109CS  757  6480 294094 1248 1471 1442 1121
      020600000350109HT  685  5351 245616 1620 2095 2055 1232
21    02060000035010975  225  2117  74240  372  465  456 1123
      020600000350109              1741
      020600000350109MACHOWARDS LFASING                                        1
42    020600000350109124 N HARBOR
43    020600000350109SANTA ANA CALIF 92703                          7145310607
      020600000350109CGY353U115264                              90900L  CA
      020600000350109
01    0206000004000460228731620   65FORD  F-250           00 35224 4500 3545 6149
      020600000400046 131770660301480001066518I7011101 JGSJJ RS   02
      020600000400046 600N 290 +060 600
04    020600000400046        18
      020600000400046CT 5796 37420 227301 1424 1885 1909 1032
      020600000400046CS 5673 53866 227203 1076 1292 1308 1034
21    020600000400046HT 3791 31655 214794 1645 2303 2331 1135
21    02060000040004675 1377 11733  60198  401  455  461 1060
      020600000400046              153
      020600000400046JOHN P O KEFFFE                                           0
42    02060000040004611692 HARRISBURG
      020600000400046LOS ALAMITOS CALIF 90720                          4314223
      020600000400046F25DR711003                                S59156  CA
```

Figure 4.4-11

```
-     020600000400046
:1    02060000041005203017318l5   65FORD  F-250                00 35224 4500 3545 6149
`2    02060000040005Z 131760670302080001066522l7011104 JGSJJ RS    02
.     020600000400052 600N 290 +060 600
`.    020600000400052          18
21    020600000400052CT 5832 35367 226132 1251 1822 1903 1052
2     020600000400052CS 5800 53759 230732 1100 1312 1370 1031
3     020600000400052HT 4163 33117 198175 1365 1743 1821 1199
21    0206000004100527 5 1424 11713  58791  322  412  430 1076
3'    020600000400052                   28
-     020600000400052JOHN P O KEFFFE                                                  0
42    020600000400052116 92 HARRISBURG
43    020600000400052LOS ALAMITOS CALIF 90720                                  4314223
.     020600000400052F250P711003                                        S59156  CA
45    020600000400052
01    020600000500085031373112 7   73FORD  ECONOLINE            00 30220 4500 3550 6000
`     020600000500085 13177065030008021102066521011099 ROMJSJRAS  02
3     020600000500085 600D 300 +060 600
04    020600000500085          100
2'    020600000500085CT 2831 34231 239279 1318 1985 1968 1045
.     020600000500085CS 1347 38268 263403  971 1140 1130 1049
21    020600000500085HT 1618 22640 214042 1514 2078 2060 1239
21    02060000050008575  465  8786  65106  320  424  420 1094
1     020600000500085                   181
.1    020600000500085MACHOWARD LEASING                                                1
42    020600000500085124 N HARBOR
3     020600000500085SANTA ANA CALIF 92703                                   7145310607
4     020600000500085E24GHN22774                                        23296K  CA
45    020600000500085
01    0206000005100910314731020   73FORD  ECONOLINE          00 30220 4500 3550 6000
2     020600000500091 13176069030008021102069021011110 JGSJSJRAS  02
03    020600000500091 600D 300 +060 600
04    020600000500091          100
1     020600000500091CT 2060 30752 230766 1483 2123 2345 1105
.1    020600000500091CS 1173 37078 265597  989 1193 1318 1050
21    020600000500091HT 1617 20659 208679 1509 2142 2367 1282
1     02060000051009175  397  8277  64503  332  444  490 1117
1     020600000500091                   95
41    020600000500091MACHOWARD LEASING                                                1
42    020600000500091124 N HARBOR
3     020600000500091SANTA ANA CALIF 92703                                   7145310607
44    020600000500091E24GHN22774                                        23296K  CA
45    020600000500091
1     0206000005401170316731100   73FORD  ECONOLINE          00 30220 4500 3550 6000
.2    020600000500117 13176062030328021102071021011093 ROMJSJRAS  02
03    020600000500117 600D 300 +060 600
.4    020600000500117          02
'1    020600000500117CT 1565 20583 253338 1461 2136 1993 1086
21    020600000500117CS  812 10567 303843 1030 1218 1137 1065
21    020600000500117HT 1329 10871 230594 1542 2161 2016 1253
'1    02060000054011775  299  3415  72562  338  449  419 1115
31    020600000500117                   231
41    020600000500117MACHOWARD LEASING                                                1
.2    020600000500117124 N HARBOR
43    020600000500117SANTA ANA CALIF 92703                                   7145310607
```

Figure 4.4-12

```
4     020600000500117E24GHN22774                          .                 23296K  CA
45    020600000500117
01    02060000055012403197315 20   .73FORD  ECONOLINE          00 30220 4500 3550 6000
C     020600000500124 1318206603002802110206792101109 8 RQMJSJGLW  02
C     020600000500124 600D 300 +060 600
04    020600000500124          02
2'    020600000500124CT 1743 15006 237935 1248 1641 1603 1182
2     020600000500124CS  742  8194 301283  990 1155 1129 1086
21    020600000500124HT 1470 12136 210230 1209 1601 1565 1349
21    02060000055012475  311  2876  69790  295  370  361 1168
3     020600000500124                    273
4     020600000500124MACHOWARD LEASING                                                1
42    020600000500124124 N HARBOR
4     020600000500124SANTA ANA CALIF 92703                                  7145310607
4     020600000500124E24GHN22774                                        23296K  CA
45    020600000500124
C'    020600000600094031473164 8   69CHEVROC-20              00 35040 5000 3895 7500
( '   020600000600094 17579065030008172310498452001109 8 JGSJSJRAS  02
03    020600000600094 575D 300 +080 575
04    020600000600094          60
2     020600000600094CT 2198 43819 224148 1978 3045 2974 1053
21    020600000600094CS 1666 38062 227467 1391 1753 1712 1173
21    020600000600094HT 1620 20453 210983 2190 3802 3714 1272
2     02060000060009475  498  9142  59215  465  697  681 1170
:     020600000600094                    453
41    020600000600094EDWARD BARR                                                      0
4     0206000006000949301 BEVAN ST
. .   020600000600094WESTMINSTER CALIF 92683                                7148944276
44    020600000600094CE2497866487                                       23609E  CA
45    020600000600094
(     02060000061010603157313 30   69CHEVROC-20              00 35040 5000 3895 7500
02    020600000600106 179820650302081231049858200110 95 RQMJSJRAS  02
03    020600000600106 575D 300 +080 575
(     020600000600106          60
2     020600000600106CT 2122 41171 234794 2037 3191 3041 1031
21    020600000600106CS 1766 36026 230689 1580 2102 2004 1143
2'    020600000600106HT 1735 20304 213378 2425 3912 3728 1259
2     02060000061010675  489  8707  61503  512  761  725 1146
31    020600000600106                    240
41    020600000600106EDWARD BARR                                                      0
4'    0206000006001069301 BEVAN ST
43    020600000600106WESTMINSTER CALIF 92683                                7148944276
44    020600000600106CE2497866487                                       23609E  CA
4     020600000600106
:     020600000700118031673141 5   72FORD  F-250             00 36020 5000 3780 6900
02    020600000700118 17977064030208101110137891951109 7 JGSJSJRAS  02
03    020600000700118 525D 340 +060 525
(     020600000700118          05
21    020600000700118CT 3777 57626 282340 1996 3245 3137  820
21    020600000700118CS 1755 13814 287018 1801 2590 2504 1094
2.    020600000700118HT 1827 10150 260543 2085 3789 3663 1118
2.    02060000070011875  589  5917  74258  513  519  792 1030
31    020600000700118                    676
4     020600000700118RICHARD L GRASS                                                  0
4:    0206000007001182023 S JANETTE LANE
```

Figure 4.4-13

```
 3   02060000070011BANAHEIM CALIF 92802                                    7146383385
 .4  020600000700118F25YRP04326                                       73568L  CA
45   020600000700118
 1   0206000007101230319731330   72FORD  F-250            00 36020 5000 3780 6900
 2   020600000700123 17976063030028101101379519511096 RQMJSJGLW  02
03   020600000700123 525D 340 +060 525
^4   020600000700123          05
 1   020600000700123CT 3838 52947 302060 2155 2848 2721  794
21   020600000700123CS 2208 12120 300987 1828 2506 2395 1051
21   020600000700123HT 1868  6725 228661 1867 2817 2692 1288
 1   02060000071012375  656  5163  74828  509  711  680 1034
 1   020600000700123                  1005
41   020600000700123RICHARD L GRASS                                                  0
 2   0206000007001232023 S JANETTE LANE
 3   020600000700123ANAHEIM CALIF 92802                                    7146383385
44   020600000700123F25YRP04326                                       73568L  CA
'5   020600000700123
 1   0206000007402210329731500   72FORD  F-250            00 36020 5000 3780 6900
02   020600000700221 17978062030108101101381419511092 RQMJSJGLW  02
03   020600000700221 650D 280 +060 650
 4   020600000700221          05
21   020600000700221CT 3704 44603 281163 1635 2569 2370  870
21   020600000700221CS 1558 11981 283574 1556 1982 1828 1119
 1   020600000700221HT 1543  9941 255847 1869 2942 2714 1142
 1   02060000074022175  537  4910  73374  443  635  586 1062
31   020600000700221                   363
^1   020600000700221RICHARD L GRASS                                                  0
 2   0206000007002212023 S JANETTE LANE
43   020600000700221ANAHEIM CALIF 92802                                    7146383385
44   020600000700221F25YRP04326                                       73568L  CA
.5   020600000700221
 1   0206000007502320330731240   72FORD  F-250            00 36020 5000 3780 6900
02   020600000700232 17977064030228101101382319511097 RQMJSJGLW  02
 3   020600000700232 650D 280 +060 650
 4   020600000700232          05
21   020600000700232CT 2951 37561 268259 2022 2843 2748  938
 1   020600000700232CS 1487  9226 285553 1662 2101 2031 1128
 1   020600000700232HT 1588  7127 248490 2123 3472 3356 1193
21   02060000075023275  488  3925  72339  499  707  683 1099
31   020600000700232                    37
 1   020600000700232RICHARD L GRASS                                                  0
 2   0206000007002322023 S JANETTE LANE
43   020600000700232ANAHEIM CALIF 92802                                    7146383385
 4   020600000700232F25YRP04326                                       73568L  CA
 5   020600000700232
01   0206000008000950314731846   68FORD  F-250            00 36023 5000 3848 6100
02   020600000800095 17978066030028001108438619511101 RQMRWKHJ   02
 3   020600000800095 575N 260 +050 575
 4   020600000800095          25
21   020600000800095CT 3926 39347 273572 1488 1989 2002  908
 1   020600000800095CS 3364 47351 294216  947 1110 1117  907
 1   020600000800095HT 2968 31779 233140 1475 1856 1868 1079
21   02060000080009575  899 10985  72632  324  403  406  948
31   020600000800095                   794
 1   020600000800095A ORT                                                            0
```

Figure 4.4-14

```
 2   02060000080009512241 ELLEN ST
.3   020600000800095GARDEN GROVE CALIF 92640                                  7146389972
44   020600000800095F25YPD57343                                          12000C  CA
 5   020600000800095
.1   0206000008101200316731830    68FORD  F-250              00 36023 5000 3848 6100
02   020600000800120 17978068030118101108439719511106 RQMRWKWSJ  02
.3   020600000800120 575N 260 +050 575
.4   020600000800120          25
21   020600000800120CT 3711 36644 289595 1700 2300 2428  880
21   020600000800120CS 3445 44332 305807 1148 1411 1490  890
.1   020600000800120HT 2836 34929 235500 1348 1826 1928 1055
21   02060000081012075  888 10667  75276  353  459  484  927
31   020600000800120                    451
.1   020600000800120A ORT                                                                  0
.2   02060000080012012241 ELLEN ST
43   020600000800120GARDEN GROVE CALIF 92640                                  7146389972
.4   020600000800120F25YHD57343                                          12000C  CA
.5   020600000800120
01   0206000009001890326731200    66CHEVROC-20               00 28323 4500 3700 7500
02   020600000900189 13176064030068100105135720011098 RQMJSJGLW  02
.3   020600000900189 900N 270 +040 900
.4   020600000900189          50
21   020600000900189CT 4719 37545 211185 1373 1832 1788 1107
.1   020600000900189CS 4560 45105 210219  922 1102 1076 1163
.1   020600000900189HT 3560 34338 177767 1186 1572 1534 1299
21   02060000090018975 1149 10776  53647  292  371  363 1185
31   020600000900189                    297
.1   020600000900189M L HIGGINS                                                            0
.2   02060000090018915630 MARIE PL
43   020600000900189WESTMINSTER CALIF                                           8394578
.4   020600000900189C2546Z102253                                        T86534  CA
.5   020600000900189
01   0206000009102020327731725    66CHEVROC-20               00 28323 4500 3700 7500
.2   020600000900202 13177062030048100105136820011093 RQMRWKWSJ  02
.3   020600000900202 900N 270 +040 900
04   020600000900202          50
.1   020600000900202CT 3844 34095 207602 1426 1793 1667 1155
.1   020600000900202CS 4522 44287 229640 1029 1175 1092 1097
21   020600000900202HT 3222 29896 181890 1358 1704 1584 1321
21   02060000091020275 1068 10131  56345  322  389  362 1162
.1   020600000900202                    275
.1   020600000900202M L HIGGINS                                                            0
42   02060000090020215630 MARIE PL
.3   020600000900202WESTMINSTER CALIF                                           8394578
.4   020600000900202C2546Z102253                                        T86534  CA
45   020600000900202
01   0206000010001250319731735    72FORD  ECONOLINE          00 30220 4500 3295 6000
.2   020600001000125 13179065030008021101564421011098 JGSRWKWSJ  02
.3   020600001000125 600D 320 +060 600
04   020600001000125          35
.1   020600001000125CT 3436 37225 213185 1254 1573 1536 1117
.1   020600001000125CS 1667 32322 260907  792  873  853 1085
21   020600001000125HT 1881 23071 199066 1205 1527 1491 1309
.1   02060000100012575  562  8197  62139  269  323  315 1145
.1   020600001000125                    166
```

Figure 4.4-15

```
 1   020600001000125MACHOWARD LEASING                                              1
 2   02060000100012524 NORTH HARBOR
43   020600001000125SANTA ANA CALIF 92703                                    5310607
 4   020600001000125E24GHN66717                                     91987K  CA
 5   020600001000125
01   020600001010200032773140O   72FORD  ECONOLINE        00 30220 4500 3295 6000
02   020600001000200 13176064030008021101565521011098 RQMRQMGLW  02
03   020600001000200 600D 320 +060 600
04   020600001000200         35
21   020600001000200CT 3140 39184 233983 1570 2088 2039 1033
21   020600001000200CS 2181 42571 265894  810  926  904 1012
21   020600001000200HT 2428 29146 211447 1481 1979 1933 1192
21   0206000010102007 5  655 10136  64938  311  394  384 1060
31   020600001000200                   294
41   020600001000200MACHOWARD LEASING                                              1
42   02060000100020024 NORTH HARBOR
43   020600001000200SANTA ANA CALIF 92703                                    5310607
44   020600001000200E24GHN66717                                     91987K  CA
45   020600001000200
01   0206000010402330330731540   72FORD  ECONOLINE        00 30220 4500 3295 6000
02   020600001000233 13178063030208021101565821011094 RQMJSJGLW  02
03   020600001000233 600D 310 +060 600
04   020600001000233         08
21   020600001000233CT 4043 39438 235591 1513 1942 1826 1017
21   020600001000233CS 1760 37787 282159  797  867  815  991
21   020600001000233HT 2564 29055 211693 1302 1792 1685 1189
21   02060000104023375  661  9508  67217  292  363  341 1044
31   020600001000233                   408
41   020600001000233MACHOWARD LEASING                                              1
42   02060000100023324 NORTH HARBOR
43   020600001000233SANTA ANA CALIF 92703                                    5310607
44   020600001000233E24GHN66717                                     91987K  CA
45   020600001000233
01   0206000010502430402731425   72FORD  ECONOLINE        00 30220 4500 3295 6000
02   020600001000243 13181061030208021101566621011089 RQMJSJGLW  02
03   020600001000243 600D 310 +060 600
04   020600001000243         08
21   020600001000243CT 2293 32545 228580 1456 1946 1724 1100
21   020600001000243CS 1495 28677 277378  864  935  828 1051
21   020600001000243HT 2282 23012 206375 1488 1689 1673 1264
21   02060000105024375  504  7438  65774  312  380  336 1112
31   020600001000243                   372
41   020600001000243MACHOWARD LEASING                                              1
42   02060000100024324 NORTH HARBOR
43   020600001000243SANTA ANA CALIF 92703                                    5310607
44   020600001000243E24GHN66717                                     91987K  CA
45   020600001000243
01   0206000011001650323731520   72CHEVROC-20             00 35040 5500 4863 7500
02   020600001100165 22778064030168101100700821011096 RQMJSJGLW  02
03   020600001100165 525D 300 +090 525
04   020600001100165         19
21   020600001100165CT 1862 17409 354684 2623 4218 4051  814
21   020600001100165CS 1503 15255 311513 2334 3597 3455 1011
21   020600001100165HT 1129  7857 299917 2570 4809 4619 1000
21   02060000110016575  393  3629  84664  657 1067 1044  960
```

Figure 4.4-16

```
 3    020600001100165                     340
 41   020600001100165LAURENCE L LITTLFJOHN                                                 0
 4?   02060000110016510581 ARTCRAFT AVE
 4    020600001100165GARDEN GROVE CALIF 92640                            7145307265
 44   020600001100165CCE242Z110279                                  97553K  CA
 45   020600001100165
 0    02060000111019103267315 35   72CHEVROC-20             00 35040 5500 4863 7500
 C_   020600001100191 22776063030008101100702721011096 RQMJSJGLW  02
 03   020600001100191 525D 300 +090 525
 C    020600001100191          19
 ?    020600001100191CT 1832 19940 364604 1393 3477 3323  786
 21   020600001100191CS 1601 17674 312181 1800 3446 3294  997
 2'   020600001100191HT 1295 12359 314402 2311 4245 4058  934
 ?    02060000111019175  417  4439  86423  496  981  938  929
 3.   020600001100191                     238
 41   020600001100191LAURENCE L LITTLFJOHN                                                 0
 4    02060000110019110581 ARTCRAFT AVE
 4    020600001100191GARDEN GROVE CALIF 92640                            7145307265
 44   020600001100191CCE242Z110279                                  97553K  CA
 4    020600001100191
 (    02060000114020903287313 30   72CHEVROC-20             00 35040 5500 4863 7500
 02   020600001100209 227770630300381011007018210110 95 RQMJSJGLW  02
 03   020600001100209 550D 300 +090 550
 (    020600001100209          17
 2.   020600001100209CT 1598 14590 354489 2574 4007 3802  825
 21   020600001100209CS 1366 13020 309556 2437 3530 3349 1028
 ?    020600001100209HT 1117  7308 295064 2331 4203 3988 1018
 ?    02060000114020975  359  3128  84023  650 1020  968  976
 31   020600001100209                     485
 4    020600001100209LAURENCE L LITTLFJOHN                                                 0
 ?    02060000110020910581 ARTCRAFT AVE
 43   020600001100209GARDEN GROVE CALIF 92640                            7145307265
 44   020600001100209CCE242Z110279                                  97553K  CA
 ()   020600001100209
 0.   02060000115021903297312 35   72CHEVROC-20             00 35040 5500 4863 7500
 02   020600001100219 227800630301281011007042210110 93 RQMJSJGLW  02
 (3   020600001100219 550D 300 +090 550
 (    020600001100219          17
 21   020600001100219CT 1414 13201 343099 2623 4252 3946  857
 ?1   020600001100219CS 1294 12053 299692 2511 3567 3310 1066
 .(   020600001100219HT 1063  6418 292272 3685 5226 4850 1033
 21   02060000115021975  334  2852  81843  765 1117 1036 1006
 31   020600001100219                     369
 (    020600001100219LAURENCE L LITTLFJOHN                                                 0
 .2   02060000110021910581 ARTCRAFT AVE
 43   020600001100219GARDEN GROVE CALIF 92640                            7145307265
 ?    020600001100219CCE242Z110279                                  97553K  CA
 5    020600001100219
 01   02060000120021303287319 40   69CHEVROC-20             00 35040 5000 3947 7500
 ?2   020600001200213 179800620299781031035982200110 91 RQMRWKWSJ  02
 3    020600001200213 550D 240 +040 550
 04   020600001200213          97
 21   020600001200213CT 5505 51332 266591 1917 2974 2711  866
 1    020600001200213CS 3250 50679 279849 1131 1311 1195  930
 .1   020600001200213HT 2327 22564 242721 2050 3037 2768 1106
```

Figure 4.4-17

```
21   02060000120021375  926 11415  71045  416  576  525  957
3    020600001200213                  620
-1   020600001200213EDWARD C BRUNS                                                      0
-2   020600001200213221 DEL MAR AVE
-    020600001200213COSTA MESA CALIF                                               5483935
-    020600001200213CE2492857103                                           14029G  CA
-5   020600001200213
0    0206000012102240329731845   69CHEVROC-20            00 35040 5000 3947 7500
0    020600001200224 17980064030108103103599520011095 ROMRWKWSJ  02
03   020600001200224 550D 240 +040 550
04   020600001200224           97
2    020600001200224CT 4797 48073 248997 1871 2744 2600  929
21   020600001200224CS 3245 50821 271165 1006 1128 1069  952
21   020600001200224HT 2178 23198 235173 1917 2780 2634 1134
2    02060000121022475  873 11295  68304  387  519  492  990
3    020600001200224                  794
-1   020600001200224EDWARD C BRUNS                                                      0
-    020600001200224221 DEL MAR AVE
-    020600001200224COSTA MESA CALIF                                               5483935
-4   020600001200224CE2492857103                                           14029G  CA
-5   020600001200224
0    0206000013002450402731720   72CHEVROC-20            00 35044 5000 4008 7500
02   020600001300245 17980061030198001101812221011089 ROMRWKWSJ  02
03   020600001300245 850N 300 +040 850
     020600001300245           30
2    020600001300245CT 3434 25650 257757 2196 3519 3138 1022
21   020600001300245CS 1987 24503 260364 1826 2493 2223 1127
2    020600001300245HT 1794 19319 221138 1918 3321 2962 1228
2    02060000130024575  596  6206  66302  515  786  701 1128
31   020600001300245                  166
-1   020600001300245ROGER KETELSLEGER                                                   0
-    02060000130024520711 HAWAIIAN AVE
-    020600001300245LAKEWOOD CALIF 90715                                        2138655485
-4   020600001300245CKE2422108799                                         70277K  CA
-    020600001300245
     0206000013102540403731430   72CHEVROC-20            00 35044 5000 4008 7500
2    020600001300254 17985065030208001101813321011093 ROMJSJGLW  02
     020600001300254 850N 300 +040 850
     020600001300254           30
1    020600001300254CT 2205 23865 237406 2077 3209 2994 1120
1    020600001300254CS 1719 26164 244765 1696 2194 2048 1180
     020600001300254HT 1558 18490 209425 1992 3159 2948 1297
     02060000131025475  474  6262  62163  497  717  669 1196
1    020600001300254                  107
     020600001300254ROGER KETELSLEGER                                                   0
     02060000130025420711 HAWAIIAN AVE
3    020600001300254LAKEWOOD CALIF 90715                                        2138655485
     020600001300254CKE2422108799                                         70277K  CA
     020600001300254
1    0206000013402710405731325   72CHEVROC-20            00 35044 5000 4008 7500
2    020600001300271 17981066030188001101813121011098 ROMJSJGLW  02
     020600001300271 600N 300 +040 600
     020600001300271           25
1    020600001300271CT 2011 12337 234631 2170 3469 3406 1212
     020600001300271CS 2143 14617 263784 2099 2979 2925 1171
```

Figure 4.4-18

```
2    020600001300271HT 1545  8518 219639 2178 3688 3621 1327
2    02060000134027175  518  3304  65316  570  876  860 1219
31   020600001300271                   120
     020600001300271ROGER KETELSLEGER                                          0
     02060000130027120711 HAWAIIAN AVE
3    020600001300271LAKEWOOD CALIF 90715                            2138655485
     020600001300271CKE242Z108799                               70277K  CA
     020600001300271
01   02060000135027804067311l0   72CHEVROC-20              00 35044 5000 4008 7500
02   020600001300278 17976062030188001101813921011093 RQMJSJGLW  02
3    020600001300278 600N 300 +040 600
     020600001300278          25
21   020600001300278CT 1766 12155 267077 2135 3462 3235 1082
2    020600001300278CS 2514 15544 275140 1934 2743 2564 1118
2    020600001300278HT 1673  9760 229623 1912 3358 3138 1262
21   02060000135027875  564  3511  69449  526  819  766 1146
     020600001300278                   166
     020600001300278ROGER KETELSLEGER                                          0
42   02060000130027820711 HAWAIIAN AVE
43   020600001300278LAKEWOOD CALIF 90715                            2138655485
     020600001300278CKE242Z108799                               70277K  CA
     020600001300278
01   02060000140024204027312S0   66CHEVROC-20              00 32740 4500 3700 7500
     020600001400242 13179063030218100105197121011093 RQMJSJGLW  02
     020600001400242 575D 250 +050 575
04   020600001400242          34
21   020600001400242CT 2357 15292 147952 1642 2386 2227 1759
1    020600001400242CS 2369 18514 182431 1741 2375 2216 1570
21   020600001400242HT 1746 11262 136087 1600 2349 2192 1982
21   02060000140024275  584  4201  43149  448  632  590 1704
1    020600001400242                   183
1    020600001400242RUDY HEMAN                                                 0
42   02060000140024211412 PARK LANE
3    020600001400242GARDEN GROVE CALIF 92640                        7145340192
4    020600001400242C2546Z125641                                T80239  CA
45   020600001400242
1    02060000141025304037312 40   66CHEVROC-20             00 32740 4500 3700 7500
2    020600001400253 13182063030228100105198321011091 RQMJSJGLW  02
03   020600001400253 575N 250 +050 575
04   020600001400253          34
1    020600001400253CT 2489 13720 141694 1717 2351 2150 1845
1    020600001400253CS 2482 18193 173985 1566 2216 2026 1634
21   020600001400253HT 1507 10217 131621 1549 2292 2095 2068
1    02060000141025375  588  3989  41340  425  604  553 1778
1    020600001400253                    64
41   020600001400253RUDY HEMAN                                                 0
2    02060000140025311412 PARK LANE
3    020600001400253GARDEN GROVE CALIF 92640                        7145340192
44   020600001400253C2546Z125641                                T80239  CA
45   020600001400253
1    02060000150025604037317 25   68FORD  F-250            00 36020 5000 3870 7500
2    020600001500256 17978061030178101108250717011090 RQMRWKWSJ  02
03   020600001500256 675D 280 +030 675
4    020600001500256          25
1    020600001500256CT 1847 24870 258257  556  858  776 1041
```

Figure 4.4-19

```
2     020600001500256CS 1888 44435 248852 1863 2490 2251 1059
2     020600001500256HT 1814 22326 233416  543  919  831 1151
21    02060000150025675  495  9047  65727  322  451  408 1079
3     020600001500256                118
4     020600001500256WALTER CHOMIN                                              0
42    020600001500256420 OPAL COVE WAY
43    020600001500256SEAL BEACH CALIF 90740                              2135960201
4     020600001500256F25YRD01629                                      87364B  CA
4     020600001500256
01    02060000151026104047313 10   68FORD  F-250            00 36020 5000 3870 7500
0     020600001500261 1798406303020810110825141701109O RQMJSJGLW  02
0     020600001500261 675D 280 +030 675
04    020600001500261          25
2     020600001500261CT 1844 24975 258533 2569 3960 3572 1040
2     020600001500261CS 1957 43684 247267 2165 2841 2563 1068
21    020600001500261HT 1352 24553 231477 2274 3901 3519 1151
21    02060000151026175  469  9122  65384  609  902  814 1083
3     020600001500261                 64
4     020600001500261WALTER CHOMIN                                              0
42    020600001500261420 OPAL COVE WAY
4     020600001500261SEAL BEACH CALIF 90740                              2135960201
4     020600001500261F25YRD01629                                      87364B  CA
45    020600001500261
0     02060000160025804037321 05   70FORD  CAMPER SPECIAL  00 36020 4500 3688 7500
0     020600001600258 1317606103018810110522571701109? RQMRWKWSJ  02
03    020600001600258 675D 310 +220 675
04    020600001600258          27
2     020600001600258CT 4144 59086 182308  547  620  568 1095
2     020600001600258CS 2836 35648 202696  694  712  652 1284
21    020600001600258HT 2583 37262 171226  701  829  760 1327
2     02060000160025875  812 10973  50496  177  193  177 1251
3     020600001600258                206
41    020600001600258GERALD LAYTON                                              0
42    02060000160025811342 PINE
43    020600001600258LOS ALAMITOS CALIF 90720                            2134313992
44    020600001600258F25YRG53629                                      56066F  CA
45    020600001600258
0     02060000161026204047314 50   70FORD  CAMPER SPECIAL  00 36020 4500 3688 7500
02    020600001600262 1318506403018810110522681901109] RQMJSJGLW  02
03    020600001600262 675D 310 +220 675
04    020600001600262          27
2     020600001600262CT 3491 61120 183606  617  693  634 1086
21    020600001600262CS 2593 36815 184941  749  813  743 1370
21    020600001600262HT 2632 39049 168492  814  945  864 1325
2     02060000161026275  746 11381  47991  197  220  201 1289
31    020600001600262                203
41    020600001600262GERALD LAYTON                                              0
42    02060000160026211342 PINE
43    020600001600262LOS ALAMITOS CALIF 90720                            2134313992
44    020600001600262F25YRG53629                                      56066F  CA
45    020600001600262
0     02060000170037504247316 55   70FORD  F-250            00 36020 5000 3688 7500
02    020600001700375 1798106203003810110304262101109O RQMRWKRMP  02
03    020600001700375 5500 230 +050
04    020600001700375        065
```

Figure 4.4-20

```
2     020600001700375CT 2735 58941 283737 2145 3109 2813  820
2.    020600001700375CS 1946 33088 285281 2477 3581 3240 1001
21    020600001700375HT 1720 25024 254770 2598 3929 3554 1054
2     02060000170037575  547  9693  73667  651  954  863  970
3     020600001700375                   60
41    020600001700375DOUGLAS HUGHES                                          0
42    02060000170037510062 SUNTAN CIR
4     020600001700375HUNTINGTON BEACH CALIF 92646               7149680580
44    020600001700375F25YRJ52004                            26410G  CA
45    020600001700375
(     02060000171037804257313O5   70FORD  F-250           00 36020 5000 3688 7500
02    020600001710378 1797906303004810110304362101l094 RQMJSJRMP  02
03    020600001710378 550D 230 +050
0.    020600001710378       065
2     020600001710378CT 3458 68154 280502 2099 3175 2970  792
21    020600001710378CS 1881 29523 273897 2173 3528 3300 1054
21    020600001710378HT 1699 23711 263438 2522 4114 3848 1032
2     02060000171037875  578  9646  72623  602  965  903  981
31    020600001710378                  196
41    020600001710378DOUGLAS HUGHES                                          0
4'    02060000171037810062 SUNTAN CIR
4!    020600001710378HUNTINGTON BEACH CALIF 92646               7149680580
44    020600001710378F25YRJ52004                            26410G  CA
45    020600001710378
(     020600001800286O410731130   69FORD  F250            00 36020 4500 3725 6100
02    020600001800286 13183064030128001104900919511093 RWKJSJGLW  02
03    020600001800286 550D 270 +210 550
0.    020600001800286       038
2.    020600001800286CT 1991 19656 248384 1534 2071 1921 1106
21    020600001800286CS 1388 23910 235896 1092 1295 1201 1238
:     020600001800286HT 1342 13475 218128 1410 1808 1677 1296
:     02060000180028675  401  5339  62271  341  429  398 1223
31    020600001800286                  104
4'    020600001800286DAVID R COWGER                                          0
4!    02060000180028615371 CEDERWOOD
43    020600001800286MIDWAY CITY CALIF 92655                    7148943615
44    020600001800286F25YRE76268                            38529E  CA
4)    020600001800286
0.    020600001810372O424731103   69FORD  F250            00 36020 4500 3725 6100
02    020600001810372 13179063030068001104944619511094 RQMJSJGLW  02
0!    020600001810372 525D 270 +140
0.    020600001810372       042
21    020600001810372CT 3647 24940 259336 1970 2493 2331 1018
2'    020600001810372CS 1446 25449 247893 1319 1382 1292 1176
'.    020600001810372HT 1347 13638 217791 1552 1750 1636 1297
21    02060000181037275  504  5860  64473  407  460  430 1168
31    020600001810372                   67
..    020600001810372DAVID R COWGER                                          0
42    02060000181037215371 CEDERWOOD
43    020600001810372MIDWAY CITY CALIF 92655                    7148943615
4)    020600001810372F25YRE76268                            38529E  CA
4)    020600001810372
01    020600001900287O410731315   67FORD  F-250           00 35240 4500 3672 6000
02    020600001900287 13182059030138100107035219511085 RQKJSJGLW  02
03    020600001900287 650D 260 +0P0 650
```

Figure 4.4-21

```
04   020600001900287           02
21   020600001900287CT 2405 27372 221848 1891 2628 2235 1159
21   020600001900287CS 1985 29411 205560 1397 1700 1445 1332
21   020600001900287HT 2739 17423 193385 1674 2318 1970 1376
21   02060000190028775  611  6815  54825  422  553  471 1303
31   020600001900287                   60
41   020600001900287ROBERT P BAUER                                                    0
42   020600001900287930 N HART ST
43   020600001900287ORANGE CALIF 92667                                        6334593
44   020600001900287F25YRA45086                                       Q74864  CA
45   020600001900287
01   020600001910294041173113З   67FORD  F-250              00 35240 4500 3672 6000
02   020600001900294 131830650301881001070356195110095 RQMJSJGLW  02
03   020600001900294 6500 260 +080 650
04   020600001900294           02
21   020600001900294CT 2231 25982 225142 1757 2468 2335 1156
21   020600001900294CS 1639 29680 213328 1395 1682 1592 1297
21   020600001900294HT 1189 21022 186803 1543 2101 1989 1412
21   02060000191029475  437  7045  55549  404  525  497 1293
31   020600001900294                   55
41   020600001900294ROBERT P BAUER                                                    0
42   020600001900294930 N HART ST
43   020600001900294ORANGE CALIF 92667                                        6334593
44   020600001900294F25YRA45086                                       Q74864  CA
45   020600001900294
01   020600002000298041173180О   71FORD  F-250              00 36020 5000 4100 7500
02   020600002000298 17976063030138101101416619511095 ROMJSJRWK  02
03   020600002000298 6000 290 +050 600
04   020600002000298           024
21   020600002000298CT 4604 82677 245642 1532 1975 1885  809
21   020600002000298CS 2523 38877 268396 1449 1895 1809 1019
21   020600002000298HT 2641 26652 248548 2056 3160 3015 1057
21   02060000200029875  801 11949  68459  437  606  578  976
31   020600002000298                   094
41   020600002000298JAMES COOK                                                        0
42   02060000200029811812 MACNAB
43   020600002000298GARDEN GROVE CALIF 92641                                  8936065
44   020600002000298F25YRK08297                                       72518K  CA
45   020600002000298
01   0206000020103000412731000   71FORD  F-250              00 36020 5000 4100 7500
02   020600002010300 17976062030158101101417319511093 ROMJSJGLW  02
03   020600002010300 6000 290 +050 600
04   020600002010300           024
21   020600002010300CT 4141 77614 252427 1469 1907 1783  815
21   020600002010300CS 2456 31878 302303 1727 2102 1965  955
21   020600002010300HT 2469 21690 257516 2166 3223 3013 1054
21   02060000201030075  752 10349  74351  479  635  593  946
31   020600002010300                   32
41   020600002010300JAMES COOK                                                        0
42   02060000201030011812 MACNAB
43   020600002010300GARDEN GROVE CALIF 92641                                  8936065
44   020600002010300F25YRK08297                                       72518K  CA
45   020600002010300
01   0206000021002890410731630   71FORD  F-250              00 36020 5000 3940 7500
02   020600002100289 17980064030128101101118619511095 RWKJSJGLW  02
```

Figure 4.4-22

```
03    02060000210028 9 700D 300 +060 700
0     020600002100289       035
21    020600002100289CT 3223 59066 287666 2202 3329 3154  808
21    020600002100289CS 1495 17817 290354 1862 2224 2106 1064
2     020600002100289HT 1897 14473 271260 2191 4026 3814 1052
2     02060000210028975  528  6862  75823  541  793  752  996
31    020600002100289                   77
4     020600002100289LEO TAYLOR                                                    0
4     02060000210028920015 ALBURTIS
43    020600002100289LAKEWOOD CALIF 90715                                   8602803
44    020600002100289F25YRL64404                                     932EMR  CA
4     020600002100289
01    0206000021102960411731500   71FORD  F-250          00 36020 5000 3940 7500
02    020600002110296 1797906403014810110112219511095 RQMRWKGSW  02
0     020600002110296 700D 300 +060 700
0     020600002110296       035
21    020600002110296CT 3093 60815 266995 2032 3034 2894  848
21    020600002110296CS 1336 15770 282302 1791 2398 2287 1105
2     020600002110296HT 1348  9783 249125 2417 3949 3766 1175
21    02060000211029675  458  6333  71881  539  794  757 1056
31    020600002110296                  084
4     020600002110296LEO TAYLOR                                                    0
42    02060000211029620015 ALBURTIS
43    020600002110296LAKEWOOD CALIF 90715                                   8602803
4     020600002110296F25YPL64404                                     932EMR  CA
4     020600002110296
01    0206000022003090413731130   69FORD  F-250          00 39020 5000 3885 7500
02    020600002200309 17976062030148101103217719511093 RQMJSJGLW  02
0     020600002200309 325D 290 +100 325
04    020600002200309       100
21    020600002200309CT 2418 17979 256624 2095 3432 3208 1079
2     020600002200309CS 1616 27230 228023 2019 3019 2823 1246
2     020600002200309HT 1096 14623 217666 2282 3590 3357 1293
21    02060000220030975  437  5773  61659  563  872  815 1219
:     020600002200309                   70
4     020600002200309D L CAMPBELL                                                  0
42    020600002200309424 JADE COVE WAY
43    020600002200309SEAL BEACH CALIF 90740                                 5981253
.     020600002200309F25HPF93665                                    31202E  CA
45    020600002200309
01    0206000022103140414731430   69FORD  F-250          00 39020 5000 3885 7500
02    020600002210314 17980061030108101103218819511089 RQMRWKRMP  02
03    020600002210314 325D 290 +100 325
04    020600002210314       100
2     020600002210314CT 1927 16266 255886 2277 3676 3282 1098
2     020600002210314CS 1859 25404 269289 2313 3510 3133 1091
21    020600002210314HT  862 10596 248930 2315 4006 3577 1177
21    02060000221031475  424  5124  69495  615  983  878 1115
:     020600002210314                  109
41    020600002210314D L CAMPBELL                                                  0
42    020600002210314424 JADE COVE WAY
4     020600002210314SEAL BEACH CALIF 90740                                 5981253
.     020600002210314F25HRF93665                                    31202E  CA
45    020600002210314
01    0206000023003110413731430   66DODGE 200            00 31820 5000 3870 7500
```

Figure 4.4-23

```
02   020600002300311 179760620301581001052950170l1093 RQMJSJGLW  02
 3   020600002300311 450D 300 +300 400
 4   020600002300311        068
21   020600002300311CT 4662 71566 206828 1616 2486 2324  945
^1   020600002300311CS 3328 34025 204069 1741 2318 2167 1283
 1   020600002300311HT 2517 25548 204482 2299 3562 3330 1250
21   02060000230031175  902 10581  54608  500  722  675 1187
31   020600002300311                 048
 1   020600002300311JOHN J MOORE                                          0
 2   020600002300311917  READING AVE
43   020600002300311WESTMINSTER CALIF 92683                         5310401
 4   020600002300311128l598205                                 U22712  CA
 5   020600002300311
01   02060000231031304l4731200   66DODGE 200               00 31820 5000 3870 7500
^2   020600002310313 1797806103012810010529581701l090 RQMRWKRMP  02
 3   020600002310313 450D 300 +300 450
04   020600002310313        068
21   020600002310313CT 4903 92171 195163 1364 1849 1673  888
 1   020600002310313CS 2925 38145 210859 1872 2413 2183 1228
_1   020600002310313HT 2017 25769 201909 2073 3502 3168 1269
21   02060000231031375  824 12329  54649  485  694  628 1148
 1   020600002310313                 018
 1   020600002310313JOHN J MOORE                                          0
42   0206000023103139172 READING AVE
^3   020600002310313WESTMINSTER CALIF 92683                         5310401
 4   0206000023103131281598205                                 U22712  CA
45   020600002310313
01   020600002400315041473l715   71CHEVROC-20              00 40020 5000 4104 7500
 2   020600002400315 17979062030108101102800720011092 RQMRWKRMP  02
 3   020600002400315 4750 290 +100 475
04   020600002400315        030
 1   020600002400315CT 1324 18001 275196  515  840  770 1026
 1   020600002400315CS 1397 17451 274467 2080 2811 2575 1123
21   020600002400315HT 1195  8351 237460  606  949  869 1241
?1   02060000240031575  353  3994  70421  353  495  454 1130
 1   020600002400315                 167
+1   020600002400315C HUTCHERSON                                          0
42   020600002400315610 HIGHLANDER ST
 3   020600002400315LA HABRA CALIF 90631                         2136918964
 4   020600002400315CE2417658485                              15093K  CA
45   020600002400315
^1   020600002410318041673114S   71CHEVROC-20              00 40020 5000 4104 7500
 2   020600002410318 17978062030218101102602120011092 RQMRWKRMP  02
03   020600002410318 475D 290 +100 475
04   020600002410318        030
 1   020600002410318CT 1761 19484 271498 2759 3997 3682 1076
21   020600002410318CS 1537 20644 313039 2724 3362 3098  982
21   020600002410318HT 1269 10201 240315 2926 4199 3869 1213
 1   02060000241031875  402  4645  75568  744  997  918 1045
 1   020600002410318                  93
41   020600002410318C HUTCHERSON                                          0
 2   020600002410318610 HIGHLANDER ST
 3   020600002410318LA HABRA CALIF 90631                         2136918964
44   020600002410318CE2417658485                              15093K  CA
45   020600002410318
```

Figure 4.4-24

```
01   0206000025003230416731800   70CHEVROC20               00 40040 5000 3998 7500
12   020600002500323 1797806303018810110278682001109 4 RQMRWKRMP  02
13   020600002500323 625D 290 +080
04   020600002500323       007
?1   020600002500323CT 1270 14832 323110 2234 3072 2889  901
?1   020600002500323CS 1096 10011 371701 2287 2755 2591  880
21   020600002500323HT  919  5814 285235 2342 3501 3292  928
?1   02060000250032375  289  2627  89763  611  810  761  928
?1   020600002500323               103
?1   020600002500323J MCARTHUR                                                   0
42   02060000250032320819 VERNE ST
 3   020600002500323LAKEWOOD CALIF                                     2138605863
 4   020600002500323CE240Z128511                                  95115E  CA
45   020600002500323
?1   0206000025103280417731030   70CHEVROC20               00 40040 5000 3998 7500
 2   020600002510328 17979063030168101110278812001109 3 RQMRWKRMP  02
03   020600002510328 625D 290 +080
04   020600002510328       007
 1   020600002510328CT 1123 10654 304210 2123 2827 2640  973
?1   020600002510328CS  917  8708 353403 1742 2062 1926  929
21   020600002510328HT  769  5263 275012 2347 3090 2886 1105
 1   02060000251032875  245  2172  85463  532  672  628  981
 1   020600002510328               112
41   020600002510328J MCARTHUR                                                   0
?2   02060000251032820819 VERNE ST
 3   020600002510328LAKEWOOD CALIF                                     2138605863
44   020600002510328CE240Z128511                                  95115E  CA
45   020600002510328
 1   0206000026003330417731420   70CHEVROCUSTOM CAMPER     00 35040 5000 3725 6700
?2   020600002600333 17979063030148101110225042001109 3 RQMRWKRMP  02
03   020600002600333 4500 270 +050
 4   020600002600333       018
 1   020600002600333CT 1618 31019 283167 2364 4348 4062  937
21   020600002600333CS 1581 20220 320818 2717 3568 3333  962
?1   020600002600333HT 1389 12236 262389 2966 4566 4265 1104
 1   02060000260033375  409  5404  78952  723 1072 1001  991
?1   020600002600333               358
41   020600002600333B SISSON                                                     0
 2   0206000026003339841 GRAHAM ST
 3   020600002600333CYPRESS CALIF 90630                                   3978496
44   020600002600333CE240Z178572                                  29598G  CA
 5   020600002600333
 1   0206000026103430418731250   70CHEVROCUSTOM CAMPER     00 35040 5000 3725 6700
02   020600002610343 17984061029988101110225172001108 7 RQMRWKRMP  02
?3   020600002610343 4500 270 +050
 4   020600002610343       018
?1   020600002610343CT 1811 35964 300858 2791 4771 4155  870
21   020600002610343CS 1355 16267 305345 2487 3164 2755 1026
 1   020600002610343HT 1151  9848 251452 3092 4489 3909 1167
 1   02060000261034375  372  4979  77072  727 1037  903 1022
31   020600002610343               362
 1   020600002610343B SISSON                                                     0
 2   0206000026103439841 GRAHAM ST
43   020600002610343CYPRESS CALIF 90630                                   3978496
44   020600002610343CE240Z178572                                  29598G  CA
```

Figure 4.4-25

```
45   020600002610343
01   02060000270033310417731245   72DODGE SPORTSMAN        00 36020 5000 4200 7700
02   020600002700331 17979063030158101101887926011093 RQMRWKRMP  02
03   020600002700331 600D 360 +090
04   020600002700331        034
21   020600002700331CT 2509 29688 288565 3226 4347 4060  924
21   020600002700331CS 2512 55555 284438 2329 2838 2651  906
21   020600002700331HT 1725 29149 237634 2680 3810 3559 1093
21   02060000270033175  610 11267  72530  699  917  857  954
31   020600002700331                 128
41   020600002700331MACHOWARD LEASING                                            1
42   020600002700331124 N HARBOR BLVD
43   020600002700331SANTA ANA CALIF 92703                              7145310607
44   020600002700331B378F24577695                                  454FNH  CA
45   020600002700331
01   02060000271033904187310I0   72DODGE SPORTSMAN        00 36020 5000 4200 7700
02   020600002710339 17980058029988101101889076011085 RQMRWKRQM  02
03   020600002710339 600D 360 +090
04   020600002710339        034
21   020600002710339CT 1525 34651 277434 3236 5042 4275  938
21   020600002710339CS 2312 56232 282547 2772 3395 2879  909
21   020600002710339HT 1883 32221 236787 2953 4148 3517 1076
21   02060000271033975  539 11933  71575  780 1057  896  956
31   020600002710339                 125
41   020600002710339MACHOWARD LEASING                                            1
42   020600002710339124 N HARBOR BLVD
43   020600002710339SANTA ANA CALIF 92703                              7145310607
44   020600002710339B378F24577695                                  454FNH  CA
45   020600002710339
01   02060000274034704197310I0   72DODGE SPORTSMAN        00 36020 5000 4200 7700
02   020600002740347 17979063030008101101890526011094 RQMJSJGLW  02
03   020600002740347 700D 290 +000
04   020600002740347        017
21   020600002740347CT 1403 22637 283031 2284 3908 3657  977
21   020600002740347CS 1493 27562 262944 1972 2732 2556 1106
21   020600002740347HT 1029 19699 244192 2438 3841 3595 1134
21   02060000274034775  358  6470  69845  579  880  824 1084
31   020600002740347                 175
41   020600002740347MACHOWARD LEASING                                            1
42   020600002740347124 N HARBOR BLVD
43   020600002740347SANTA ANA CALIF 92703                              7145310607
44   020600002740347B378F24577695                                  454FNH  CA
45   020600002740347
01   020600002750356042073102O   72DODGE SPORTSMAN        00 36020 5000 4200 7700
02   020600002750356 17977061029998101101891226011091 RQMRWKRQM  02
03   020600002750356 700D 290 +000
04   020600002750356        017
21   020600002750356CT 1867 25868 301657 3017 4745 4329  907
21   020600002750356CS 1617 29711 306078 3069 3858 3519  961
21   020600002750356HT 1319 21405 258684 3228 4582 4180 1065
21   02060000275035675  423  7071  77765  827 1135 1035  975
31   020600002750356                 105
41   020600002750356MACHOWARD LEASING                                            1
42   020600002750356124 N HARBOR BLVD
43   020600002750356SANTA ANA CALIF 92703                              7145310607
```

Figure 4.4-26

```
44  020600002750356B37BF24577695                                    454FNH  CA
 5  020600002750356
 1  0206000028003360417731630   65CHEVR03/4 TON          00 29213 4500 3700 7500
02  020600002800336 131800630301061001006871200110093 RQMRWKRWP  01
 3  020600002800336 525N 230 +040
 4  020600002800336        036
21  020600002800336CT 3436 30912 185633 2099 2696 2503 1288
 1  020600002800336CS 3259 24929 217138 2050 2399 2227 1290
 1  020600002800336HT 2262 25290 159366 1893 2330 2163 1531
21  02060000280033675  803  7018  51707  538  652  605 1347
31  020600002800336                    268
 1  020600002800336WERNER                                                          0
 2  020600002800336920 F CHALYNN
43  020600002800336ORANGE CALIF 92667
                                                                    6338533
 4  02060000280033652175516                                       S31047  CA
 5  020600002800336
01  0206000028103410418731120   65CHEVR03/4 TON          00 29213 4500 3700 7500
 2  020600002810341 131840610299861001006882200110087 RQMRWKRQM  01
 3  020600002810341 525N 230 +040
04  020600002810341        036
21  020600002810341CT 3274 26238 193153 2378 3108 2706 1290
 1  020600002810341CS 3019 23015 221270 2095 2376 2069 1288
 1  020600002810341HT 2591 27651 159512 1867 2388 2079 1495
21  02060000281034175  787  6674  52700  558  676  589 1339
 1  020600002810341                    201
 1  020600002810341WERNER
42  020600002810341920 E CHALYNN                                                   0
43  020600002810341ORANGE CALIF 92667
                                                                    6338533
 4  02060000281034152175516                                       S31047  CA
45  020600002810341
01  0206000029003440418731530   65CHEVROC20              00 29213 4500 3700 7500
 2  020600002900344 131790610299860001059070200110090 RQMJSJGLW  01
 3  020600002900344 675N 320 +030
04  020600002900344        012
 1  020600002900344CT 5429  9623 246193 2018 3245 2921 1133
 1  020600002900344CS 4780 10517 242288 1604 1918 1726 1255
21  020600002900344HT 4770  7842 214417 2013 3126 2813 1305
21  02060000290034475 1311  2550  62716  483  679  611 1241
 1  020600002900344                    157
41  020600002900344W PULFORD
42  02060000290034417260 SANTA LUCIA                                               0
 3  020600002900344SANTA ANA CALIF 93708
                                                                    8474049
 4  020600002900344C2545Z147094                                   R79725  CA
45  020600002900344
 1  0206000029103480419731045   65CHEVROC20              00 29213 4500 3700 7500
 2  020600002910348 131760600300060001059090200110090 RQMRWKRQM  01
03  020600002910348 675N 320 +030
04  020600002910348        012
 1  020600002910348CT 4973 13460 250716 2565 3691 3326 1098
21  020600002910348CS 5040 12550 267483 2195 2660 2397 1134
21  020600002910348HT 3227 11920 216126 2417 3206 2690 1288
 1  02060000291034875 1202  3351  66464  623  810  730 1164
 1  020600002910348                    17
41  020600002910348W PULFORD
 2  02060000291034817260 SANTA LUCIA                                               0
```

Figure 4.4-27

```
43   0206000029103488SANTA ANA CALIF 93708
                                                              8474049
 4   0206000029103488C2545Z147094                        R79725  CA
 5   02060000291034R
01   020600003000345041873170S   65CHEVROC20          00 28323 4500 3700 7500
 2   020600003000345 1317606302998800010825792001109 6 ROMJSJGLW  02
 3   020600003000345 800N 280 +290
04   020600003000345         007
21   020600003000345CT 3273 29829 202909 2153 2557 2445 1214
 1   020600003000345CS 4662 35833 206510 1196 1306 1249 1239
21   020600003000345HT 3035 25056 185238 1838 2352 2249 1348
21   02060000300034575 1040  8392  53246  423  500  478 1261
 1   020600003000345               339
 1   020600003000345A CALVANO
42   0206000030003458172 KINER AVE                                        0
 3   020600003000345HUNTINGTON BEACH CALIF 92646
                                                              8423440
 4   020600003000345C2545Z123135
45   020600003000345                                           CA
01   020600003010349041973120O   65CHEVROC20          00 28323 4500 3700 7500
 2   020600003010349 131790620299880001082583200110 92 ROMJSJGLW  02
03   020600003010349 800N 280 +290
04   020600003010349         007
 1   020600003010349CT 4002 36729 204934 1792 2588 2375 1147
 1   020600003010349CS 4577 40088 208337 1287 1485 1362 1203
21   020600003010349HT 3924 33315 189292 1610 2148 1970 1243
 1   02060000301034975 1138  9983  53914  397  510  468 1201
 1   020600003010349               507
41   020600003010349A CALVANO
42   0206000030103498172 KINER AVE                                        0
 3   020600003010349HUNTINGTON BEACH CALIF 92646
44   020600003010349C2545Z123135                               8423440
45   020600003010349                                           CA
 1   020600003100350041973123 2   71CHEVROC20          00 35040 5000 3998 7500
 2   020600003100350 179790620299881011040101200110 92 ROMRUKRMP  02
03   020600003100350 550D 300 +080
 4   020600003100350         013
 1   020600003100350CT 3407 66356 245419 1693 2391 2194  876
21   020600003100350CS 1643 17263 289930 1816 2276 2088 1067
21   020600003100350HT 1533 16906 228950 2105 2740 2514 1213
 1   02060000310035075  531  7391  70128  499  649  595 1054
31   020600003100350               94
41   020600003100350W JOHNSON
42   0206000031003504521 AMERWOOD                                         0
 3   020600003100350BUENA PARK CALIF 90623
44   020600003100350CF241Z65 505                               8266367
 5   020600003100350                                    06774K  CA
     020600003110358042073121 5   71CHEVROC20          00 35040 5000 3998 7500
02   020600003110358 179830640299810110401142001109 3 ROMRWKJSJ  02
03   020600003110358 5500 300 +0R0
     020600003110358         013
     020600003110358CT 3883 74502 264582 1982 2650 2648  801
21   020600003110358CS 1753 22483 294428 2170 2604 2420 1026
     020600003110358HT 1491 17174 255624 2565 3390 3150 1099
     02060000311035875  570  8574  73854  598  768  714  987
31   020600003110358               306
     020600003110358W JOHNSON
                                                                          0
```

Figure 4.4-28

```
42   0206000031103584521 AMERWOOD
 3   0206000031103588UENA PARK CALIF 90623                                    8266367
.4   0206000031103580CE2417653505                                          06774K  CA
45   02060000311035R
 1   02060000320035404197316O5   69DODGE CAMPER SPECIAL  00 38320 5000 3807 7500
 2   020600003200354 179800600299780011035173170110880 RQMRWKGSW  02
03   020600003200354 600D 250 +100
^4   020600003200354        070
'1   020600003200354CT 3710 47833 294806 3303 5010 4398  827
21   020600003200354CS 3694 74093 290860 2757 3465 3042  821
21   020600003200354HT 2670 41620 255506 2954 4205 3691  959
'1   02060000320035475  908 15785  75102  782 1069  938  856
.1   020600003200354                    104
41   020600003200354I MARTIN                                                        0
 2   020600003200354880l ALBATROSS
 3   020600003200354HUNTINGTON BEACH CALIF 92646                             9682900
44   0206000032003541281910560                                            38708E  CA
'5   020600003200354
'1   020600003210357042073113O   69DODGE CAMPER SPECIAL  00 38320 5000 3807 7500
u2   020600003210357 1797906102999800110351841701109O RQMRWKGSW  02
03   020600003210357 600D 250 +100
 4   020600003210357        070
'1   020600003210357CT 3247 47416 289461 2897 4665 4198  844
21   020600003210357CS 3337 64516 256829 2186 2892 2603  932
'1   020600003210357HT 2214 35590 254477 2716 4352 3917  995
'1   02060000321035775  799 14026  70180  664  984  885  928
31   020600003210357                    38
^1   020600003210357I MARTIN                                                        0
 2   0206000032103578801 ALBATROSS
+3   020600003210357HUNTINGTON BEACH CALIF 92646                             9682900
44   0206000032103571281910560                                            38708E  CA
 5   020600003210357
 1   020600003300353041973145S   66FORD  F250              00 36020 4500 3545 7500
02   020600003300353 131800600299781011009690200110888 RQMRWKRQM  02
`3   020600003300353 400D 290 +095
 4   020600003300353        100
21   020600003300353CT 4474 51249 297793 1852 2338 2052  804
?1   020600003300353CS 4205 67369 276844 1827 2079 1825  868
 1   020600003300353HT 2938 36048 254051 1948 2380 2090  987
.1   02060000330035375 1041 14660  73294  498  592  520  883
31   020600003300353                    12
 1   020600003300353J SPILLER                                                       0
 2   02060000330035312541 CHRISTY LANE
43   020600003300353LOS ALAMITOS CALIF 90720                                 6269511
 4   020600003300353F25YR806082                                           T86840  CA
 5   020600003300353
01   020600003310359042073130B   66FORD  F250              00 36020 4500 3545 7500
^2   020600003310359 131800600299981011009702200110888 RQMRWKGSW  02
 3   020600003310359 400D 290 +095
.4   020600003310359        100
21   020600003310359CT 3428 31553 241520 1634 2213 1942 1046
 1   020600003310359CS 3905 58907 222759 1497 1712 1503 1049
 1   020600003310359HT 2547 29697 221567 1648 2084 1829 1143
21   02060000331035975  911 11920  60387  419  514  451 1072
^1   020600003310359                    66
```

Figure 4.4-29

```
'1    020600003310359J SPILLER                                                    0
 2    020600003310359I2541 CHRISTY LANE
43    020600003310359LOS ALAMITOS CALIF 90720                              6269511
44    020600003310359F25YR8060R2                                    T86840  CA
 5    020600003310359
01    020600003400361042073I600    67FORD  F250            00 36020 5000 3800 6900
02    020600003400361 179850590299881001061522200II084 RQMRWKRQM  02
 3    020600003400361 525D 270 +060
 4    020600003400361         046
21    020600003400361CT 4569 47551 367218 2966 5027 4201  692
21    020600003400361CS 3659 69379 306841 2608 3142 2626  804
21    020600003400361HT 2868 36985 310479 2871 4802 4014  836
21    02060000340036175  968 14788  85562  736 1072  896  786
31    020600003400361              170
 1    020600003400361DONALD KAISER                                                0
42    02060000340036117263 PALM
43    020600003400361FOUNTAIN VALLEY CALIF 92708                           8477817
 4    020600003400361F25YRA98072                                    V96553  CA
 5    020600003400361
01    020600003410366042173I315    67FORD  F250            00 36020 5000 3800 6900
02    020600003410366 179790610301381001061534200II090 RQMRWKGSW  02
 3    020600003410366 525D 270 +060
04    020600003410366         046
21    020600003410366CT 4239 38190 354170 2895 4479 4025  738
21    020600003410366CS 3314 63090 296312 2213 2922 2626  847
21    020600003410366HT 2682 35106 291013 2553 4256 3824  890
21    02060000341036675  889 13270  81931  655  970  871  833
 1    020600003410366              153
 1    020600003410366DONALD KAISER                                                0
42    02060000341036617263 PALM
43    020600003410366FOUNTAIN VALLEY CALIF 92708                           8477817
 4    020600003410366F25YRA98072                                    V96553  CA
45    020600003410366
01    020600003500362042073I630    73FORD  F250            00 36020 5000 3780 6900
 2    020600003500362 179850590299880211000947250II084 ROMJSJGLW  02
 3    020600003500362 500D 260 +060
04    020600003500362         003
 1    020600003500362CT 2932 52032 291146 1690 2110 1764  826
 1    020600003500362CS 1103 12823 303641 1530 2024 1692 1050
21    020600003500362HT 1255 10788 261460 2010 2827 2363 1118
21    02060000350036275  417  5513  77049  454  606  506 1010
 1    020600003500362              145
41    020600003500362A-1 RENTAL                                                   1
42    020600003500362126 N HARBOR BLVD
 3    020600003500362SANTA ANA CALIF                                       5311420
 4    020600003500362F25YRP45543                                    1155177 CA
45    020600003500362
 1    020600003510365042173I205    73FORD  F250            00 36020 5000 3780 6900
 2    020600003510365 179750590301380211000965250II087 ROMJSJGLW  02
03    020600003510365 5000 260 +060
04    020600003510365         003
 1    020600003510365CT 1917 45322 296383 1457 1836 1592  840
21    020600003510365CS 1205 13069 309002 1522 1838 1593 1032
21    020600003510365HT 1242 12150 260692 1981 2581 2237 1082
 1    02060000351036575  365  5264  78728  437  546  474  998
```

Figure 4.4-30

```
31   020600003510365                              145
 1   020600003510365A-1 RENTAL                                                                  1
42   020600003510365126 N HARBOR BLVD
43   020600003510365SANTA ANA CALIF                                                      5311420
 4   020600003510365F25YPR45543                                                  1155177 CA
 5   020600003510365
01   0206000035403680423731300    73FORD  F250                  00 36020 5000 3780 6900
02   020600003540368 17978063030038021100097625011094 RQMRWKGSW  02
03   020600003540368 550D 260 +060
04   020600003540368          007
21   020600003540368CT 2408 56989 282964 1371 1660 1564  831
21   020600003540368CS 1658 37014 295618 1415 1700 1602  958
21   020600003540368HT 1368 22557 257905 1976 2507 2362 1061
21   02060000354036875  463  9917  75240  417  512  483  953
31   020600003540368                           189
41   020600003540368A-1 RENTAL                                                                  1
42   020600003540368126 N HARBOR BLVD
43   020600003540368SANTA ANA CALIF                                                      5311420
 4   020600003540368F25YPR45543                                                  1155177 CA
45   020600003540368
01   0206000035503730424731100    73FORD  F250                  00 36020 5000 3780 6900
02   020600003550373 17979063030068021100098725011094 RQMRWKRMP  02
03   020600003550373 550D 260 +060
04   020600003550373          007
21   020600003550373CT 2359 54586 287194 1173 1626 1520  830
21   020600003550373CS 1523 35551 370049 1261 1453 1358  798
21   020600003550373HT 1224 21627 262399 1655 2281 2133 1052
21   02060000355037375  431  9513  85748  361  460  430  862
31   020600003550373                           84
41   020600003550373A-1 RENTAL                                                                  1
42   020600003550373126 N HARBOR BLVD
43   020600003550373SANTA ANA CALIF                                                      5311420
44   020600003550373F25YPR45543                                                  1155177 CA
45   020600003550373
01   0206000036003670421731625    67CHEVRO3/4 TON               00 32744 5000 3800 7500
02   020600003600367 17979060030138001107935920011088 RQMJSJGLW  02
03   020600003600367 300N 250 +250
04   020600003600367          100
21   020600003600367CT 6352 66978 191699 1387 1849 1631  996
21   020600003600367CS 7083 73659 192783 1271 1376 1214 1039
21   020600003600367HT 4930 44100 185260 1805 2460 2170 1168
21   02060000360036775 1683 17013  50775  386  477  420 1062
31   020600003600367                           429
41   020600003600367R FLETCHER                                                                  0
42   0206000036003671856 OHIO PLACE
43   020600003600367COSTA MESA CALIF 92626                                               5579335
44   020600003600367CE2477138103                                                 085503  CA
45   020600003600367
01   0206000036103700423731440    67CHEVRO3/4 TON               00 32744 5000 3800 7500
02   020600003610370 17979063030028001107937020011094 RQMRWKRMP  02
03   020600003610370 300N 250 +250
04   020600003610370          100
21   020600003610370CT 5987 45956 193684 1937 2364 2211 1108
21   020600003610370CS 9551 73911 200597 1230 1275 1193  991
21   020600003610370HT 5768 59339 165349 1255 1352 1265 1140
```

Figure 4.4-31

```
21   02060000361037075 2055 16999  50417  370  408  382 1051
3    020600003610370               58
41   020600003610370R FLETCHER                                                  0
42   02060000361037018S6 OHIO PLACE
4    020600003610370COSTA MESA CALIF 92626                              5579335
4    020600003610370CE2472138103                                   Q85503  CA
45   020600003610370
3    02060000370037404247315S5   726MC   3500            00 35040 6000 408010000
     020600003700374 27581062030026001101365321011090 ROMJSJ6LW  02
03   020600003700374 400D 300 +080
04   020600003700374       018
     020600003700374CT 1874 26392 338548 2667 3683 3332  818
21   020600003700374CS 1597 19978 319119 2314 2767 2503  967
21   020600003700374HT 1408 16042 285769 2802 3784 3423 1001
     02060000370037475  427  5396  83678  674  868  785  940
     020600003700374               24
41   020600003700374BAKER RENTALS                                               1
     020600003700374BAKER ST
4    020600003700374COSTA MESA CALIF
44   020600003700374CE3327508996                                   19629L  CA
45   020600003700374
     02060000371037704257312S5   726MC   3500            00 35040 6000 408010000
02   020600003710377 27579663036048001101366521011094 ROMRVKGSW  02
03   020600003710377 400D 300 +080
     020600003710377       018
     020600003710377CT 2246 30542 348761 2418 3686 3448  782
21   020600003710377CS 1663 22403 317969 2175 2777 2597  959
     020600003710377HT 1718 237.. 292711 2632 3772 3529  944
     02060000371037775  450  6547  84637  629  868  812  913
31   020600003710377               211
41   020600003710377BAKER RENTALS                                               1
     020600003710377BAKER ST
     020600003710377COSTA MESA CALIF
44   020600003710377CE3322508996                                   19629L  CA
     020600003710377
     02060000374038704267316 47   726MC   3500            00 35040 6000 408010000
02   020600003740387 27576062030028001101367621011094 ROMJSJRMP  02
03   020600003740387 600D 300 +080
     020600003740387       010
21   020600003740387CT 1855 32... 335386 2232 2754 2579  803
21   020600003740387CS 1613 31... 341992 1683 2270 2125  868
     020600003740387HT  691 11577 31.053 2104 3272 3063  943
     02060000374038775  346  7026  88665  539  709  664  872
31   020600003740387               180
     020600003740387BAKER RENTALS                                               1
     020600003740387BAKER ST
43   020600003740387COSTA MESA CALIF
     020600003740387CE3327507996                                   19629L  CA
     020600003740387
41   02060000375039204277312S0   726MC   3500            00 35040 6000 408010000
02   020600003750392 27577C..03002800110136692101109S ROMRWKRMP  02
     020600003750392 600D 300 +080
     020600003750392       010
21   020600003750392CT 1346 17562 325357 2560 3574 3392  881
     020600003750392CS 1341 24616 323944 2127 2478 2351  937
```

Figure 4.4-32

```
21   020600003750392HT 1010 15484 304882 2653 3440 3264  950
 1   02060000375039275  333  5466  85075  632  797  756  929
31   0206000037503?2                      285
41   0206000037503?2BAKER RENTALS
 2   0206000037503?2BAKER ST                                                      1
 3   0206000037503?2COSTA MESA CALIF
44   020600003750392CE332Z508996                                    19629L  CA
 5   0206000037503?2
 1   020600003800379042573161S   67DODGE CAMPER SPECIAL  00 38320 5000 3714 7500
02   020600003800379 179760630300381001046096200110?6 ROMRWKRMP  02
03   020600003800379 625N 250 +130 625
 4   020600003800379        048
21   020600003800379CT 4546 36350 273420 1887 3183 3042  915
21   020600003800379CS 2606 30992 272539 2134 2798 2673 1044
 1   020600003800379HT 2219 32381 23?980 2109 2911 2782 1082
 1   02060000380037975  777  8677  69797  553  777  742 1024
31   020600003800379                     314
 1   020600003800379I MERRITT
 2   0206000038003791385 LEE AVE                                                   0
43   020600003800379LONG BEACH CALIF 90804                                  GE38853
44   02060000380037916286238                                        V93677  CA
 5   020600003800379
01   020600003810383042673104?   67DODGE CAMPER SPECIAL  00 38320 5000 3714 7500
02   020600003810383 17978064030078160104610920011096 ROMJSJGLW  02
 3   020600003810383 625N 250 +130 625
 4   020600003810383        048
21   020600003810383CT 3303 35816 242039 1912 2629 2528 1022
21   020600003810383CS 1960 34934 261621 1736 2166 2063 1066
 1   020600003810383HT 1??3 33630 225517 1651 2540 2433 1109
21   02060000381038375  602  9267  65899  482  632  608 1068
31   020600003810383                     283
 1   020600003810383I MERRITT
 2   0206000038103831385 LEE AVE                                                   0
43   020600003810383LONG BEACH CALIF 90804                                  GE38853
 4   02060000381038316286238                                        V93677 . CA.
 5   020600003810383
01   020600003900381042573194O   73DODGE SURVEYOR         00 41340 8500 744011000
02   020600003900381 51576063030038111100113735011096 ROMJSJGLW  02
 3   020600003900381 650N 290 +075
04   020600003900381        052
21   020600003900381CT 5231 58208 457725 3370 4970 4749  558
 1   020600003900381CS 295? 49711 382720 2835 3941 3766  731
 1   020600003900381HT 1597 40821 390702 3698 5840 5581  687
21   02060000390038175  816 13072 106966  852 1254 119?  676
 1   020600003900381                    119
 1   020600003900381R B SYSTEMS                                                     1
-2   0206000039003811501 S HARBOR
 3   020600003900381SANTA ANA CALIF                                          8395511
 4   020600003900381H39CN25600477.                                           CA
 5   020600003900381
 1   020600003910386042673145S   73DODGE SURVEYOR        00 41340 8500 744011000
     020600003910386 51577064030048111100114935011097 ROMJSJGLW  02
     020600003910386 650N 290 +075
 4   020600003910386        052
     020600003910386CT 2467 58133 433181 3845 5459 5289  593
```

Figure 4.4-33

```
 1   02060000391038 6CS 2582 43439 411120 3558 5048 4891  705
21   0206000039103 86HT 1217 31961 384382 4057 6211 6019  720
21   0206000039103 8675  578 11554 108865 1003 1458 1413  683
 1   0206000039103 86                            87
.1   0206000039103 86R B SYSTEMS                                                   1
42   0206000039103 86501 S HARBOR
 3   0206000039103 86SANTA ANA CALIF                                        8395611
 4   0206000039103 86H39CN2S600477                                            CA
45   0206000039103 86
^1   02060000394040104287316 15   73DODGE SURVEYOR          00 41340 8500 744011000
 2   0206000039404 01 51578063930058111100116735011094 ROMJSJGLW  02
03   0206000039404 01 650N 290 +050
04   0206000039404 01        015
 1   0206000039404 01CT 3779 66308 455395 3096 4821 4541  552
.1   0206000039404 01CS 2558 37996 421973 3076 4248 4001  703
21   0206000039404 01HT 1366 29773 412656 4557 6474 6098  681
 1   0206000039404 0175  663 11131 113614  934 1335 1257  660
 1   0206000039404 01                           225
41   0206000039404 01R B SYSTEMS                                                   1
'2   0206000039404 01501 S HARBOR
 3   0206000039404 01SANTA ANA CALIF                                        8395611
44   0206000039404 01H39CN2S600477                                            CA
45   0206000039404 01
 1   02060000395040304297314 05   73DODGE SURVEYOR          00 41340 8500 744011000
.2   0206000039504 03 51576069030008111100116735011090 ROMJSJGLW  02
03   0206000039504 03 650N 290 +050
 4   0206000039504 03        015
'1   0206000039504 03CT 4113 72706 433003 4076 6164 5555  535
21   0206000039504 03CS 2255 30761 434135 3544 4914 4428  702
^1   0206000039504 03HT 1109 32094 407866 4397 6404 5771  681
'1   0206000039504 0375  621 10761 115504 1050 1495 1347  654
31   0206000039504 03                            11
41   0206000039504 03R B SYSTEMS                                                   1
 2   0206000039504 03501 S HARBOR
 3   0206000039504 03SANTA ANA CALIF                                        8395611
44   0206000039504 03H39CN2S600477                                            CA
 5   0206000039504 03
 1   02060000400038004257317 00   72DODGE SURVEYOR          00 41340 8500 744011000
02   0206000040003 80 51576063030038101102467735011096 ROMRWKRMP  02
^3   0206000040003 80 600N 290 +220
 4   0206000040003 80        039
21   0206000040003 80CT 5952106372 507731 3374 7180 6861  455
21   0206000040003 80CS 4982 80558 600264 5640 9148 8742  457
 1   0206000040003 80HT 3332 36090 383367 3811 6810 6503  691
 1   0206000040003 8075 1259 19587 139937 1235 2149 2054  503
31   0206000040003 80                            99
 1   0206000040003 80R B SYSTEMS                                                   1
 2   0206000040003 80501 S HARBOR
43   0206000040003 80SANTA ANA CALIF                                        8395611
'4   0206000040003 80H39CN2S542152                                     164FOD  CA
 5   0206000040003 80
41   02060000401038404267311 24   72DODGE SURVEYOR          00 41340 8500 744011000
02   0206000040103 84 51578064030048101102468035011096 ROMRWKRMP  02
 3   0206000040103 84 600N 290 +220
 4   0206000040103 84        039
```

Figure 4.4-34

```
-1   020600004010384CT 4064113925 437818 3573.5617 5404  501
 1   020600004010384CS 3120 74311 422118 3320 4301 4137  627
21   020600004010384HT 2480 43220 380433 3776 6561 6312  692
21   02060000401038475  838 19725 110297  935 1394 1341  611
 1   020600004010384                     115
 1   020600004010384R B SYSTEMS
42   020600004010384501 S HARBOR                                                   1
 3   020600004010384SANTA ANA CALIF
 4   020600004010384M39CN25542152                                      8395611
45   020600004010384                                             164FOD  CA
-1   02060000404039004277310l5   72DODGE SURVEYOR        00 41340 8500 744011000
 2   020600004040390 515760630300281011024705350l1096 RQMRWKRMP  02
03   020600004040390 650M 290 +050
04   020600004040390          010
 1   020600004040390CT 4855129519 470899 2913 4871 4655  458
21   020600004040390CS 2550 84216 445961 2697 3333 3185  586
21   020600004040390HT 2004 51663 449919 3960 6344 6063  587
 1   02060000404039075  771 22581 120654  828 1206 1152  555
 1   020600004040390                     101
41   020600004040390R B SYSTEMS
 ?   020600004040390501 S HARBOR                                                   1
 3   020600004040390SANTA ANA CALIF
44   020600004040390M39CN25542152                                      8395611
45   020600004040390                                             164FOD  CA
 1   0206000040503990428731450   72DODGE SURVEYOR        00 41340 8500 744011000
 2   020600004050399 515780630300581011004716350ll094 RQMJSJRQM  02
03   020600004050399 650N 290 +050
     020600004050399          010
     020600004050399CT 5126107165 380695 2300 4033 3799  558
21   020600004050399CS 2225109709 381936  996 2503 2357  613
2    020600004050399HT 1291 39961 386354 2018 3360 3165  697
     02060000405039975  689 23809 102114  418  820  773  621
31   020600004050390                     74
41   020600004050399R B SYSTEMS
     020600004050399501 S HARBOR                                                   1
     020600004050399SANTA ANA CALIF
44   020600004050399M39CN25542152                                      8395611
     020600004050399                                             164FOD  CA
     0206000041003850426731350   68DODGE CAMPER SPECIAL  00 31820 5000 4249 7500
02   020600004100385 179780640300481011046451200l1096 RQMJSJGLW  02
     020600004100385 425D 280 +000
     020600004100385          035
 1   020600004100385CT 9107 82115 352635 1244 1546 1487  618
21   020600004100385CS 6720104583 264700  610  608  643  764
     020600004100385HT 6694 70655 273448 1155 1350 1298  778
     02060000410038575 1927 24022  76293  240  280  270  732
 1   020600004100385                     132
     020600004100385CARL PARKER
     0206000041003858091 ELLIS AVE                                                 0
 3   020600004100385HUNTINGTON BEACH CALIF
     020600004100385128l814355
     020600004100385                                             91775A  CA
 1   020600004110391042773l035   68DODGE CAMPER SPECIAL  00 31820 5000 4249 7500
 2   020600004110391 1797606203002810ll046462200ll094 RQMRWKGSW  02
     020600004110391 425D 280 +000
```

Figure 4.4-35

```
020600004110391          035
020600004110391CT10391 84887 352297 1284 1621 1518  609
020600004110391CS 9323 85613 281327  947 1011  946  772
020600004110391HT 7126 72990 268486 1101 1357 1270  778
02060000411039175 2380 21829  78114  284  331  310  733
020600004110391                  126
020600004110391EARL PARKER                                                   0
0206000041103916091 ELLIS AVE
020600004110391HUNTINGTON BEACH CALIF
0206000041103911281814355                                     91775A  CA
020600004110391
02060000420039304277313 35   67INTERN1200             00 30424 4500 3704 7300
020600004200393 13176062030008000108132118011094 ROMRXKRQM  02
020600004200393 550N 290 +190
020600004200393          046
020600004200393CT 8082 46905 244665 1592 2255 2112  918
020600004200393CS 5346 52233 233992 1247 1369 1282 1033
020600004200393HT 3811 37559 206473 1464 1905 1784 1137
02060000420039375 1466 12509  60919  369  457  428 1032
020600004200393                  78
020600004200393C I STORTS                                                    0
020600004200393320 ADAMS
020600004200393FULLERTON CALIF                                   5266797
020600004200393713208866 79327                                V97911  CA
020600004200393
0206000042104660510731260   67INTERN1200             00 30420 4500 3704 7300
020600004210466 1318206 0360648000108166016011096 ROHJSJGLW  02
020600004210466 550N 290 +190
020600004210466          076
020600004210466CT 6859 40501 225218 1843 2157 2061 1016
020600004210466CS 3066 50341 232542 1510 1555 1485 1064
020600004210466HT 3507 33350 207221 1642 2005 1915 1166
02060000421046675 1151 11569  59567  432  463  462 1079
020600004210466                  65
020600004210466C I STORTS                                                    0
020600004210466320 ADAMS
020600004210466FULLERTON CALIF                                   5266797
020600004210466713208866879327                                V97911  CA
020600004210466
0206000043003950427731710   72INTERN1510             00 34524 6000 468514000
020600004300395 2757906030028001102051416011096 ROHRWKRMP  02
020600004300395 450N 220 +050
020600004300395          018
020600004300395CT 5773 29703 287556 2608 3696 3531  898
020600004300395CS 2561 15207 280715 2145 2535 2326 1078
020600004300395HT 1815 16332 256103 2931 3713 3738 1098
02060000430039575  910  5476  73378  662  834  797 1060
020600004300395                  142
020600004300395SUPPOSE-U-DRIVE                                               1
0206000043003952809 SAN FERNANDO RD
020600004300395GLENDALE CALIF                                  2132433151
02060000430039581450116213275                                 75240K  CA
020600004300395
0206000043104050420731645   72INTERN1510             00 34524 6000 468514000
020600004310405 2757606302998600110205251601 1094 ROHJSJGLW  02
```

Figure 4.4-36

```
03   020600004310405 450N 280 +050
04   020600004310405       018
21   020600004310405CT 3039 17908 342980 3283 4825 4549  829
21   020600004310405CS 2784 22341 310122 2279 2724 2568  971
21   020600004310405HT 1788 17513 263063 2986 4013 3783 1066
21   02060000431040575  681  5336  81006  719  945  891  961
31   020600004310405                37
41   020600004310405SUPPOSE-U-DRIVE                                             1
42   0206000043104053809 SAN FERNANDO RD
43   020600004310405GLENDALE CALIF                                      2132433151
44   020600004310405H14501H213275                                   75248K  CA
45   020600004310405
01   02060000434040604307313O5   72INTERN1510          00 34524 6000 468514000
02   020600004340406 2757606103002800110205361601l092 RQMJSJGLW  02
03   020600004340406 700N 280 +000
04   020600004340406       008
21   020600004340406CT 2211 23313 339508 2298 3235 2970  824
21   020600004340406CS 1907 19434 357103 2166 2399 2202  873
21   020600004340406HT 1410 14149 286674 2497 3197 2935 1008
21   02060000434040675  488  5003  88866  610  748  687  895
31   020600004340406                30
41   020600004340406SUPPOSE-U-DRIVE                                             1
42   0206000043404063809 SAN FERNANDO RD
43   020600004340406GLENDALE CALIF                                      2132433151
44   020600004340406H14501H213275                                   75248K  CA
45   020600004340406
01   02060000435041505017309З0   72INTERN1510          00 34524 6000 468514000
02   020600004350415 2757760303602180011070547160111035 ROHKWKRMP  02
03   020600004350415 700N 280 +000
04   020600004350415       008
21   020600004350415CT 5555 32710 318430 2239 3231 3059  815
21   020600004350415CS 1515 16994 335783 1961 2208 2090  936
21   020600004350415HT 1406 15700 303715 2685 3652 3457  949
21   02060000435041575  627  5334  86110  594  757  717  912
31   020600004350415                75
41   020600004350415SUPPOSE-U-DRIVE                                             1
42   0206000043504153809 SAN FERNANDO RD
43   020600004350415GLENDALE CALIF                                      2132433151
44   020600004350415H14501H213275                                   75248K  CA
45   020600004350415
01   02060000440039404277314 55   72FORD  CONDOR          00 39020 8500113001500O
02   020600004400394 5157606303000600110087117001l096 ROMRKKRQM  02
03   020600004400394 4750 370 +090
04   020600004400394       004
21   020600004400394CT 4117 78475 407887 4022 5895 5636  580
21   020600004400394CS 2578 19316 406474 4019 5880 5621  773
21   020600004400394HT 2958 22537 396796 3995 6423 6140  725
21   02060000440039475  605  6788 107283 1070 1610 1539  711
31   020600004400394               250
41   020600004400394NIAL ALFSON                                                 1
42   02060000440039410345 GARVEY
43   020600004400394EL MONTE CALIF                                      2138694168
44   020600004400394M50HVN93269                                              CA
45   020600004400394
01   02060000441040404297315 28   72FORD  CONDOR          00 39020 8500113001500O
```

Figure 4.4-37

```
'2    020600004410404 515780620299860011008723700110092 PQMJSJGLW  02
 3    020600004410404 4750 370 +090
04    020600004410404       004
 1    020600004410404CT 5561 20110 399578 2792 5013 4631  588
 1    020600004410404CS 2557 20540 420348 4304 6685 6176  746
 1    020600004410404HT 1660 23513 397356 4374 7403 6839  717
21    02060000441040475  685  9119 109160 1066 1741 1609  700
 1    020600004410404                 98
 1    020600004410404NIAL ALFSON                                                1
42    02060000441040410345 GARVEY
'3    020600004410404EL MONTE CALIF                                    2138694168
 4    020600004410404850HVN93269                                             CA
45    020600004410404
01    0206000044404080430731505   72FORD  CONDOR             00 39020 85001130015000
 2    020600004440408 515820640300280011008734700110094 RQMJSJRQM  02
 3    020600004440408 5500 300 +060
04    020600004440408       002
 1    020600004440408CT 3897 96853 424979 2688 4902 4585  536
 1    020600004440408CS 1758  9855 450340 4298 6441 6024  729
21    020600004440408HT 1281 18122 411665 4826 7105 6645  710
21    02060000444040875  555  8244 115713 1094 1680 1571  674
 1    020600004440408                147
41    020600004440408NIAL ALFSON                                                1
42    02060000444040810345 GARVEY
 3    020600004440408EL MONTE CALIF                                    2138694168
 4    020600004440408850HVN93269                                             CA
45    020600004440408
 1    0206000044504160501731120   72FORD  CONDOR             00 39020 85001130015000
 2    020600004450416 515790630307200011008745700110093 RQMRQKRMP  02
03    020600004450416 5500 300 +070
04    020600004450416       002
 1    020600004450416CT 2798 93260 428400 3244 4856 4532  541
21    020600004450416CS 1658 11157 592713 4179 6151 5741  559
21    020600004450416HT 1766 19631 413939 4753 7326 6838  701
 1    02060000445041675  516  8328 135043 1104 1655 1545  587
 1    020600004450416                440
41    020600004450416NIAL ALFSON                                                1
 2    02060000445041610345 GARVEY
 3    020600004450416EL MONTE CALIF                                    2138694168
44    020600004450416850HVN93269                                             CA
'5    020600004450416
 1    02060206450051004307231725   73DODGE GIROBRAGO INDIAN00 41340 85001000015000
02    020600004500410 515850650700160011005199700110093 RQMJSJJHP  02
03    020600004500410 4000 000 +100
 4    020600004500410       018
 1    020600004500410CT 4947 33932 484211 5713 8940 8306  566
21    020600004500410CS 7016 11656 412039 4442 73 6 6862  761
 1    020600004500410HT 3153 16161 393039 4135 9011 8372  737
 1    02060000450041075 1459  4050 112365 1234 2182 2027  705
31    020600004500410                257
41    020600004500410PCO-VEC RENTALS                                           1
 2    020600004500410555 W HUNTIN TON
43    020600004500410MONROVIA CALIF                                    2133583284
44    020600004500410332209230439                                    135HHN  CA
 5    020600004500410
```

Figure 4.4-38

```
 1   020600004510418050173124B   73DODGE WINNEBAGO INDIAN00 41340 85001000013000
 ʋ2  02060000451041B 515810630302180011005202700110092 ROMJSJRWK  02
 03  020600004510418 400N 000 +100
 4   020600004510418        018
 ·1  020600004510418CT 3453 39587 454092 4758 8519 7842  599
 21  020600004510418CS 5005 12118 416131 4752 7355 6770  762
 ⁻1  020600004510418HT 2605 12679 401968 4635 8853 8149  734
 ·1  02060000451041875 1063  4849 112068 1259 2142 1972  715
 31  020600004510418                 160
 41  020600004510418REC-VEC RENTALS                                                 1
 2   020600004510418635 W HUNTINGTON
 .3  020600004510418MONROVIA CALIF                                          2133583284
 44  0206000045104183322209230430                                        135HHN  CA
 ·5  020600004510418
 ·1  020600004540421050273110S   73DODGE WINNEBAGO INDIAN00 41340 85001000013000
 02  020600004540421 5157706403027600110052137001109? RO¹JSJRMP  02
 ¹3  020600004540421 700N 000 +050
 ·4  020600004540421        009
 ?1  020600004540421CT 2338 45482 478129 5328 7847 7580  567
 21  020600004540421CS 1598 18778 466548 4148 6643 6417  686
 ·1  020600004540421HT 1368 19003 412793 4533 7977 7706  706
 .1  02060000454042175  451  6556 120991 1203 1942 1876  663
 31  020600004540421                 154
 1   020600004540421REC-VEC RENTALS                                                 1
 2   020600004540421635 W HUNTINGTON
 43  020600004540421MONROVIA CALIF                                          2133583284
 ʼ4  0206000045404213322209230430                                        135HHN  CA
 5   020600004540421
 ʋ1  020600004550430050373130O   73DODGE WINNEBAGO INDIAN00 41340 85001000013000
 02  020600004550430 515790640301580011005225700110095 RONRWKRMP  02
 ·3  020600004550430 700N 000 +050
 ·4  020600004550430        009
 21  020600004550430CT 2948 50343 502672 4272 7038 6712  534
 ·1  020600004550430CS 1815 20022 475320 3921 6488 6188  669
 ·1  020600004550430HT 2581 19124 322548 2791 5726 5461  875
 21  02060000455043075  607  7116 116710  980 1704 1625  677
 31  020600004550430                 108
 1   020600004550430REC-VEC RENTALS                                                 1
 42  020600004550430635 W HUNTINGTON
 43  020600004550430MONROVIA CALIF                                          2133583284
 4   0206000045504303322209230430                                        135HHN  CA
 5   020600004550430
 01  020600004600419050173154S   66FORD  F350          00 35224 6000 43281000O
 ·2  020600004600419 2757606303023800010539822001109S RO¹JSJGLW  02
 ·3  020600004600419 600N 230 +040
 04  020600004600419        24
 ?1  020600004600419CT 7190 42107 359524 2944 4972 4739  704
 :1  020600004600419CS 4856 43464 356710 3221 4196 3999  781
 21  020600004600419HT 3348 28737 324770 3217 5214 4969  830
 21  02060000460041975 1314 10393  92857  843 1241 1183  776
 ·1  020600004600419                 122
 1   020600004600419RAY MCCOY                                                       0
 42  020600004600419523 E MARIPOSA DR
 3   020600004600419RIALTO CALIF                                            7148753821
 .4  020600004600419F35YR746731                                          T43197  CA
```

Figure 4.4-39

```
45   0206000046 00419
11   02060000461042305027312?0   66FORD  F350                 00 35224 6000 432810000
02   02060000461042? 27585067030278000105299320011097 ROMJSJRMP  02
03   0206000046104?3 600N 230 +040
04   02060000461042?          24
11   020600004610423CT 4511 39687 364279 3374 5175 5042  716
21   020600004610423CS 6207 41563 354274 3172 4203 4095  783
?1   020600004610423HT 2997 29225 315690 3227 4843 4719  851
?1   02060000461042375 1314 10038  92114  862 1225 1194  785
31   020600004610423                     198
41   020600004610423RAY MCCOY                                                          0
2    020600004610423523 E MARIPOSA DR
3    020600004610423RIALTO CALIF                                        7148753821
44   020600004610423F35YR746731                                    T43197  CA
5    020600004610423
1    020600004700425050273151?   67GMC   CUSTOM              00 35120 5000 3823 7500
02   020600004700425 1?283067030?18100100125720011099 ROMJSJRMP  02
?3   020600004700425 4500 310 +210
4    020600004700425          060
?1   020600004700425CT 5280 4031? 244230 2207 2874 2844  973
21   020600004700425CS 2815 59118 244085 1569 1724 1707  994
1    020600004700425HT 1917 37467 220962 2334 2846 2817 1104
?1   02060000470042575  824 13041  63340  513  611  605 1017
31   020600004700425                     105
1    020600004700425JERRY WIENCER
2    02060000470042510872 HOLLY DR                                                     0
43   020600004700425GARDEN GROVE CALIF                                   7145375070
?4   020600004700425C?25?00RC6604                                      83097H  CA
5    020600004700425
01   0206000047104370504731220   67GMC   CUSTOM              00 35120 5000 3823 7500
02   020600004710437 1798156?03009810010012?820011094 ROMJSJGLW  02
3    020600004710437 4500 310 +210
?    020600004710437          060
21   020600004710437CT 4102 47632 260846 1931 2802 2628  926
1    020600004710437CS 2761 6045? 233085 1517 1779 1669 1021
1    020600004710437HT 2214 4000? 220017 1822 1994 1870 1069
21   02060000471043775  772 13550  62765  451  549  515 1017
?1   020600004710437                     88
1    020600004710437JERRY WIENCER
?2   02060000471043710872 HOLLY DR                                                     0
43   020600004710437GARDEN GROVE CALIF                                   7145375070
?    020600004710437C?25900RC6604                                      63097H  CA
5    020600004710437
01   0206000048004220502731150   66GMC   TRUCK               00 36520 5000 3810 7500
?    020600004800422 175?5067030?76000101?21220011097 RO?RVKGSW  02
3    020600004800422 6500 270 +100
04   020600004800422          060
?1   020600004800422CT 3242 4017? 261602  657  851  829  942
?    020600004800422CS 2485 589?0 227691  239  386  376 1048
21   020600004800422HT 2136 4251? 211050 1710 2267 2209 1109
?1   02060000480042275  680 13392  61397  213  273  266 1040
?    020600004800422                     596
?    020600004800422ANDY ANDERSON
?2   0206000048004222000 E 1ST                                                         0
?    020600004800422SANTA ANA CALIF                                          5581000
```

Figure 4.4-40

```
44   0206000048004?215027F12355R                                        U58257  CA
45   02060000480042?
01   02060000481042905037311O0     66GMC    TRUCK              00 36520 5000 3810 7500
02   020600004810429 1797906503014600010857232O011097 ROMRWKRMP  02
03   020600004810429 6500 270 +180
04   020600004810429          060
21   020600004810429CT 2729 51518 263763 1888 2477 2414  893
21   020600004810429CS 1679 62839 236414 1155 1354 1320 1010
21   020600004810429HT 1541 45090 217347 1479 2061 2009 1077
21   02060000481042975  497 14759  63163  375  479  467 1000
31   020600004810429                  91
41   020600004810429ANDY ANDERSON                                                  0
42   0206000048104292000 E 1ST
43   020600004810429SANTA ANA CALIF                                        5581000
44   020600004810429150Z7F12355?                                      U58257  CA
45   020600004810429
01   02060000490042?0503731023   65FORD  STAKE BED         00 35224 5000 3670 7500
02   020600004900428 17978063030144810010287151951109? ROMJSJGLW  02
03   020600004900428 600N 340 +020
04   020600004900428          046
21   020600004900428CT 5884 40735 259516 1741 2079 1956  923
21   020600004900428CS 4855 54647 269410 1708 1826 1718  928
21   020600004900428HT 3215 33971 228930 1482 1989 1871 1079
21   02060000490042875 1229 12203  68169  440  514  483  964
31   020600004900428                 72
41   020600004900428EMERALD BAY COMMUNITY ASSN                                     0
42   020600004900428600 EMERALD BAY
43   020600004900428LAGUNA BEACH CALIF
44   020600004900428F250F612096                                       255052  CA
45   020600004900428
01   020600004910436050473105O   65FORD  STAKE BED         00 35224 5000 3670 7500
02   020600004910436 179330640300981001028725195110?3 ROMJSJGLW  02
03   020600004910436 600N 340 +020
04   020600004910436          046
21   020600004910436CT 6122 41692 247144 1676 1966 1824  951
21   020600004910436CS 4500 55623 285477 1697 1788 1659  888
21   020600004910436HT 3512 35839 220823 1634 1896 1760 1089
21   02060000491043675 1218 12607  69016  447  495  460  949
31   020600004910436                 35
41   020600004910436EMERALD BAY COMMUNITY ASSN                                     0
42   020600004910436600 EMERALD BAY
43   020600004910436LAGUNA BEACH CALIF
44   020600004910436F250F612096                                       255052  CA
45   020600004910436
01   020600005000420050273101?   72CHEVROC20               00 35040 5000 4068 7500
02   020600005000420 1797706?0302781011035911200110?7 ROMRWKGSW  02
03   020600005000420 4500 230 +100
04   020600005000420          32
21   020600005000420CT 1170 13155 293083 1691 2384 2303  995
21   020600005000420CS  728  8341 287835 1440 1681 1624 1134
21   020600005000420HT 1073  8449 253443 1927 2737 2644 1169
21   02060000500042075  246  2509  74443  435  569  549 1111
31   020600005000420                 160
41   020600005000420MARY HOLMES                                                    0
42   0206000050004207792 PRINE DR
```

Figure 4.4-41

```
 3   020600005000420HUNTINGTON BEACH CALIF                         8476868
44   020600005000420CCE242/114326                                   CA
45   020600005000420
 1   020600005010431050373l450    72CHEVROC20               00 35040 5000 4068 7500
 2   020600005010431 179810640301381011035922200l1094 ROMRWKRMP  02
03   020600005010431 4500 230 +100
 4   020600005010431         32
 1   020600005010431CT 1581 17061 295513 1629 2301 2164  962
21   020600005010431CS  730  9153 290331 1361 1621 1525 1120
21   020600005010431HT  753  7483 251835 1890 2427 2282 1187
 1   02060000501043175  245  2767  74650  418  532  501 1100
31   020600005010431                 65
41   020600005010431MARY HOLMES                                                     0
 2   0206000050104317792 RHIDE DR
 3   020600005010431HUNTINGTON BEACH CALIF                         8476868
44   020600005010431CCE242/114326                                   CA
 5   020600005010431
 1   020600005040441050773l100    72CHEVROC20               00 35040 5000 4068 7500
02   020600005040441 179806302018810110354332001l093 ROMJSJGLW  02
03   020600005040441 6000 300 +090
 4   020600005040441         07
21   020600005040441CT 1538 19958 305654 1865 2309 2141  923
21   020600005040441CS  863 15229 300279 1504 1613 1456 1024
 1   020600005040441HT 1125 13435 264327 1957 2493 2311 1092
 1   02060000504044175  289  4196  78850  456  537  498 1018
31   020600005040441                 52
 1   020600005040441MARY HOLMES                                                     0
 2   0206000050404417792 RHIDE DR
43   020600005040441HUNTINGTON BEACH CALIF                         8476868
64   020600005040441CCE242/114326                                   CA
 5   020600005040441
01   020600005050445050731037    72CHEVROC20               00 35040 5000 4068 7500
02   020600005050445 179770640301461511035942200l1096 ROMRGKKBM  02
 3   020600005050445 6000 400 +040
 4   020600005050445         07
21   020600005050445CT 1648 23421 301622 1852 2268 2196  919
21   020600005050445CS  980 15522 325584 1759 1097 1021  976
21   020600005050445HT  746 11349 269464 2105 2593 2489 1090
21   02060000505044575  277  1288  81076  501  581  553  992
31   020600005050445                141
 1   020600005050445MARY HOLMES                                                     0
 2   0206000050504457792 RHIDE DR
43   020600005050445HUNTINGTON BEACH CALIF                         8476868
 4   020600005050445CCE242/114326                                   CA
 5   020600005050445
```

Figure 4.4-42

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO. APTD 1572	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE A Study of Baseline Emissions on 6000-14,000 Pound Gross Vehicle Weight Trucks		5. REPORT DATE June 1973
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO 2060
9. PERFORMING ORGANIZATION NAME AND ADDRESS Automotive Environmental Systems, Inc. 7300 Bolsa Avenue Westminster, California 92683		10 PROGRAM ELEMENT NO.
		11 CONTRACT/GRANT NO 68-01-0468
12. SPONSORING AGENCY NAME AND ADDRESS EPA - ECTD Procedures Development Branch 2565 Plymouth Rd. Ann Arbor, Michigan 48105		13. TYPE OF REPORT AND PERIOD COVERED Final Dec. 15'72-May 15 '73
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Report gives results of EPA-sponsored study in Los Angeles area to determine two objectives: (1) the contribution of 3- to 7-ton GVW vehicles to air pollution, and (2) the feasibility of using light-duty vehicle emission test procedures in future surveillance and compliance programs for 3- to 7-ton GVW vehicles.

Mean baseline emission levels for the 50 vehicles tested were: HC, 6.87 g/m; CO, 84.83 g/mi; CO_2, 746.1 g/mi; NO_x, 7.37 g/mi; and evaporative HC emissions, 2.43 g/mi.

Light-duty vehicle test procedures appeared to be feasible for medium-duty vehicles as no difficulty in performing the tests was encountered. Although some simple and inexpensive modifications were made to the test equipment to accomodate vehicles in the 5- to 7-ton GVW class, no changes were required in equipment or procedures for vehicles in the 3- to 5-ton GVW class except for dynamometer road-load horsepower settings. The test procedure used was the 1975 Federal Test Procedure.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Truck Emissions 6000-14,000 Pounds GVW		

18. DISTRIBUTION STATEMENT Release Unlimited	19. SECURITY CLASS *(This Report)* UNCLASSIFIED	21 NO OF PAGES 156
	20 SECURITY CLASS *(This page)* UNCLASSIFIED	22. PRICE

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